

# The Economist

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Chiplomacy and supply chains

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Markets and the end of free money

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Flying taxis race to the sky

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TQ: The future of defence technology

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JANUARY 29TH–FEBRUARY 4TH 2022

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# Russia's roulette

The stakes in Ukraine

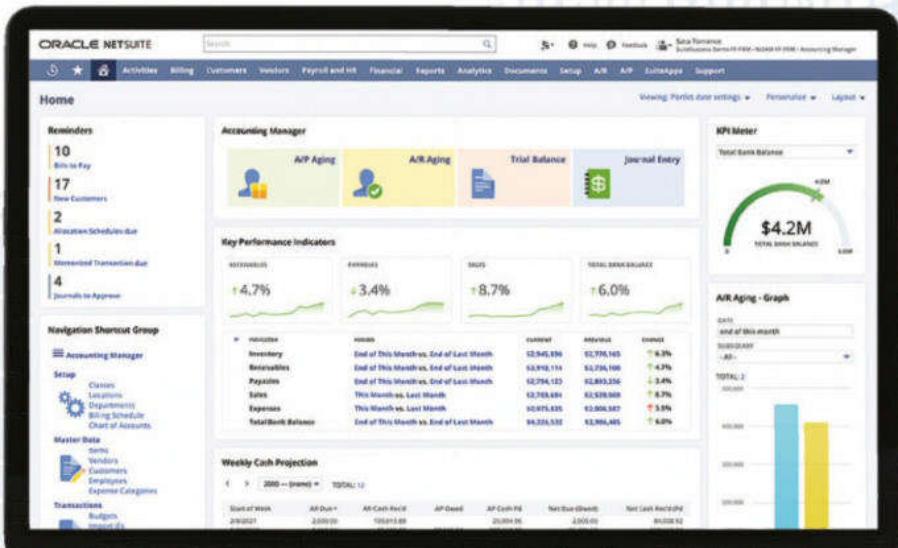


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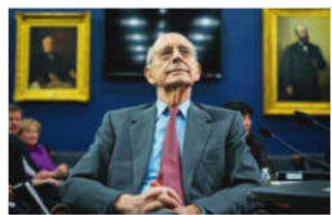
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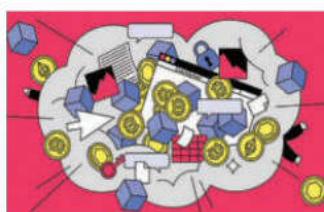
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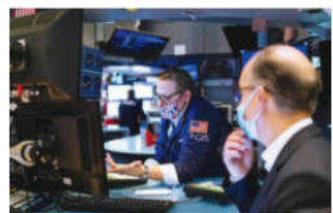
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 to take part in 'a severe contest between  
 intelligence, which presses forward,  
 and an unworthy, timid ignorance  
 obstructing our progress.'

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**Russia** moved yet more troops close to its border with **Ukraine**. Vladimir Putin's party claimed, without evidence, that Ukraine's government was planning to attack Russian-speakers in eastern Ukraine, and appealed for Mr Putin to lend them military assistance.

Western diplomats warned Russia of severe consequences if it **invades** Ukraine. High-level diplomatic talks yielded no progress in defusing tensions, and America and some other countries told embassy staff to leave Ukraine. America and Britain sent more defensive equipment to help Ukraine defend itself against a possible attack. NATO beefed up its defences of member states in Russia's shadow. America promised to help Europe secure more gas, in case Mr Putin decides to restrict supplies.

An electoral college consisting of 1,009 MPs, senators and representatives of regional bodies set about choosing **Italy's** next president. The process, which consists of a series of secret ballots held once a day, could go on for some time. Though the president's role is partly ceremonial, the post carries the responsibility of dissolving parliament and appointing new governments.

Stephen Breyer, one of three liberal justices on **America's Supreme Court**, will retire at the end of the court's current term. President Joe Biden will nominate his successor, thereby maintaining the court's current 6-3 split between conservatives and liberals. Progressives had pressed

Justice Breyer, aged 83, to step down to ensure his replacement by a Democrat-controlled Senate. Mr Biden has promised to nominate a black woman for the vacancy.

**Britain's** wait for the results of an inquiry into parties held at the prime minister's office and residence during covid-19 lockdowns dragged on. Police are also investigating whether those events broke the law. It emerged that another bash took place in Downing Street, this time for Boris Johnson's birthday. Some Conservative MPs have submitted letters of no confidence in Mr Johnson, though not yet enough to trigger a leadership ballot.

Carrie Lam, **Hong Kong's** chief executive, defended a decision to cull nearly 2,000 pet hamsters after several in a pet shop tested positive for covid-19. Meanwhile members of the territory's European chamber of commerce have speculated that the city may not reopen to outsiders until early 2024, according to a report seen by Reuters.

### Citius, altius, coronavirus

Xi Jinping, China's president, met Thomas Bach, the president of the International Olympic Committee, in a rare face-to-face meeting to discuss how to maintain coronavirus prevention policies during the forthcoming **Winter Olympics**. The games, which start in Beijing on February 4th, are testing China's strict zero-covid policy, which is already coming under strain from the Omicron variant.

**Thailand** became the first Asian country to decriminalise marijuana. The health minister said on January 25th that the government would drop the plant from its list of controlled drugs, allowing people to grow it at home.

**Pakistan** appointed Justice Ayesha Malik to the Supreme Court, the first time a woman has ascended to that position. Her appointment is note-

worthy in a country where only 17% of judges are women, and only 4.4% of those in higher courts.

Lourdes Maldonado, a journalist, was **shot dead** in Tijuana. The motive was unclear. She was the third reporter to be killed in Mexico this year. Most such murders go unsolved and unpunished. Mexico's drug gangs, which dislike investigative scrutiny, pull strings in many local governments.

After repeated denials, the **Cuban** regime finally acknowledged that it is holding mass trials of 700 protesters, including some as young as 16. People who took part in protests last year against the communist regime have been given unusually harsh sentences. Several activists were also arrested ahead of a demonstration in support of political prisoners.

**Guatemala's** highest court ruled that five former paramilitary soldiers were guilty of raping 36 indigenous women during the civil war. The attacks took place in the 1980s.

At least two people were killed in **Haiti**, after a 5.3-magnitude earthquake hit the south-west part of the country. The country has suffered a string of natural disasters. In August an earthquake killed more than 2,000 people.

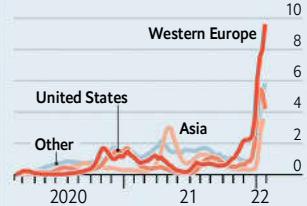
Army officers seized power in **Burkina Faso**, dissolving the government, suspending the constitution and deposing the president, Roch Kaboré. Lieutenant-Colonel Paul-Henri Sandaogo Damiba took his place. The coup threatens to undermine efforts to fight jihadists in the Sahel. Recent military takeovers in neighbouring Mali, which were supposed to restore order, failed to do so.

Lazarus Chakwera, the president of **Malawi**, dissolved his cabinet after three ministers were accused of corruption. The shakeup came after Mr Chakwera was accused by

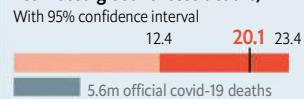
### Coronavirus data

To 6am GMT January 27th 2022

#### Weekly confirmed cases by area, m



#### Estimated global excess deaths, m



#### Vaccine doses given per 100 people

By country-income group



Sources: Johns Hopkins University CSSE; Our World in Data; UN; World Bank; The Economist's excess-deaths model

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church leaders of failing to honour his campaign pledge to fight graft.

Eight people were killed and 50 injured in a crush outside a football stadium in **Cameroon** ahead of a football match between the host and the Comoros in the Africa Cup of Nations.

The Syrian Democratic Forces, a Kurdish-led militia, regained control of a prison in north-eastern **Syria** that had been seized by Islamic State. The jihadist group freed hundreds of inmates, some of whom are still on the loose. Dozens of people were killed in the fighting.

An air strike that hit a detention centre in **Yemen** killed more than 80 people. The attack was carried out by the Saudi-led coalition fighting the Houthi rebels in Yemen. The Houthis responded by launching missiles and drones at the United Arab Emirates, which is a member of the coalition.



The world's **stockmarkets** continued to slide this week, as investors prepared for tighter monetary policy. By January 26th the S&P 500 index had dropped by 9% since the start of the year. Share prices elsewhere have been falling too. The NASDAQ composite, a tech-heavy index, has dropped more sharply than the broader market. Higher interest rates would lower the value that investors place on the future profits of speculative firms.

America's **Federal Reserve** signalled that it will indeed raise interest rates in March to try to bring inflation under control. That will be the first increase since 2018. The Fed also signalled that it will wind down its bond-buying programme, which was expanded during the pandemic.

**Cryptocurrencies** have also experienced a sell-off recently, partly caused by growing scrutiny from regulators. Bitcoin sank to a six-month low this week. It has lost roughly half its value since November. The price of smaller currencies, such as ethereum and litecoin, also fell.

**Microsoft** said that its fourth-quarter sales grew to a record \$51.7bn, up 20% from the same period last year. Net income rose to \$18.8bn. The results were fuelled by its gaming and Windows software units. But even though they beat analysts' forecasts, the firm's share price fell after the announcement. It later recovered when the firm published rosy forecasts for its cloud division.

**Boeing** reported a loss of \$4.3bn for 2021, its third annual loss in a row. That is partly

because of a charge of \$3.5bn it had to pay to compensate customers for the delays in delivering its 787 Dreamliner. Factory defects and regulatory problems have slowed production.

Results were also gloomy for **Cathay Pacific**, Hong Kong's flag-carrier. It said it expects losses to reach up to HK\$6.1bn (\$783m) in 2021. Although that is an improvement on its HK\$21.6bn loss in 2020, the firm continues to suffer under the territory's severe border restrictions.

### Feeling the heat

As part of a firm-wide restructuring plan **Unilever**, a consumer-goods giant, said that it will axe about 1,500 management jobs. Pressure to improve performance has been increased of late by Trian, an activist hedge fund which has built a stake in the company, and by the firm's failed bid to buy the consumer-health business of GlaxoSmithKline, a British drugmaker.

**Tesla** reported record net profits of \$2.3bn in the fourth quarter of 2021. But Elon Musk, the electric-car maker's boss, warned that supply-chain woes, such as the shortage of

semiconductors, would probably weigh on the firm's results during 2022. He noted that Tesla's factories have been running below capacity for several quarters.

**Samsung**, a big South Korean chipmaker, reported its best-ever quarter. Net profit rose to 10.8trn won (\$9bn), up 64% compared with the same period last year. The results of **Intel**, another big chipmaker, were less impressive. Fourth-quarter revenues edged up to \$20.5bn, but net income fell by 21%. Both firms plan to increase investment this year to meet surging chip demand.

After resolving a row with Mongolia's government **Rio Tinto**, the Anglo-Australian miner, said it will push ahead with the expansion of a large copper mine in the country. Wrangling over costs had put the project on hold. A few days earlier Serbia's government revoked Rio's licence to build a new lithium mine in the country, following protests by environmentalists.

In **Japan** the inflation rate rose in December to its fastest pace since the start of the pandemic. Core inflation, which excludes the cost of fresh food, increased by 0.5% compared

with the same month a year earlier. The rise was mostly down to higher energy prices.

**South Korea's** economy grew by 4% in 2021, the fastest pace of expansion in 11 years. It was helped by a jump in exports and construction activity, which offset a slow recovery in the covid-hit service sectors.

The IMF predicted that the **world economy** will grow by 4.4% this year. That is a downward revision from its projection in October of 4.9%. It is also a slowdown from last year's growth rate of 5.9%. The forecast reflects a downgrade in expected growth in America, because of supply-chain woes and monetary tightening, and in China, because of a covid resurgence and financial stress in the property market.

### Buying the dip

The IMF also urged **El Salvador** to reverse its decision to make bitcoin legal tender. Last year the country allowed consumers to use the cryptocurrency in any transactions, in a plan spearheaded by Nayib Bukele, the country's 40-year-old president. Mr Bukele responded to the suggestion by posting a GIF on Twitter depicting the IMF as Homer Simpson.



# Russia's roulette

A war in Ukraine would have terrible consequences, especially for Russia

**S**ELDOM IN THE field of human conflict did so much hang on the whims of one man. Is Vladimir Putin about to invade Ukraine, as the massing Russian troops on its borders suggest? Or is he bluffing, to extort concessions from his neighbour and the West? No one can be sure of Mr Putin's intentions. Even his own foreign minister seems to be kept guessing. But, if fighting is about to break out, the world needs to understand the stakes.

Perhaps Mr Putin is planning a full-scale invasion, with Russian forces thrusting deep into Ukraine to seize the capital, Kyiv, and overthrow the government. Or he may seek to annex more territory in eastern Ukraine, carving out a corridor linking Russia with Crimea, the Ukrainian peninsula Mr Putin grabbed in 2014. Then again, he may want a small war, in which Russia "saves" Kremlin-backed separatists in Donbas, an eastern region of Ukraine, from supposed Ukrainian atrocities—and, at the same time, degrades Ukraine's armed forces (see Briefing).

Because Mr Putin has the initiative, it is easy to conclude he has the advantage. In fact he faces perilous choices. A big war entails extraordinary risks. But a smaller war that limits these risks may fail to halt Ukraine's Westward drift. And if a small war does not bring the capitulation of the government in Kyiv, Mr Putin may ineluctably be drawn into a larger one.

A full Russian invasion would be Europe's biggest war since the 1940s, and the first toppling since then of a democratically elected European government by a foreign invader. Russians would not only suffer casualties, especially during a long-running insurgency, but also cause the death of untold Ukrainians—fellow Slavs, with whom many have family ties.

Russia would also suffer heavy sanctions. Its banks would be harshly penalised and its economy deprived of crucial American high-tech components. The ultra-rich, including possibly Mr Putin himself, might be prevented from spending and saving abroad. Ordinary Russians would suffer from lower living standards, which have already been falling over the past seven years.

And the subjugation of Ukraine would come at a strategic cost to Russia. Every country in its shadow would revise its security calculations. NATO would reinforce the defences of its eastern members. Sweden and Finland might join the alliance.

For Mr Putin, the economic consequences of war would be survivable, at least in the short term. His central bank has \$600bn in reserves—more than enough to weather sanctions. But the political gains in Ukraine could easily be overwhelmed by setbacks at home which, as Mr Putin knows better than anyone, is where his fate will ultimately be determined.

Perhaps, then, he will start with a less ambitious invasion. However, a limited war could claim many lives and be hard to contain. Sanctions might be lighter, but they would still be painful. Russia's decoupling from the West would still accelerate. Moreover, if the government in Kyiv remained independent, it would only redouble its efforts to join the West. Mr Putin's thuggery over the past eight years means that even Russian-speakers in eastern Ukraine no longer hanker for closer ties with Moscow.

The coming weeks will determine how Mr Putin chooses, and nobody should doubt the stakes. Europe faces the prospect of Russia throttling the flow of piped gas. Even in the absence of a cut-off, it was expected to spend \$1trn on energy in 2022, twice as much as in 2019 (see Europe section). War would affect the prices of other commodities, too. Oil is already spiking. Russia is the world's largest exporter of wheat, with Ukraine close behind. Russia is a big source of metals: in today's tight markets even a small shock could send commodity prices upwards (see Finance & economics section).

A successful invasion of Ukraine would also set a destabilising political precedent. The global order has long been buttressed by the norm that countries do not redraw other countries' borders by force of arms. When Iraq seized Kuwait in 1990 an international coalition led by America kicked it out. Mr Putin, who has a nuclear arsenal at his command, has already got away with annexing Crimea; if he seizes a bigger slice of Ukraine, it is hard to see him suddenly concluding that the time has come to make peace with NATO.

More likely, he would push on, helped by the newly established presence of Russian troops in Belarus to probe NATO's collective-security pact, under which an attack on one member is an attack on all. Not only would he relish the chance to hollow out America's commitments to Europe, but he has also come to rely on demonising an enemy abroad to justify his harsh rule at home.

Other potential aggressors would take note, too. The likelihood of China invading Taiwan would surely rise. The regimes in Iran and Syria would conclude they are freer to use violence with impunity. If that is right, more of the world's disputed borders would be fought over.

With so much at risk, the West should respond in three ways: deter, keep talking and prepare. To deter Mr Putin, Western powers—especially Germany—should stop equivocating, present a united front and make clear that they are willing to pay the price for imposing sanctions on Russia and also to support those Ukrainians who are ready to resist an occupying army. Meanwhile, diplomats should keep talking, looking for common ground on, say, arms control and pressing for a face-saving climbdown that Mr Putin and his captive media would be free to spin however they wish. And Europe should prepare for the next crisis by making clear that its energy transition will cut its dependence on Russian gas by using storage, diversification and nuclear power.

Seldom has the difference between a country's interests and those of its leader been so stark. Russia would benefit from better, closer, peaceful relations with the West. Such ties would be available if Mr Putin didn't behave so abominably. Only he benefits from discord, since he can tell Russians they are under siege and need a strongman to defend them. But even the wiliest strongman can miscalculate. Invading Ukraine could ultimately prove Mr Putin's undoing, if it turns into a bloody quagmire or makes Russians poorer, angrier and more eager for change. Even if just for his own sake, he should claim a victory over the imaginary threat Russia confronts in Ukraine—and back down. ■



## Financial markets

# A turning point

**The era of free money is coming to an end. That means financial volatility and economic uncertainty**

After the interest-rate cuts and hectic central-bank bond-buying of early 2020, investors came to believe that central-bank stimulus would pretty much last for ever. Today, however, as investors come to terms with the end of the era of free money, financial markets are in spasms. Markets now expect interest rates to increase four times in 2022 as the Fed fights the inflation that has lifted growth in the consumer-price index to 7%, a level barely imaginable a year ago. On January 26th the Fed confirmed that it would end its bond-buying programme (see Free exchange) and signalled that it would probably raise rates soon.

This hawkish shift is the most important among many to have taken place in the world's central banks in recent months. But it has only recently begun to bite in asset markets. After reaching a vertiginous high of nearly 40 times earnings at the turn of the year, the S&P 500 index of stocks has fallen by 9% in January (markets in Europe and Asia have fallen too, though by less). Markets' intraday volatility has been just as striking (see Finance & economics section), reflecting investors' struggle to digest the consequences of tighter money.

One is the repricing of long-dated assets. As interest rates collapsed during the pandemic, the value of securities with pay-offs stretching far into the future soared. Shares of technology firms like Zoom and Netflix, already sent higher by the switch to remote work and at-home entertainment, looked even more desirable as the return on bonds all but vanished. Their rise propelled the American stockmarket. Lately, however, long-term real interest rates have surged in anticipation of monetary tightening, causing a reversal of fortune. The turnaround has been dramatic for the most speculative stocks and novel instruments such as cryptocurrencies.

The effect of higher rates on the real economy is slower-burning and harder to anticipate. Ultra-cheap money let companies raise vast amounts of capital in 2021, a boom that will not be re-

peated. Homebuyers have assumed big mortgages as house prices have soared. Distressed firms have taken advantage of government-backed loans. Government debt-to-GDP ratios have ballooned, because of large, sustained deficits in the rich world and a collapse in growth in many emerging economies.

High indebtedness makes the world economy more sensitive to changes in monetary policy. Central banks must raise rates enough to quell inflation but not so much that they tip economies into recession as interest burdens rise. Households have stronger balance-sheets than you might expect given the depth of the recent recession, but their health depends in part on asset prices staying high. And if tighter money at the Fed causes turmoil in emerging markets, the consequences could rebound on America's economy.

As they aim for a narrow landing strip, central banks also face high winds, because of the risk of war in Ukraine and uncertainties associated with the pandemic. Economists are struggling to forecast how many people who left the workforce in 2020 will eventually return—and the more that do, the less the chance that a damaging wage-price spiral will take hold.

They are also grappling with doubts over when consumers will shift their spending back to services, easing the upward pressure on goods prices caused by bunged-up supply chains. Economic data have become harder to interpret. If retail sales fall, for example, does it reflect economic weakening, or a welcome return to normal patterns of consumption?

The uncertainty about the global economy's strength and its ability to withstand higher rates, combined with central banks' twitchy trigger-fingers as they worry about inflation, means that markets are entering a new phase. During much of the pandemic, cheap money drove asset prices to astonishing highs even as the world economy was in the dumps. Today they are tightly bound to its fate. ■



## Myanmar Out of mind

**One year on from the coup, the country is at risk of being forgotten**

In the decade when its generals allowed it some semblance of democracy, Myanmar flourished. The government brokered a landmark ceasefire agreement with half of the country's many rebel groups. Poverty rates plummeted and foreign investment surged. The economy grew annually by an average of 6.6%. A middle class emerged.

In just one short year, the generals have undone the gains of the past decade (see Asia section). Employment has fallen. Dollar-a-day poverty has more than doubled, engulfing nearly half the population. In cities it has tripled. The currency has plunged by 60% in the past five months. The economy is 30% smaller

than was forecast before the coup and the pandemic. Electricity blackouts are widespread. Schools are, in effect, shut.

Foreign investors are heading for the exit, too. TotalEnergies, a French energy giant that had few qualms about dealing with previous juntas, announced its departure in January. Chevron, an American oil major, and this week Woodside Petroleum, from Australia, have followed suit. Adani Ports, part of a huge Indian firm, is shipping out. Ant Group, a Chinese company, recently pulled out of a deal to buy a stake in a local fintech company.

Worse still, the army is using force to suppress widespread resistance to its rule. General Min Aung Hlaing, the head of the

► armed forces and leader of the junta, has launched a campaign of mass bloodletting. Soldiers have razed entire towns and massacred civilians. The UN says the army's attacks against civilians are crimes against humanity. Some ordinary Burmese have taken up arms, unleashing violence across the country. About 400,000 people have fled their homes.

Yet the world is forgetting about Myanmar. The West is distracted by domestic squabbles, an increasingly bellicose China and the prospect of a new war in Europe (see previous leader). India and China, Myanmar's biggest neighbours, are loth to get involved. The ten-country Association of South-East Asian Nations (ASEAN) is divided over how to handle its most troublesome member. Its strongest response so far has been to ban General Min Aung Hlaing from its summits—a big step by its standards, but a negligible one when set against what is needed.

By remaining silent, Myanmar's neighbours do themselves no favours. Tens of thousands of refugees are pouring into Thailand and India. Violence and drugs are spilling over borders, too. Methamphetamine is flooding South-East Asia as drug cartels take advantage of the chaos to raise production. Resistance fighters angry at what they perceive as China's support for the junta are attacking Chinese investments, including a nickel plant and pipelines that carry oil and gas from the Bay of Bengal.

Even if Western countries are reluctant to get involved, they can help bring the junta to the negotiating table. On January 26th America warned businesses of "significant reputational, finan-

cial and legal risks" of working in Myanmar. America and Europe have placed sanctions on generals, the companies they control and some state enterprises. They should also target the state agency that collects revenues from oil and gas companies—an industry that is the regime's biggest source of foreign currency. Firms with links to the junta should divest.

Such measures are only the start. Previous juntas brushed off Western pressure. Myanmar's Asian neighbours have more influence. But India is worried about ceding the advantage to China, so it continues to sell weapons to the junta and remains officially closed to refugees. China, the country with most sway over the generals, is unhappy. It is thought to be quietly pressing them to release Aung San Suu Kyi, the democracy activist who led the government that the generals toppled. Deposed MPs from her party have formed a shadow government and are co-ordinating resistance to the junta. China has already asked this rival government to restrain the rebels attacking Chinese investments. It would be wise to hedge its bets still more.

ASEAN, too, should be braver, by suspending Myanmar's membership. The junta is in a precarious position. Its troops are stretched thin. Despite a year of fighting, it has not crushed the resistance. Dissent is growing in the ranks. ASEAN and China claim to cherish stability, yet they are propping up a junta whose efforts to cling to power are unsettling the region. If doing what is right is not motive enough, Myanmar's neighbours should do what is in their interests, and strive for a return to democracy. ■

### Trustbusting

## All-consuming

**Competition policy should protect consumers, not anyone else. But it should do so more competently**

EVER SINCE its first antitrust law passed in 1890, America has argued over what trustbusting is for. One school, named after Louis Brandeis, a judge, holds that big companies must be tamed because they corrupt politics and damage customers, competitors and staff. The other says the goal of antitrust is to protect the welfare of consumers, which can be enhanced by big, efficient firms. For decades the consumer approach has been ascendant, but now the consensus has frayed and trustbusters are heading in a Brandeisan direction. This is a mistake. Competition policy needs reforms, to correct past failings and to adapt to the digital economy. Yet it should continue to be based on the principle that consumers are what count.

A shift towards more politicised and expansive antitrust is taking place across the rich world. President Joe Biden has appointed trustbusters, such as Lina Khan (pictured) at the Federal Trade Commission, who are exploring new responsibilities like protecting small firms or workers. Since the 1990s the EU has tended to put consumers' interests first, but now its commissioner wants to apply a "broader notion" of harm. Lawmakers everywhere are redrafting rules to constrain technology firms, even when their products are popular and free. On January 20th America's Senate Judiciary Committee approved, with bipartisan support, a bill that would ban tech giants from using their platforms to favour their own services.

The change is happening because competition policy has

fallen short. In America the consumer welfare standard is associated with rulings that make it difficult for trustbusters to win in court unless they can meet abstruse legal tests proving that a firm has raised or will raise prices. Competition authorities have lost cases they should have won, such as when Sprint and T-Mobile merged, taking the number of mobile networks down to three. The authorities became gun-shy about bringing cases. Between the 1990s and 2010s the average number of mergers investigated per year by the Department of Justice fell from 180 to 70, despite frantic industry consolidation. Sleepy trustbusters missed the rise of big tech.

The new expansive and strident approach is tempting, but it did not work well in the past. Standing up for consumers, who are diffuse, does not come naturally to politicians who tend to indulge vocal and concentrated interests, such as incumbent firms, lobbyists and unions.

Before the consumer welfare standard emerged in legal judgments in the 1970s and 1980s, America's trustbusting was capricious. In 1949 the government won a case against a grocery chain, A&P, whose low prices led a government lawyer to accuse it of being "a gigantic blood sucker, taking its toll from all levels of the food industry". In 1967 the Supreme Court ruled that firms that started a price war by shipping cheap pies into Utah had acted illegally. Europe shows how trustbusters can be clueless. What purpose was served in 2005, when the EU forced Microsoft to release a version of the Windows operating system? ■



▶ without a media player—even though it barely sold any copies?

Instead of aiming to protect everyone, opening the door to clumsy interventions, trustbusters should reform the consumer standard. Regulators and governments, especially in Europe, must be realistic about their ability to anticipate consumers' needs and should not pursue firms purely because they have grown big by being useful. The large and fluid tech ecosystems offered by Alphabet, Amazon, Apple and others show the complexity of the task: they are in an innovative phase with new services being created that are highly popular and they increasingly compete with each other. It would be easy to erode the quality of their products with ill-judged rules.

A key step is to identify market power using indicators that go beyond price. Abusive dominant firms typically exhibit per-

sistently high returns on capital, high market shares and face a lack of credible new entrants. In tech this points to particular services such as search and smartphone app stores, rather than an entire industry. For example, Amazon's e-commerce business is big but has mediocre returns and faces new competitors.

America has many conventional industries that flash red, including credit cards, airlines, telecoms and health care. Once dominant firms have been spotted, they should find it harder to win approval for mergers. They could, for instance, be obliged to show that acquisitions will promote consumer welfare. And defendants should have the benefit of the doubt less often in American antitrust cases of all kinds. The remedy for the failures of competition policy is not to abandon the consumer welfare standard but to bring it up to date. ■

### American drugs policy

## Oregon's trailblazing

### Psychedelic therapy shows great promise. More states should legalise it

**P**ICTURE YOURSELF in a boat on a river, with tangerine trees, marmalade skies—and licensed professionals who may finally be able to help you overcome your treatment-resistant depression. The first half of that sentence reflects the Beatles-era view of psychedelic drugs. The second is a new policy being pioneered in Oregon, which could herald a welcome shift in America more broadly.

The view in the 1960s was that psychedelic drugs put users into an indolent, blissed-out state that encouraged them, in the words of an early booster, the one-time Harvard psychologist, Timothy Leary, to “turn on, tune in, drop out”. Unfortunately, the moral panic that this stirred up in the United States shut down research into the therapeutic possibilities of psychedelics and led the federal government to declare that they have “a high potential for abuse and serve no legitimate medical purpose”.

That assessment was wrong, and the era of American moral panic over the drugs appears at last to be waning. Early next year, following the passage of a ballot measure in 2020 and under conditions currently being carefully worked out, Oregonians will be able to avail themselves of therapy using psilocybin, the psychoactive compound in “magic mushrooms” (see United States section). Several other states, including conservative ones such as Texas, have approved medical research into psychedelics. America’s drugs regulator may approve MDMA, better known as Ecstasy, for treating post-traumatic stress disorder as early as next year, and has hailed psilocybin as a “breakthrough therapy” in treating severe depression. The European Medicines Agency is conducting large-scale trials of psilocybin to treat otherwise intractable depression.

This new spirit of openness is inspired by the drugs’ promise in the treatment of various maladies of the mind. Studies testifying to their benefits are admittedly small, but they are growing in number. What is more, the results are striking.

The conditions that psychedelics seem to ameliorate include depression, addiction and post-traumatic stress disorder. Precisely how they work is unclear, which is one reason more research is required. Users report an increased sense of connec-

tedness, a decrease in anxiety (particularly for terminally ill patients nearing the end) and a reduction in depressive symptoms. It seems that these benefits persist. In one study, 14 months after taking psilocybin users reported a heightened sense of well-being and a belief that taking the drug was among the most meaningful experiences of their lives.

It is true that the reported experiences are subjective, and some feelings may be suggested by people’s expectations of how this sort of drug will affect them. But a number of things about psychedelics can be said with confidence. They are not addictive; consuming too much of them may be unpleasant but is not fatal; and any harm they cause is limited to the person taking them. At the very least—as a comfortable majority of Oregon’s voters realised in 2020 when, alongside legalising psychedelics, they decriminalised possessing small amounts of all drugs—no body should be imprisoned for using them.

They certainly show enough promise to justify Oregon’s experimental policy. Psilocybin will be available only in a licensed setting with a trained facilitator, after screening for contraindicative conditions such as schizophrenia or heart trouble. This reduces risk, and will foster networks of professionals who can learn from each other. It will also let people choose a setting that best suits them. Some may feel most comfortable in a surgery; others may prefer to be at a retreat in nature. Psilocybin is not intended to replace conventional therapies, but to sit alongside them; reaping the full benefits requires users to build the experience into their lives.

### You answer quite slowly

Some may find psilocybin does not bring them all they hoped for. The drug is not a cure-all; and Oregon’s policies may need to be tweaked. But the state’s voters deserve praise for their clear-headed sense of proportion, too long absent from American drug policy. More states should follow Oregon’s lead of cautious experimentation. Psychedelic drugs show tremendous promise. Initiatives like Oregon’s are essential if they are to realise their potential to help those who today must bear their suffering. ■





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Applications should be addressed to [recruitment@encharter.org](mailto:recruitment@encharter.org) by 15 February 2022.

**How the West lost Russia**

Little has been said about how actions taken by the West with regard to Russia since 1991 have limited the security options available to us today ("How to talk to Mr Putin", January 8th). Those decisions have not only complicated our relationship with Russia but also impeded the establishment of democracy in that country. You asserted that "NATO is a defensive alliance". It is not perceived that way in Russia. Our decision to expand into areas previously dominated by the Soviet Union reinforced the perception that NATO is aggressively pursuing policies detrimental to Russia's political and security interests.

Russians find it difficult to understand how NATO membership for Estonia, Latvia and Lithuania enhances the security of countries like Belgium, France and Iceland. Estonia is only 200 miles from St Petersburg. The Russian reaction should have been expected. It is relatively moderate when compared with the American reaction to Moscow's effort to establish a military presence in Cuba during the 1960s. We would have benefited more by coming up with something for the Baltic countries short of NATO membership that still enhanced their security.

These decisions have helped facilitate the rise of demagoguery in Moscow. In a way we helped create opportunities for people like Vladimir Putin to rule. Now we have no other option than to deal with his like.

ROBERT MORLEY  
Former staff member of the National Security Council  
Richmond, Texas

**Dropping the baton**

You made the assertion that Herbert von Karajan was Hitler's favourite conductor ("Out of the abyss", January 15th). Actually, Karajan had the misfortune to be the conductor at a disastrous performance of "Die Meistersinger von Nürnberg" held in Berlin in 1938, which was marred by

Rudolf Bockelmann (in the role of Hans Sachs) appearing to be the worse for drink. Hitler blamed Karajan for the debacle. His favourite conductor was Wilhelm Furtwängler.  
PETER BEST  
*Christchurch, Dorset*

**Electricity in Mexico**

Your article on Mexico's energy reforms said that the plans "are a grave threat, not only to the economy but also to the rule of law" as "they would make electricity both dirtier and more expensive" ("Back to the disco era", January 8th). The only contracts that will be cancelled are those for firms that take advantage of the Comisión Federal de Electricidad's (CFE) transmission and distribution network to avoid paying what they should. This has cost Mexicans around \$1bn over the past three years. New contracts will be made to establish alliances with the private sector and promote the generation of energy in a fair way. If a firm operates legally to produce energy it should not be afraid of these reforms.

Moreover, we are not proposing a return to "dirty energy". In fact, 38% of the total energy injected by CFE into the electrical circuit was clean in 2021. As part of the energy transition CFE will build the most important solar-energy plant in Latin America and keep running its hydroelectric power plants. This will lessen the need to build more coal-fired plants (CFE only has three; China has 946). You were also wrong in thinking that CFE may not produce enough electricity to meet Mexico's needs.

Finally, you say that the proposed changes "would also probably violate several trade agreements". The reform is not trying to strip private firms of their assets, but rather to foster new links. *The Economist* promotes a liberal vision of the market and a belief that private initiative should drive a country's economy. It should review what is happening in Britain's energy sector, where the commitment to energy

deregulation and private initiative has been totally detrimental to its citizens.  
LUIS BRAVO NAVARRO  
Corporate communication co-ordinator  
Comisión Federal de Electricidad  
*Mexico City*

**Spain's north-west frontier**

It is true that living standards have risen in the Spanish region of Galicia; as you say, until relatively recently the drive from Madrid took nine hours ("To the end of the earth", January 8th). Pricey infrastructure has been a consistent drag; few cheap flights are available to get here. And Galicia has been left out of most public-investment initiatives, which are designed with other regions in mind.

Spanish politics has nothing to do with Galician success. Long neglected by the rest of Spain, Galicia developed itself through stable regional politics, learning not to expect solutions from the Spanish government. Inditex (the Zara fashion group) embodies this spirit. It works in a highly competitive market without government aid, creating thousands of jobs and contributing more to Galician living standards than any rail connection or state body.

JAVIER CASTRO VALDIVIA  
*A Coruña, Spain*

**The pitfalls of blockchains**

One fundamental point missing from your "Build block better" (January 1st) was a meaningful explanation of what problem blockchains, particularly public blockchains, are meant to solve. "Openness" is an aspiration that has been around for years. Yet public blockchains are arguably less open because each one uses a different technology and there is no accountable party in charge to make changes.

Moreover, the notion that blockchains are more resistant to government influence is fundamentally a call for abandoning all attempts to regulate

the financial system. If blockchain and cryptocurrency advocates simply want a financial system with no controls at all against fraud, reckless behaviour or tax evasion, the honest thing to do would be to campaign through the political system to change the law. That would be better than pursuing regulatory arbitrage and special treatment by hiding behind a wall of complex, unnecessary and wasteful technology.

MARTIN WALKER  
Director for banking and finance  
Centre for Evidence-Based Management  
*Leiden, Netherlands*

**Boris done wrong**

Boris Johnson did not get Brexit done (Bagehot, January 15th). We are still renegotiating the Northern Ireland protocol, which was apparently acceptable to sign, but was then not acceptable. The sunny uplands and reinvigorated relationships with our closest allies are nowhere to be seen. Unless of course Liz Truss and, previously Lord Frost, have a similarly tenuous relationship with the truth as their boss. A more accurate description would be Boris botched Brexit.

HUGH MCEVOY  
*Lamberhurst, Kent*

Bagehot wrote a fine column on Mr Johnson's penchant for lying, but Captain Jack Sparrow from "Pirates of the Caribbean" said it best:

Me? I'm dishonest, and a dishonest man you can always trust to be dishonest. Honestly. It's the honest ones you want to watch out for, because you can never predict when they're going to do something incredibly stupid.

ALEX FINE  
*Washington, DC*

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## Place your bets

KYIV AND LONDON

### Vladimir Putin is keeping the world guessing

A BATTALION TACTICAL GROUP (BTG) is a Russian army unit which consists of 800 or so troops, sometimes rather more, and most of the armour, artillery and air defences they need in order to fight. When Russia attacked Ukraine in 2014, stirring up separatism among Russian speakers in Donbas, at the eastern end of the country, and annexing Crimea, it did so with perhaps half a dozen BTGs. The following year, when its surrogates in Donbas needed help, it responded with roughly ten BTGs.

There are now 56 Russian BTGs on or near Ukraine's border, according to its gov-

ernment. Other estimates put the number above 70. It is by far the largest concentration of military force seen in Europe since the end of the cold war. And only Vladimir Putin can say how, or if, it will be put to use.

When President Joe Biden said, on January 19th, that he thought Vladimir Putin was going to invade Ukraine, the reason he offered was simply "he has to do something". Huge clouds of smoke betoken fire; mobilisations have momentum. But the fact that Mr Biden thinks his Russian counterpart, having gone this far, must go further, does not mean Mr Putin agrees. Mr

Putin comes from a political culture very unlike Mr Biden's, one where negotiations often start with threats rather than attempts at understanding. And he is accountable to no one.

Having not specified any objective or target, Mr Putin might feel able to de-escalate in a way a leader who has to build coalitions around courses of action would not. It is striking that, inside Russia, there have been quite a few voices prophesying not war, but its absence—and though the absence of war, as students of Spinoza can attest, is not the same thing as peace, it would nevertheless entail fewer risks for Mr Putin.

Russia is not the only place where people are unconvinced about the imminence of battle. Volodymyr Zelensky, Ukraine's president, has told the public that Mr Putin's mobilisation is a form of psychological warfare best countered by staying calm. Years of losing soldiers in Donbas have taught the country a certain stoicism.

But there was a marked increase in tension around January 23rd, when various embassies started withdrawing people from Kyiv. Young members of the middle class are making contingency plans to leave Kyiv or to move family members out of regions where fighting looks more likely. Official reassurance does little to help when it tips over to absurdity. Oleksiy Danilov, the head of Ukraine's national security and defence council, insisted on January 25th that Russia's troop movements are nothing out of the ordinary and on the 26th that full-scale invasion would be "physically impossible". They are, and it's not.

Mr Putin has made political capital out of armed conflict before. The war in Chechnya which began in 1999 helped him ascend to the presidency. The war in Georgia, in 2008, marked a new defiant anti-NATO nationalism. Seizing Crimea in 2014 was hugely popular at home.

But he has fought shy of committing massive forces or risking dreadful casualties, and many Russian opposition politicians, political analysts and businesspeople think he has no interest in changing that approach now. They suggest the mobilisation along the border was not intended as the prelude to war, but just to generate a sense of conflict and crisis at home, thus shoring up the regime, and to rattle the West, exposing some of its internal tensions. Those goals have been achieved.

The drums of war have drowned out grumbles about inflation, the raging pandemic and corruption. The demands Russia has made of NATO—that it abandon an open-door policy towards new members, that it cease military activity in the countries of eastern and central Europe and that it remove various missile systems—have brought about high-level summity remi- ►

riscent of cold-war superpower stand-offs, confirming the great-power status that Russia sees as its due.

In the Russian media NATO's rejection of these demands has shown the alliance to be the aggressors and Mr Putin the doughty defender of the motherland. As George Kennan, an American diplomat, put it in 1946 when sketching the basis of America's cold-war strategy, in Russian nationalism "conceptions of offence and defence are inextricably confused".

The West's responses, including promises to supply more arms to Ukraine, have allowed the confusion to be deepened. As Alexei Navalny, an opposition leader who Mr Putin tried to have killed in 2020, recently wrote from jail: "Time and again the West falls into Putin's elementary traps...It just takes my breath away."

This all explains why some observers in Russia see it as possible for Mr Putin to lay his cards down and walk away from the table, reserving the right to pick them back up at a later date. Given the risks that war would pose for the Russian economy, the fortunes of Mr Putin's coterie and the mood of the people, they think he would be mad not to. But that does not mean he will. His personal calculus may be different from theirs. He is becoming increasingly isolated and may be ill-informed on some things, such as the economic impacts to be expected. He may have lost sight of the big picture—or he may think he sees a bigger picture than anyone else.

Part of the picture is that when in 2014 there was a widely discussed plan to carve out the whole of the Russian-speaking south and east of Ukraine Mr Putin turned it down. Control of Crimea and a destabilising insurgency in Donbas seemed like a good enough result. The Minsk agreements, which were aimed at bringing about a ceasefire, required a new federal

role for the country's regions. That would have allowed separatists in Donbas to hobble any Westward drift on the part of the country as a whole.

But the Minsk agreements are moribund and Ukraine has remained a unitary state. Although it has not moved towards formal NATO membership during the subsequent eight years, it has benefited a lot from Western assistance, military and otherwise, which looks set to continue.

An independent Orthodox Slavic country that is part of the Western project is a direct affront to Mr Putin's model of an authoritarian Russia; if that affront is to be avoided, Ukraine must be kept in subaltern turmoil, weak and cowed. And although Ukraine is less vulnerable today than it was in 2014, it looks unlikely that it will ever again be as vulnerable as it is today. That is an argument for changing the run of play as soon as possible. So is the fact that Russia currently has an impressive war chest, the better to ride out sanctions.

There is also an argument from self-preservation. Russian leaders routinely conflate enemies at home with his enemies abroad. A Western plot to destroy Russia which uses both "foreign agents" at home and catpaws abroad (the role allocated to Ukraine) allows Mr Putin to portray himself as the resolute leader of an embattled Russia. This is self-serving but it may also, in its way, be sincere. To quote Kennan again, Russian leaders "have no difficulty making themselves believe what they find is comforting and convenient to believe". And though it is not exactly comforting, Mr Putin may believe that his enemies within mean America and its allies are actively attempting to get rid of him.

In an ABC News programme aired on March 17th 2021 Mr Biden agreed with his interviewer's assertion that Mr Putin was "a killer". Referring to evidence from

American intelligence that Russia had sought to interfere in America's elections, he said that Mr Putin would "pay a price" as a result. Mr Putin may have seen this as a direct threat. People who know the president say he is obsessed with his own security and assassination attempts. Months spent in a bunker isolating himself from covid-19 may well have added to this sense of paranoia.

Two days after Mr Biden's remarks, Mr Putin and Sergei Shoigu, his defence minister for the past decade, went away for a weekend. When they returned Russia started assembling troops on the Ukrainian border and in Crimea. Less than a month later, Mr Putin published an essay about the historic links between Russia and Ukraine which concluded that Ukraine was no longer a sovereign state but an American bridgehead. It is plausible that he sees an attack on Ukraine as a defensive action, a fight for survival against America's plot to undermine his rule.

#### Not single spies, but in battalions

If Mr Putin chooses to use some or all of the forces he has at his disposal, when is he likely to do so? The wherewithal for a major offensive will not be fully assembled until the middle of February, says an eastern European official familiar with the intelligence. The Russian forces massing in Belarus—well placed for an attack on Kyiv—are expected to reach their full complement by February 10th. That is now tagged as the starting day for a hastily announced joint "exercise" called "Allied Resolve".

Mr Putin may choose to hold his fire during the Winter Olympics in Beijing; a war in Ukraine will make good relations with China an even higher priority than they already are. If so that would suggest a window of opportunity between the end of the games on February 20th and the spring thaw. That said, though soft ground will make the going tougher for Russian armour, a later attack is not impossible.

Ukraine's paucity of air defences and the weakness of its armed forces means that Russia could drive to Kyiv perhaps as easily as American forces reached Baghdad in the Iraq war of 2003. Michael Kofman, an expert on Russia's armed forces at CNA, a think-tank, thinks Russia might go so far as to encircle Kyiv, take Odessa, a coastal city due south of the capital and partition the country, leaving only its western fringes unoccupied. "It would be terribly risky, and costly," he wrote in an essay for "War on the Rocks" a website, "but it would make Putin the Russian leader who restored much of historical Russia, and established a new buffer against NATO."

As the comparison with the attack on Baghdad suggests, the problem in this scenario is what happens after Russia wins. One Russian-backed thug has already done ►►



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Russia and Ukraine, selected events

2021

Jan	17th	Navalny returns to Russia and is arrested
	19th	Film about Putin's secret palace
Jan/Feb		Protests in Moscow and across Russia
Mar	17th	Biden calls Putin a killer
	30th	Build-up of troops on Ukrainian border
	31st	Navalny hunger strike begins
Apr	13th	Biden calls Putin and offers a summit
	22nd	Russia announces withdrawal of troops from Ukraine's border
Jun	16th	Biden summit with Putin in Geneva
Jul	12th	Putin publishes his essay "On the historical unity of Russians and Ukrainians"
Aug	24th	Ukraine celebrates 30th anniversary of independence
Sep	17th	Russian parliamentary elections
Oct/Nov		Repressions in Russia intensify
Nov		Build-up of Russian troops
Dec	7th	Biden calls Putin
	17th	Russia publishes demands/draft treaties with US and NATO
	28th	Russia bans Memorial, a human-rights organisation

2022

Jan	6th	Russia sends troops to Kazakhstan
	10th	US-Russia talks
	12th	Russia-NATO talks
	17th	Russian troops arrive in Belarus for joint exercise

Source: *The Economist*

► a midnight flit from Kyiv: Viktor Yanukovych, when faced by revolution in 2014. There would be little to stop a post-invasion quisling from suffering the same fate if, after the invasion, Russia left the stage. So Russia would either have to break up the unitary state or accept an open-ended occupation, one which partisans from western Ukraine would flock to fight.

In 2020 RAND, an American think-tank, estimated that Russia would need 80,000 or so troops to seize and hold tracts of eastern Ukraine, including the cities of Donetsk and Kharkiv. A larger effort that included Kyiv would take a lot more, easily absorbing even Russia's substantial forces. It would not be the first great power to wade into such a conflict on the basis of rosy assumptions about its course. But it may see less risky ways to get what it wants.

This is one reason why Ukraine's Centre for Defence Strategies, a think-tank, calls a "hybrid invasion" likelier than a traditional one. The CDS says such an effort would involve cyber-attacks, disinformation and psychological operations like bomb threats. There have been several hundred recent bomb scares across Ukraine aimed at schools, political offices and other non-military targets.

If, by demoralising Ukraine's population and exhausting its security forces, such action brought about regime change

on its own, so much the better for Mr Putin. If not, it could become the preparatory phase for something more intense.

The report also moots an "armed escalation" in the Donbas region, of which only 30% is currently controlled by pro-Russian separatists. Mr Putin has long claimed, most recently in December, that Ukraine's government is committing genocide against Russian-speaking minorities in the region. Their protection could be used as a pretext for taking the rest of Donbas.

On January 26th Vladimir Vasilyev, who leads United Russia, Mr Putin's party, in parliament, said that "Military shelling in Luhansk and Donetsk regions is increasing, people are dying again, suffering, their property is being destroyed... We appeal to the leadership of our country to provide assistance to the Luhansk and Donetsk republics in the form of supplies of military products necessary to deter aggression, as well as to take all necessary measures to ensure the safety of their citizens." It is not an appeal he would have made without being asked. If shelling were deemed an insufficient incitement, a "false flag" operation might be put in play.

The front lines in Donbas have hardly moved in years. Breaking through them would involve a substantial and conspicuous Russian intervention. But it would be smaller than a drive to Kyiv, and also possibly more acceptable to outsiders. Antony Blinken, America's secretary of state, has said that "a single additional Russian force [going] into Ukraine in an aggressive way" would trigger sanctions. But not all America's allies can be counted on to take as hard a line, and Mr Putin may think he is more likely to get away with expanding a small war than starting a big one from scratch.

Despite some of these attractions, seizing the Donbas has a big drawback. It might not work. In his essay on Russia and Ukraine Mr Putin wrote that "Kyiv simply does not need Donbas". That cuts both ways. Taking Donbas might be a short-term victory, and in the context of broader hybrid warfare it might bring down the current regime. But in the medium to long term it would be quite likely to consolidate or accelerate an unencumbered drive towards the West by the rest of Ukraine.

A further possibility, which could be undertaken alongside another or on its own, would be for Mr Putin to use the forces he has moved into Belarus to consolidate control over the country. Though he resents it, Alexander Lukashenko, the president of Belarus, relies on Russia in many ways, not least in his suppression of the widespread protest which began as a response to his stealing an election in 2020. An effective annexation of Belarus might not necessarily trigger sanctions. It would leave Russia nicely positioned to go on menacing Ukraine. And it would allow

Mr Putin to pose a new level of threat to the Suwalki gap, a narrow corridor which connects Poland to Lithuania, and thus the three Baltic states to the rest of NATO.

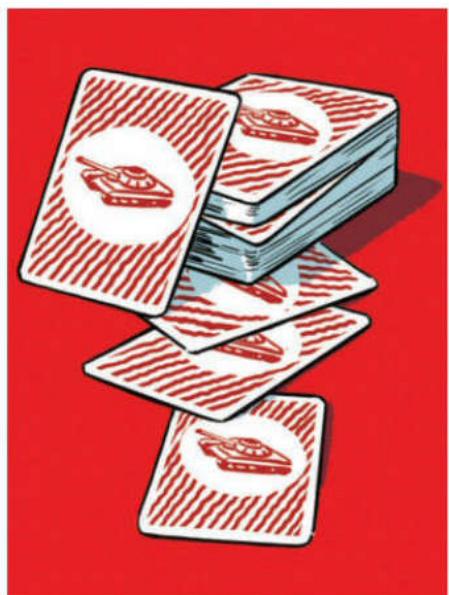
**The insolence of office**

On top of the military risks are political and economic ones. The prospect of war is already sending the stockmarket and the rouble tumbling. War proper, which would trigger new sanctions, would make things a lot worse. There could be a catastrophic run on the banks. Because accommodation with the West, where property rights are secure, is what makes it possible for Russia's wealthy to pass things on to their children, lasting isolation could be very irksome for the elite.

Russian public opinion shows signs of dissonance. The vast majority of Russians blame America and the West for stoking tension and provoking Russia. But despite the propaganda effort, Russians have an increasingly positive attitude towards Ukrainians. Accustomed to seeing themselves as victims, they see Ukraine the same way: "America's pawn".

The queasiness Russians may feel at the thought of lots of Ukrainian deaths may be one reason why the Kremlin's militarism causes anxiety rather than support. As Lev Gudkov of the Levada Centre, a polling outfit, wrote recently, "An ordinary Russian does not want to be held hostage to the insane course of the country's leadership; he cares about his own life and the well-being of his relatives." A long-drawn-out war in which not just Ukrainians but young Russians die in their thousands would be massively unpopular.

Hence the belief, among many in Russia, that Mr Putin would be best advised to press no further. The problem is that Mr Putin is not looking for advice. He will follow his own mind. ■





## Vacancy on the Supreme Court

### Exit left

NEW YORK

#### Justice Stephen Breyer retires after almost 28 years on America's Supreme Court

NOT SINCE 2010 has a Democratic president put a justice on the Supreme Court. Joe Biden will now have his chance. On January 26th sources close to Stephen Breyer, the 83-year-old dean of the court's liberal bloc, said he will retire at the end of the court's current term. In one sense, Mr Biden's nomination will change little: a liberal will replace a liberal. But on the campaign trail he promised to nominate a black woman for the first time ever.

Mr Biden will no doubt move quickly. Democrats appear likely to lose the Senate in mid-term elections later this year. The last time a Democratic president asked a Republican Senate to seat a Supreme Court nominee—when Barack Obama chose Merrick Garland to replace Antonin Scalia in 2016—the nomination never even got a hearing. Mitch McConnell ended filibusters for Supreme Court nominations in 2017 when he was the majority leader.

The Democrats' bare Senate majority may be just enough to put a new nameplate on Mr Breyer's door when the court begins

its next term on October 3rd. That will require some unity from a caucus that has shown precious little recently.

Senate Democrats have been sniping at each other for months over the stagnation of Mr Biden's agenda. Progressives have had knives out for two centrist Democrats, Joe Manchin of West Virginia and Kyrsten Sinema of Arizona, who refused to abolish the filibuster to pass voting-rights legislation. Chuck Schumer, the majority leader, has taken flack from all sides for a legislative strategy that has sometimes seemed to

stem more from his fear of losing a primary later this year than from an effort to actually pass laws.

Now the caucus will need to stick together to confirm Mr Biden's nominee. Picking up some Republican support from centrists such as Susan Collins of Maine and Lisa Murkowski of Alaska is possible, but in the current climate the White House will not want to count on it. Most probably they will have to butter up Mr Manchin, whose relationship with the White House has deteriorated. He is typically guarded about his intentions but has voted for all of Mr Biden's judicial nominees.

Justice Breyer was confirmed, in 1994, with 87 votes. He has been a stalwart but pragmatic liberal who believes judges should look beyond a law's text to its "purposes" and "consequences". This approach inspired his majority opinions upholding abortion rights, delineating the limits of presidential power and addressing the delicate matter of religion in the public square. He also wrote impassioned dissents in favour of racial integration of public schools and against the constitutionality of the death penalty.

He has been prolix in oral arguments. He has a gentle sense of humour, often acknowledging when he was flummoxed and regularly imploring lawyers for help in writing decisions. "We are going to get people so mixed up no matter what we say," he fretted during a hearing in 2013. Earlier this ►►

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month he prefaced a query about a potential settlement in a dispute over flags and free speech with a self-deprecating caveat: "I'm sure this is a useless question."

A penchant for case-by-case consideration and balance led him to join conservatives in some high-profile cases involving criminal defendants and other matters. He joined decisions that allowed a 40-foot cross on public land and shielded religious schools from some anti-discrimination lawsuits. He followed a similar path personally. In the wake of *Bush v Gore*, the Supreme Court decision in 2000 that halted vote-counting in Florida and made George W. Bush president, clerks for the liberal and conservative justices weren't talking to one another. To ease the tension, Justice Breyer walked into the clerks' dining room—a nearly unheard-of occurrence—and started chatting to the conservatives.

The leading candidate to replace him is Ketanji Brown Jackson, 51, whom Mr Biden promoted from a district court to the powerful circuit court of appeals in the District of Columbia. A unanimous voice-vote in the Senate confirmed Ms Jackson to her seat nine years ago. She has dual degrees from Harvard and spent two years as a federal public defender—a relative rarity among federal judges (prosecutorial experience is far more common). She was vice-chair of the US Sentencing Commission, where she helped revise sentencing guidelines that imposed harsh penalties for crack cocaine that disproportionately affected African-Americans. This injustice was not an abstraction for her: when she was a teen, her uncle was sentenced to life in prison for a minor drug crime; he was granted clemency 30 years later.

A second contender for Justice Breyer's seat is Leondra Kruger, a 45-year-old judge on the California state supreme court. She, too, wields a pair of Ivy League degrees and clerked on the Supreme Court. She worked in the solicitor-general's office, which represents the federal government before the Supreme Court, arguing 12 cases. Her presentations were crisp and unflappably calm, even when all nine justices were openly hostile to the position she was dispatched to defend.

Other prospects include two district-court judges—Leslie Abrams Gardner, 47, and J. Michelle Childs, 55—as well as Tiffany Cunningham and Candace Jackson-Akiwumi, both appellate judges in their 40s. Any of them would be groundbreaking. Only two of America's 115 Supreme Court justices have been African-American; both were male (Thurgood Marshall and Clarence Thomas). And there are only eight black women currently serving on America's 13 circuit courts, four of whom have been seated in the past year.

Some may take issue with Mr Biden basing his decision on race and gender,

though the leading contenders all have the requisite qualifications. The potential nominees are hardly liberal firebrands. Ms Kruger, for instance, has often sided with conservative jurists, and has said that she works to enhance "the predictability and stability of the law"—not exactly the sort of rallying cry that inspires progressives.

However quickly Mr Biden gets a successor to Justice Breyer in place, and whoever she turns out to be, the court's direction will not change: there will still be twice as many conservatives as liberals. Abortion rights appear likely to be restricted, gun-rights bolstered and affirmative action's days numbered. At least in the near term, the next justice will probably find herself dissenting early and often. ■

#### New York crime

## New sheriff in town

JAMAICA, QUEENS

**Eric Adams unveils his blueprint to help the thin blue line tackle violence**

"**I**T HAS BECOME like the old West, shootouts at high noon," says Khayan Reed, a violence-disrupter in the Bronx. He works with Stand up to Violence (SUV), a programme begun by Jacobi, a city-run hospital. SUV considers violence a disease that can be cured through intervention. Until the pandemic hit, it was seeing success. Gun violence in its targeted area had decreased. Now, violence is pervasive. "There's just so many guns," says Carjah Dawkins-Hamilton, SUV's director.

New York City is nowhere near the 2,000 murders a year it saw in the early 1990s (it had 488 in 2021). But some neighbourhoods are decidedly unsafe. This month five police officers have been shot,

two of them fatally. Several people were pushed onto the subway tracks, and one of them killed. A teenager was killed while working at a Burger King. An 11-month-old baby was hit in the face by a stray bullet.

"Gun violence is a public-health crisis. There's no time to wait," says Eric Adams, the new mayor. On January 24th he released his blueprint for combating gun violence. Mr Adams is a former police captain, but his plan goes beyond policing. Every city agency will be involved in public safety, even rubbish collectors. "If you live in a community that is filthy," says Erica Ford, founder of Life Camp, another violence-intervention group, "you think you're filthy, which helps to reinforce negative behaviour." Each agency will have an anti-gun-violence co-ordinator. Mr Adams intends to increase the number of hospital-based intervention programmes, such as SUV. He will redirect resources to those in urgent need of mental-health care.

Next week President Joe Biden is due to visit New York to discuss gun violence with the mayor. Mr Adams is prioritising the issue which won him the election. He will be judged on how successful he is at making streets and the subway safer.

But some of what he wants to do is out of his hands. He lobbied for more gun restrictions and begged Congress to pass the stalled Build Back Better Act, which includes funds for anti-violence initiatives. He wants the state to roll back bail reforms and wants violent teenagers under 18 to be tried as adults. The progressives in Albany, the state capital, are unlikely to oblige.

Controversially, Mr Adams intends to reimagine the disbanded Street Crime Unit, a plainclothes squad. Members will wear modified uniforms and cameras and will be carefully vetted and trained. Some violence-disrupters are worried that this means indiscriminate "stop and frisk", which a federal court ruled unconstitutional in 2013, will return. But one Life Camp violence-disrupter, who has spent time behind bars, sighs that "desperate times call for desperate measures".

Most of Life Camp's workers have incarceration histories, which gives them credibility among the people they are trying to deter from violence. Roger "Nacy" McCleary and Justice Townsend, who were 21 and 19 when they were locked up, served 31 and 27 years. They know only too well what's at stake. One recent afternoon in Jamaica, Queens, a New York borough, Life Camp's outreach team canvassed Sutphin Boulevard's "hotspots", corners where troublemakers congregate. Along the way, they said hello to everyone. They warmly greeted a 12-year-old going into a shop with his sisters. The disrupters had previously intervened when he started hanging out with a gang. Mr Adams will need a lot of similar interventions for his plan to succeed. ■



After the killing, the candles



### Insider trading

## Capitol gains

### Allegations of insider trading spur vigorous new efforts to stop it

ATTENTION TO LAWMAKERS' finances is not new. What is surprisingly recent is a ban on insider trading by members of Congress. It was outlawed only in 2012, on the heels of the financial crisis, through the aptly named STOCK Act (Stop Trading on Congressional Knowledge). But as recent allegations of foul play show, the issue is far from resolved. Two newly introduced bills hope to put an end to it.

Before the STOCK Act, trading on non-public information obtained as a sitting member of Congress was not an offence. The act banned it and requires members of Congress and their senior staff to disclose financial holdings, sales and purchases within a 30-day notice period. But enforcement is flawed. Deadlines frequently pass without members disclosing their transactions: recent research by Business Insider, a financial-news site, counts 54 tardy lawmakers in 2020 and 2021. Violations are not publicly reported, and neither are payments of the initial fine of a paltry \$200.

No member of Congress has been prosecuted under the STOCK Act. Court filings made public in October suggest that a probe by the Securities and Exchange Commission into allegations against Senator Richard Burr is still going on. This concerns a suggestion that in February 2020 Mr Burr ordered stock sales of up to \$1.7m after a briefing on the threat of the fledgling covid-19 pandemic.

Trading scandals are not limited to Congress. Beginning in September 2021, the Federal Reserve drew criticism as the Dallas Fed's president, Robert Kaplan, and

the Boston Fed's president, Eric Rosengren, and vice-chairman, Richard Clarida, made large trades at a time when they were involved in wrangling over policy in the early stages of the pandemic. Mr Clarida moved between \$1m and \$5m out of a stock fund before repurchasing from the same fund just three days later—just as the Fed was poised to announce a large stimulus. All three ultimately resigned.

Two senators have introduced bills to limit congressional trading. Jon Ossoff, a Democrat elected in Georgia in 2021, introduced the Ban Congressional Stock Trading Act on January 12th with Mark Kelly, a Democratic senator for Arizona. The next day Josh Hawley, a Republican from Missouri, introduced his Banning Insider Trading in Congress Act. He had previously been in talks with Mr Ossoff about a joint bill. The bills barely differ, mandating not just members of Congress themselves but also their spouses and, in Mr Ossoff's case, dependent children to place any individual stocks in a "qualified blind trust" upon assuming office. Both bills foresee large financial penalties for non-compliance.

Through a qualified blind trust an independent trustee would control any assets a member of Congress or their family may hold, thus mitigating the risk that they will abuse access to information. Mr Ossoff, who during his election campaign accused his opponent of profiting from trades early in the pandemic, placed his stocks in a blind trust soon after taking office. Only nine other sitting members of Congress have done the same.

These proposed rules differ markedly from the ones the Fed has now implemented. It has put in place a complete ban on purchasing individual stocks. Should Fed officials wish to sell already-purchased shares during their time in office, they will have to give 45 days' notice. This way, the Fed hopes to prevent officials from abusing their knowledge of monetary policy.

They will still be allowed to buy and sell diversified mutual and exchange-traded funds. "Frankly, I'm mystified by the focus on individual stocks," says Simon Johnson, of the MIT Sloan School of Management. "Fed professionals and congresspeople have plenty of access to policy changes that can impact the market as a whole."

Donna Nagy, a law professor at Indiana University, agrees. "Insider trading is already illegal," she notes. "What is not illegal is owning stocks that are directly and substantially affected by policy the Congress member shapes." At least 15 lawmakers on the House and Senate Armed Services Committees hold stock in defence contractors. John Hickenlooper, who serves on a Senate Subcommittee for Communications, Media and Broadband, holds between \$250,000 and \$500,000 each in Alphabet, Amazon and Facebook stock.

"The attention on trading obscures the fact that ownership itself can create conflicts of interest," Ms Nagy argues. She points to the stringent regulation placed on federal judges, which requires them to recuse themselves from cases if they are a shareholder in any of the involved parties. And, she adds, the assets initially placed in a blind trust are decidedly not blind.

Among Democratic voters, 70% agree that members of Congress should be banned from trading individual stocks. Even more Republicans, 78%, say the same. Within Congress, both sides of the aisle seem in agreement. And yet any bill has large hurdles to surmount. Nancy Pelosi, the House speaker, opposes a ban on congressional trading. She has said that spouses should be able to take part in a free-market economy, stating that she had trust in her members. Overcoming the speaker's opposition is a tall task, especially with two competing bills. But pressure is building: on January 24th a letter signed by 27 members of Congress (25 Democrats and two Republicans) urged her and the Republicans' leader in the House, Kevin McCarthy, to bring the legislation to the floor. ■

### Sports betting

## Playing for high stakes

HAWAIIAN GARDENS, CALIFORNIA

**Small casinos may lose out in the fight over sports gambling in California**

BLINK AT THE wrong moment while driving south on the I-605 into Long Beach and you might miss it. A sign advertising the Gardens Casino is one of the few markers for the town of Hawaiian Gardens, a square mile nestled at the bottom of Los Angeles County. Inside the casino, hundreds of tables offering poker, baccarat and other games are filled with Angelenos there to eat, drink and gamble. The casino accounts for 70% of Hawaiian Gardens' tax revenue. The prospect of legal sports gambling could have been a boon for small California towns supported by such card rooms, licensed to play select games. Instead, it could pose an existential danger.

After years of failure by the state legislature in Sacramento to forge a compromise, the battle to legalise sports gambling in California has shifted terrain. Now large online-gambling websites, Native American tribes and the card rooms are taking advantage of California's permissive referendum rules to sponsor four measures, aiming to qualify them for the ballot in November. Each measure would favour one group at the expense of the others. Rather than usher in a new, competitive market, ►►

► the spoils look likely to be captured by just a few winners.

The Supreme Court annulled the federal prohibition on sports gambling in 2018. States raced to write the practice into law, eager for new tax revenue. Today, 30 states and the District of Columbia have such laws, with three more set to join them. But California is the best prize: analysts project over \$3bn in annual revenue there. The Native American tribes and the card rooms are desperate to lure young sports gamblers, lest they are poached by the gambling sites. For all players, this is a big pot.

The only measure that has qualified for the ballot so far is one backed by California's Native American tribes. Gambling is a critical source of tax revenue for them, as well as the basis of their power in state politics. The measure would give them a near-monopoly on in-person sports gambling, extending their dominance of the industry. But it is another provision, allowing private citizens to sue casinos and opening the prospect of crippling damages and injunctions, that card rooms fear most. The card rooms suspect their longtime tribal rivals aim to drive them into bankruptcy.

A smaller group of tribes has sponsored another measure that would allow them to offer sports gambling online. Although the tribes may need the technical expertise of the online operators, they could name their price to would-be partners. Frederick Boehmke of the University of Iowa reckons both tribal measures are a gamble that Californian voters' past sympathy for Native American interests will once again translate into support at the polls.

Yet the tribes are not the only ones hoping to keep the market for themselves. Large online-gambling websites, including DraftKings and BetMGM, have gone all-in on a third measure. It would allow sports wagers to be run only by the websites and the tribes. This would require non-tribal online operators to pay licensing fees of \$100m. Conveniently, only the measure's sponsors could afford these sums. Nine months before the election they have already committed more than \$100m to the effort, just under half the total amount Uber, Lyft and others spent on a ballot fight in 2020, the most expensive in California's history.

The small cities that host card rooms are betting on a fourth measure. Becca Gidden of Eilers & Krejcik Gaming, a research firm, reckons this is the most liberal of the bunch, opening both online and in-person sports gambling to card rooms, the tribes, racetracks and professional sports leagues; online operators would need to find a partner among one of these. But the cities' principal aim is to stymie the tribes. For Keith Sharp, general counsel of the Gardens Casino, the opportunity of sports gambling is less important than the threat



**House of cards**

of the measure that has already qualified for the ballot: "If it weren't there, we would just stand on the sidelines."

For the tribes and cities that depend on tax receipts from gambling, the stakes could not be higher. Victor Farfan, a life-long resident of Hawaiian Gardens and a city-council member, remembers what the town was like before the casino arrived in 1997, and how far it has come since. "When I was growing up, it was a tough neighbourhood plagued by gang violence," he says. "If the ballot goes against us, it could put Hawaiian Gardens back ten years." ■

#### Autopsies and covid-19

## The politics of death

FARMINGTON, CONNECTICUT

### America's elected coroners are too often a public-health liability

**I**N FLU SEASONS past, James Gill never worried about how the death certificates his office produced might be received by grieving families. As Connecticut's chief medical examiner, he oversees investigations for about two-thirds of all deaths in the state, and his work is not usually the stuff of controversy. Covid-19 changed that. Relatives sometimes question whether covid was the cause of their loved one's demise; some want the virus removed from the death certificate. Dr Gill, a civil servant, is insulated from such pressure. That is not so in many parts of America.

Death investigation in America falls into two broad categories. Medical-examiner systems are run by unelected technocrats, physicians who probe deaths and draft certificates. Coroner systems are led by elected officials, who may or may not be medi-

cal doctors. Both are supported by forensic pathologists, specialists in autopsies.

About 60% of Americans live under medical-examiner systems, according to Jeffrey Jentzen, a professor at the University of Michigan and author of a history of death investigation. Coroners dominated during the early years of the republic, but were prone to corruption. Undertakers, law-enforcement officials and insurance agents all stood to gain by taking on a second job as a coroner. Issuing death certificates provided many potential avenues for profit, from determining insurance payouts to covering up evidence of a crime.

A push to replace coroners with medical examiners gained traction in the early 20th century, before losing momentum. Coroners attract little attention—about 80% ran unopposed in the latest electoral cycle. But polarisation has created more competition. When Bobbi Jo O'Neal ran for coroner in South Carolina's Charleston County in 2020, after two decades as a nurse conducting death investigations, she faced a less qualified opponent. Yet as a Republican in an increasingly liberal area, she barely scraped through.

Covid-19 has put death investigators under pressure. With no national supervision, and often minimal guidelines from states, they were left to their own devices. Carl Schmidt, medical examiner for Wayne County in Michigan, says his office decided that if they did not see symptoms of acute respiratory distress, coupled with an inflammatory response signalling a viral infection, the death would not be attributed to covid-19. Others were less meticulous. Dr Schmidt recalls one coroner giving a presentation arguing that conducting covid-19 autopsies was unnecessary. The varied quality of autopsies is one reason why measuring excess deaths gives a better overall gauge of covid's toll.

But it is the politicisation of the pandemic that has most exposed the weaknesses of coroners in America. Coroners reliant on voters who are sceptical about covid have not been as scrupulous as their medical-examiner peers. One coroner in Missouri candidly told the press that he strikes covid-19 from the death certificates at the request of the family of the deceased. Despite increased demand for their services, coroners have struggled to secure extra resources. Dr Schmidt observes that "some autopsies are done in a garage with a single light bulb, like a Quentin Tarantino movie."

Excess deaths may be a superior tool for a broad covid count, but death certificates from autopsies provide critical information for understanding the virus. America's ability to provide reliable ones will remain patchy and poorly resourced. Coroners were "already overwhelmed with the opioid epidemic", recalls Dr Gill, "and the cavalry wasn't coming then." ■

## Drug policy

## Turn on, tune in

PORTLAND, OREGON

## The emergence of sensible policy on psychedelic drugs

**C**HAD KUSKE was a Navy SEAL for 18 years. When he retired, he found himself “struggling with depression, substance abuse and anger”. Various treatments had failed, until another ex-SEAL suggested psilocybin, the consciousness-altering compound in “magic mushrooms”. “It basically changed my life forever,” Mr Kuske says. “I realised that I’d been living in my own personal hell and I was keeping myself there by my own choices and I had the power to change that.”

Mr Kuske’s experience is not unusual. Scientists began studying the potential for psychedelics to treat mental illness more than 60 years ago, before anxiety over the drugs’ countercultural popularity in the 1960s shut down research. Thankfully, it has restarted—and studies are showing that psychedelic drugs have potential in treating several thorny mental-health problems. Oregon’s voters approved psilocybin for supervised use in 2020, and other jurisdictions may soon follow suit. This is good news not just for people suffering from depression and post-traumatic stress disorder (PTSD), but also for American drug policy: it shows that evidence-based decisions are replacing moral panic.

That does not mean Oregonians can pick up a few mushrooms on their way home from work and spend the evening tripping. Measure 109, which almost 56% of voters approved, does not legalise psilocybin or make it available at dispensaries, as cannabis now is (a separate measure passed in the same election did decrimi-

nalise the possession of small amounts of all drugs, punishable with only a \$100 fine that can be voided by completing a health screening at an addiction-treatment centre). Instead, it makes psilocybin therapy available at treatment centres under the supervision of a trained facilitator.

Oregon’s health department will license the centres, facilitators, psilocybin producers and testing labs. People who want therapy will not need to provide a diagnosis of depression or PTSD. Tom Eckert, a psychotherapist who with his late wife, Sheri, began the efforts leading to Measure 109, said he intended such therapy to “sit outside a conventional medical model... It will be open to anyone who can safely benefit from it.” The screening process should help exclude those unsuited to it. Precisely what that means is under discussion. Oregon is still honing its rules, with the goal, according to the state’s health department, of having the treatment centres up and running in the spring of 2023.

Psychedelic drugs put users in an altered state of consciousness. They include lab-synthesised compounds such as LSD and MDMA (commonly called ecstasy) as well as naturally occurring, plant-based substances such as psilocybin, mescaline, ayahuasca and ibogaine. George Goldsmith, whose firm, Compass Pathways, has developed a synthetic version of psilocybin, explains that the drugs act on “a brain network that integrates perception with prediction” and so help break “the dysfunctional pattern of thinking characteris-

tic of so many mood disorders”.

They also appear to spur the growth of neural connections that stress and depression tend to erode, suggesting that they may have a reparative function. Studies have shown that psychedelics have potential to treat addiction, PTSD and severe depression, as well as to alleviate end-of-life anxiety in terminally ill patients.

These studies have mostly had small sample sizes. Some worry they might overestimate psychedelics’ benefits—notably of microdosing, a fashionable practice of regularly taking small doses of psychedelics. A study by Imperial College London found that people given placebos and actual microdoses reported equal levels of well-being and happiness.

Still, America’s Food and Drug Administration—hardly a cheerleader for illegal drugs—called psilocybin a “breakthrough therapy” for depression. That designation is meant to speed development of drugs that may represent a big improvement over current treatment. Mr Goldsmith says his conversations with European regulators have been like “pushing on an open door”.

## Far out

Nor is it just Europeans and coastal liberals interested in psychedelics’ potential. Texas legalised research into them last year; the state’s flagship medical school opened the Centre for Psychedelic Research and Therapy in December. Graham Boyd, who runs a political-action committee that supports criminal-justice reform, credits veterans with persuading Rick Perry, the state’s arch-conservative former governor, to back the measure. Jesse Gould, a former Army Ranger who runs a charity that sends veterans abroad for psychedelic retreats and credits ayahuasca with helping him overcome his PTSD, said he initially resisted the therapy because “I didn’t identify as someone who did drugs”.

At least ten cities have made psychedelics a low priority for law enforcement. Legislators in Washington state recently introduced a bill that would replicate Oregon’s model, and California’s legislature is mulling a bill as well. Politicians in around 12 other states have introduced legislation to decriminalise or study the benefits of psychedelic drugs.

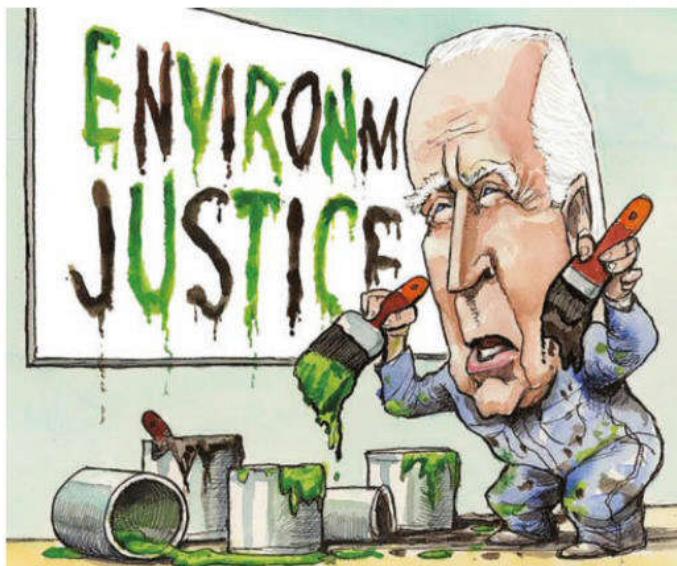
Such openness is welcome not just for the benefits it may provide traumatised soldiers or people with severe depression, but for what it indicates about America’s shifting attitude to drugs. “Building prisons and filling them with people who use these substances was the worst policy,” says Mr Boyd. It “obliterated our ability to think clearly about what good policy would look like... Once we clear away the overhang of criminal prohibition I think we can come up with better policy toward all of these substances.” ■



Letting them work their magic

## Lexington | Environmental justice in the balance

*The case for pursuing civil rights and climate policy in tandem has been oversold*



**T**HIRTY-FIVE YEARS ago this month the United Church of Christ published a report that inspired a movement. Entitled “Toxic wastes and race in the United States”, it documented what activists had long claimed. Hazardous-waste sites were so likely to be found in non-white neighbourhoods that the race of the local populace was the most reliable predictor of their whereabouts. Three in five black and Hispanic Americans lived near toxic sludge. One of the study’s architects, Benjamin Chavis, a former aide to Martin Luther King, termed this “environmental racism”.

It established a link between civil rights and environmentalism, and created a new cause, which was named after an alternative slogan: “environmental justice”. Justice activism is dedicated to lifting the disproportionately heavy burden that environmental problems, from pollution to coastal erosion, place on racial and other minorities. And on that score it has largely failed. A follow-up study in 2007 found that the communities living closest to pollution were as non-white as before, and there is little reason to think the situation has improved. But notwithstanding its lack of success the justice movement has become hugely influential.

In 1994 Bill Clinton ordered every federal agency to make “environmental justice part of its mission”. The movement was soon spawning innumerable doctoral theses and a racially loaded lexicon. Polluted areas are deemed “sacrifice zones” and investors’ tendency to ignore them “green-lining”. As Democrats’ focus on racial and green concerns increased, so did the prominence of such activism. The Green New Deal, a Utopian policy pushed by left-wingers in 2019, was laced with justice language and goals. President Joe Biden has embraced both. After his inauguration he pledged that “at least 40% of the overall benefits” of his planned splurge on renewable energy and other climate-related infrastructure would go to “disadvantaged communities”. He also established several enabling authorities, including the Environmental Justice Advisory Council, led by veteran activists.

This development has been almost unquestioned on the left, even by those who rightly dispute one of its premises. Racism is not the only reason pollution afflicts minorities: waste dumps are placed on cheap land where poor communities—white as well as non-white—live. Nonetheless, the combination of covid-19 and

the Black Lives Matter protests has made the languishing of minorities politically unacceptable. Justice activism seems to offer an explanation for and a solution to it. And Mr Biden’s climate splurge, maybe the biggest thing his administration will achieve, looks to many like the means to pay for it. What’s not to like?

Perhaps a lot. The overarching problem is the activists’ elision of environmental problems that are long-standing and local with global warming. That is also an equity issue, but not chiefly because of its toll on American minorities. Several hundred million people in African and South Asian countries, whose contributions to global emissions are a rounding-error, are suffering far more serious warming, to which they are incomparably more vulnerable. The moral imperative for rich emitters such as America is therefore to slash their emissions. And there are reasons to fear that the justice movement could make that daunting task even harder.

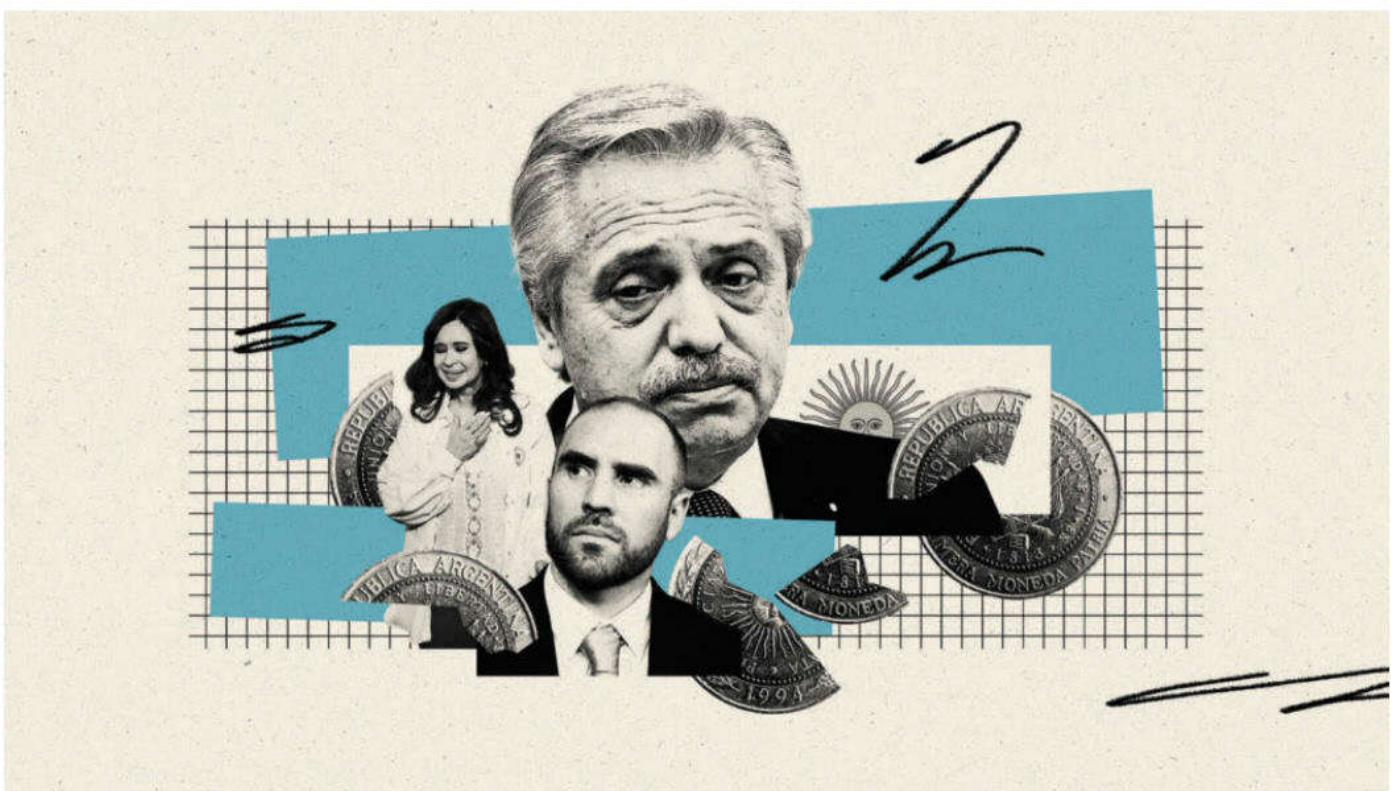
Consider the incoherence of the administration’s justice goals. It is unclear what its promised “benefits” to poor communities are. Wind turbines cannot be situated chiefly on the basis of race—and how, anyway, should their benefits be counted? The activists sought to clarify matters with a list of recommended investments, but this raised a bigger problem. Many of their suggestions have little or no direct connection to climate change. For example: “We should invest in transportation hubs because the communities that are most impacted by the lack of access to transportation are the low-income, people of colour and elderly communities.” Lexington is all for win-wins. But the notion that limited government spending on the climate emergency ought to cover a general socioeconomic upgrade seems dubious, and arguments to the contrary a distraction at best.

Many activists want worse. Extending the notion of justice to retribution, they oppose any climate solution that past polluters might profit from. Thus the White House advisory committee ruled that carbon capture and storage, nuclear power and the development of carbon markets (all of which are probably essential) could not be counted as “benefits”. Other justice activists oppose using hydrogen as a fuel, even when it is produced with renewable energy—apparently because it does not conform to their bucolic vision of a wind-and-solar powered world. The administration, to its credit, has pushed back. Yet the prominence it has given to such muddle-headedness has invited trouble. Justice activists are “frustrated” with the administration’s slow progress, says one. Two of her colleagues quit their White House posts this month. Bigger fights loom, she predicts, once the administration starts dispersing the billions it has raised for infrastructure to the states.

### Justice delayed

The politics of the administration’s dalliance with this issue is, if anything, harder to justify than the economics. Though many black and Hispanic voters profess to feel positively towards environmental justice, only 6% consider climate change a top priority. The prevalence of Hispanics in oil-and-gas jobs is an added vulnerability for Mr Biden. He should treat the activists’ claims to speak for their communities with caution.

He might also consider how they are viewed across the aisle. The biggest obstacle to effective climate policy is not Democratic unity, which looks unbreakable on the issue. It is the Republican refusal to take it seriously. There is probably nothing Mr Biden can do to fix that. Yet by promoting a left-wing, racialised view of the problem—even though he himself seems ambivalent about it—he has perhaps made a bad case worse. ■



## Argentina

## Mad existence

BUENOS AIRES

### The IMF cannot solve Argentina's dysfunction

**I**F YOU LEAVE Argentina for ten days, the joke goes, everything changes. Come back in 20 years, however, and everything seems the same. Two decades ago an IMF programme failed to stop an economic crisis in Argentina. Between 1998 and 2002 GDP tumbled by nearly 20%, and the government defaulted on its debt for the seventh time in its history. Today Argentina's future once again hinges on negotiations with the IMF. So far talks are not going well.

In 2020 Argentina's government defaulted on its debt once again, leaving a \$57bn loan provided by the IMF in 2018 in a state of limbo. The government is now negotiating with the fund, seeking an agreement which would revive the loan arrangement and delay repayments.

Over the next two years, Argentina must make payments to the IMF totalling about \$40bn or risk becoming a financial pariah (see chart 1 on next page). That is money the country does not have. And the backdrop to the negotiations is forbidding. The peso on the parallel exchange market is now worth half the official rate. Annual inflation is above 50%.

After a difficult start to the millennium, Argentina's economy enjoyed a decade of strong growth, powered by a global boom in trade and commodity prices. But from 2012 onwards the market for commodities softened. Frustration with economic stagnation contributed to the election, in 2015, of Mauricio Macri, a liberal-minded politician. His victory ended years of rule by Peronists, members of a populist movement that has dominated Argentina for decades.

Mr Macri's government pursued some reforms. But structural problems continued to impede growth. And the government's gradual approach to fiscal consolidation meant that Argentina relied heavily on capital markets to fund a budget deficit which ran at over 5% of GDP through his first three years in office. In 2018, as rising interest rates in the United States contributed to a tightening of global financial con-

ditions, markets grew wary of the state of Argentina's finances, and Mr Macri turned to the IMF for help.

The loan the IMF agreed to provide—an initial \$50bn, subsequently raised to \$57bn, of which \$44bn was ultimately disbursed—was the largest in the fund's history. It was intended to reassure markets and thus to restore the flow of private credit; the programme's architects expected that much of the available money might never need to be handed over.

But markets remained skittish. Signs of stabilisation evaporated with Mr Macri's loss to Alberto Fernández, a Peronist, in elections in 2019. The peso tumbled, inflation surged and in 2020 the new government began working to restructure nearly \$100bn in privately held foreign-currency debt. It cancelled the deal with the IMF.

The current negotiations come at a difficult time. A boom in commodity prices in early 2021 provided much-needed relief to the Argentine economy. But GDP remains about 8% below the level of 2017. A slowdown in global growth this year will weigh on commodity prices. As central banks around the world raise interest rates to tame inflation, financial conditions look ever less forgiving. And the government has continued to run hefty budget deficits, which it funds by printing money (see chart 2 on next page). In 2021 the central bank printed the equivalent of 4% of GDP.

A self-lacerating evaluation of the 2018 deal, published by the IMF in December, fuelled notions that the fund deserves ►►

#### → Also in this section

**26 Innovative Brazilian slang****27 Bello: Putin's Caribbean chum**

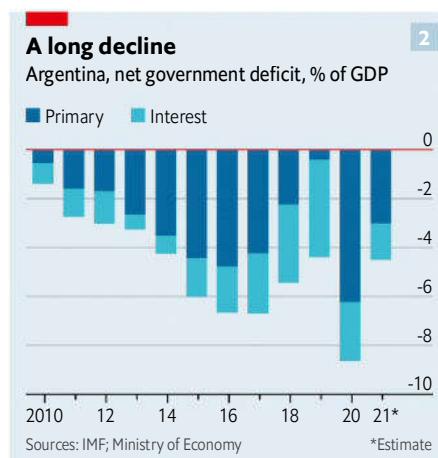
► most of the blame. The potential costs of failed negotiations to the IMF have further contributed to the government's recalcitrance. Because the fund stands to lose money and face, any attempt to drive a hard bargain will be less credible, the thinking goes.

Although the current negotiations are important, Argentina's economic ills predate the loan in 2018. Populist politicians have long meddled in the markets. After the price of meat rose last year with inflation, beef exports were banned. When the ruling coalition lost a primary election in September, the government slapped price controls on more than 1,400 products, from shaving cream to cat food. Its budgets are distorted by sops to special interests. Public sector employment has ballooned over the past decade while the private sector has shrunk. Regressive utility subsidies amount to 1.5% of GDP for electricity alone.

The IMF cannot simply demand reforms to address such problems. The more it asks of Argentina, the less confident it can feel that conditions will be met. However, the fund seems to have insisted on an improvement in the fiscal outlook. Last year's economic rebound helped to shrink Argentina's primary budget deficit (ie, before interest costs) from more than 6% of GDP in 2020 down to 3%.

Martín Guzmán, the economy minister, insists that further reductions should occur at a slow pace, with the primary deficit closed by 2027. That is too slow for the fund's tastes, and involves too many years of government spending financed by the printing presses.

On top of this, the political class appears too busy squabbling to deal with bigger issues. The government has failed to unite in negotiations. Mr Guzmán seems to spend more time trying to convince the powerful Peronist vice-president, Cristina Fernández de Kirchner, of the need for a deal than writing a credible programme. On January 18th Ms Kirchner wrote on her website that the "Macrista pandemic" (ie, the rule of Mr Macri) had been worse than



covid-19. She blames the Peronists' loss in recent mid-terms—the worst defeat in 40 years—on spending cuts. The temptation to spend ahead of next year's presidential election could mean that even if a deal is signed, it could quickly veer off track.

Meanwhile the centre-right opposition, whose leaders are fighting over who will be the presidential candidate, have refused to meet Mr Guzmán, arguing that he hasn't presented a credible economic plan. Even if they win the presidential race, it is not clear they would make serious changes. Federico Sturzenegger, a former central-bank chief, notes that the three non-Peronist administrations that have been in power since the return to democracy in 1983 have failed to stick to fiscal discipline or rein in interest groups.

With deadlines looming, the government is flailing. On January 26th *Clarín*, an Argentine newspaper, reported that the government had warned that it may miss two payments to the IMF, due on January 28th and February 1st, totalling \$1.1bn. It has reportedly asked China for an increase in the size of a standing arrangement with the Chinese government, by which Argentina swaps its currency for an equivalent amount of yuan—a globally accepted reserve currency—thus bolstering its foreign-exchange reserves. Mr Fernández is due to visit Beijing in February.

Such shenanigans are no substitute for fiscal reform. Achieving a budget balance in a difficult post-pandemic environment will not be easy. High inflation is already eroding the real value of some social spending. A new IMF deal without a commitment to reform and near-term budget balance would buy a little time. But it would not do much to boost growth or to win the confidence of investors.

Falling into arrears with the IMF, by contrast, would leave Argentina cut off from other multilateral lenders, who are one of its few remaining sources of credit. In the worst-case scenario, a default could trigger a panic similar to 2001. The outlook is grim. And carries a whiff of *déjà vu*. ■

## Brazilian Portuguese

# Talk talk

SÃO PAULO

**What a rare word for "sex" reveals about a language**

THE SONG, a hit at Brazil's carnival in 2014, starts like any other. A man wonders whether a woman will still love him after he loses his job, his house and his car. But then the chorus gets weird. If the woman stays, the singer belts over a thumping drum, it is because she likes his "lepo lepo". Most Brazilians had no idea what "lepo lepo" meant.

A talk-show host put the question to strangers on the street. "I use it a lot, but I don't know," one man admitted. Some people guessed that it was slang for penis (it is actually slang for sex or sexual prowess). It turned out that the phrase was unfamiliar outside Bahia, the north-eastern state where Psirico, the band, is from.

No matter. Its construction, a loose example of what linguists call reduplication, a way of forming words in which an existing word or part of a word gets repeated, is common in Brazilian Portuguese. "We play around with words, and end up making new ones," says Márcio Victor, the lead singer of Psirico.

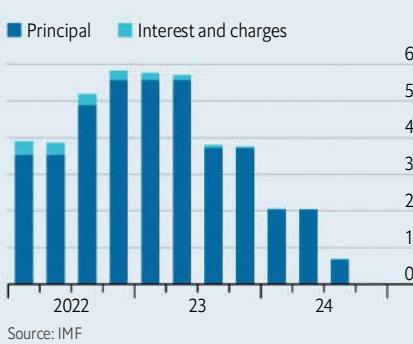
In most cases, the third-person singular form of a verb is repeated to form a noun with a related meaning. For example, "empurra" (she pushes) becomes "empurra-empurra" (jostling crowd, or moshpit). "Lambe" (he licks) becomes "lambe-lambe" (poster). In other cases, the last syllable of a noun is replicated to add intensity. "Choro" (crying) becomes "chororô" (cry-fest or a crybaby).

In many languages reduplication is used to form plurals (in Indonesian, "rumah" means house; "rumah-rumah" houses). In spoken English, it often serves as clarification or to intensify the meaning. The origins of reduplication in Portuguese are hard to pin down. According to a paper in 2019 by Antonia Vieira, a Brazilian linguist, the first Portuguese dictionary, compiled by a priest in the 1700s, contains 44 examples. Many, however, are what Gabriel Araújo of the University of São Paulo calls "pseudo-reduplication", in which the base that is doubled is an onomatopoeic sound rather than a word with meaning, resulting in words like "pi-pi", birdcall, and "zum-zum", the buzz of mosquitoes.

In Brazilian Portuguese, reduplication appears to have produced more, and more varied, words than its European counterpart. In addition to the onomatopoeia of everyday speech, Brazilians use reduplication when talking to children ("au-au" has ►►

## Tough times ahead

Argentina, schedule of debt repayments to IMF  
\$bn



▶ become a synonym for dog) and as pet names for relatives ("vovó" is a nickname for "avó", or grandmother; "titi" for "tio", or uncle). Some examples are thought to be the result of exposure to hundreds of indigenous and African languages, in which reduplication is common.

The urge to reduplicate may reflect a culture that is younger, less conservative and more open to experimentation, some surmise. Reduplication came in handy to name new things in a new world. For example, in the Maré favela in Rio de Janeiro in the 1940s, residents attached a rubber

tyre to a wooden barrel to bring water from Guanabara bay and called it a "rola-rola", from the verb "to roll". "Brazilians use language to make a hard life more fun," says Mr Araújo.

Reduplication, a mostly oral tradition, was hardly studied in Brazil until the turn of the 21st century. But in the past two decades it has started to get more attention. It helps that new reduplicated words appear all the time, while old ones change their meaning or gain currency.

The election in 2018 of Jair Bolsonaro, Brazil's populist president, helped to popu-

larise "mimimi", an onomatopoeic phrase he uses to mock wokeness and concerns about covid-19. On January 17th a Brazilian newspaper came up with "mente-mente", from the verb "mentir" (to lie) to criticise the president.

And as YouTube influencers from Brazil become ever more popular, Brazilian Portuguese has begun to creep across the Atlantic. In November a Portuguese newspaper ran a story with the headline: "There are Portuguese children who only speak Brazilian". Reduplication, no doubt, is among the peeves of their parents. ■

## Bello The bear in the Caribbean

*Russia has become a crucial ally of Nicolás Maduro's regime in Venezuela*

IT RAISED EYEBROWS in the West. Amid talk of war in Ukraine, Kremlin officials this month dangled the possibility that, if NATO did not stop protecting countries close to Russia, Russia might deploy forces to Venezuela and Cuba. Jake Sullivan, the United States' national security adviser, dismissed such talk as "bluster". A large-scale deployment is indeed unlikely. Nonetheless, Russia's role in the region is troubling. For the past 15 years or so it has propped up crooked dictatorships in Venezuela and Nicaragua. Vladimir Putin relishes a chance to needle the United States and look mighty on Russian television.

On three occasions since 2008 Russia has sent a pair of Tupolev bombers, capable of carrying nuclear weapons, halfway around the world to Venezuela for missions that have lasted around a week. They have twice strayed into the airspace of Colombia, an ally of the United States. In 2008 Russia sent the *Peter the Great*, a nuclear-powered guided-missile cruiser, and several other ships for exercises with the Venezuelan navy.

These deployments all coincided with moments of tension with the United States over Russian attacks on Georgia and Ukraine. Their purpose is "symbolic reciprocity", says Vladimir Rouvinski, a Russian academic at Icesi University in Cali, Colombia. "You, the United States and Europe, do things in Ukraine. We will do things in your zone of influence."

Perhaps the closest the world ever came to armageddon was in 1962 when the Soviet Union installed nuclear missiles in Fidel Castro's Cuba, only 100 miles or so from Florida. They were withdrawn in return for an American guarantee not to invade Cuba, which remained a subsidised satellite of the Soviet Union until that empire's collapse

in 1991. When Mr Putin came to power in Russia a decade later one of his first acts was to shut a Soviet-era listening post on the island in a gesture of détente.

Hugo Chávez, Venezuela's late leftist and anti-American strongman, offered Mr Putin a way back into Latin America. When Chávez was flush with oil money he spent some \$6bn on Russian armaments, including 24 Sukhoi fighter jets, 50 helicopters, tanks, anti-aircraft missiles and 100,000 Kalashnikov rifles. That was the start of what has become a broad and deep relationship. Between them Chávez and Nicolás Maduro, his successor, have signed some 200 agreements with Russia.

For Mr Putin Venezuela has become a colourful example of his claim to be restoring his country's global influence. He lacks the cash to be a paymaster in Latin America. But he is a source of short-term loans, limited investment, arms sales and diplomatic support for anti-American regimes. In 2018 Mr Maduro staged an illegitimate election and the democratic world recognised Juan Guaidó, the opposition speaker of the legislature, as presi-

dent. It looked as if Mr Maduro might fall, as President Donald Trump piled on sanctions and mused about military intervention. Mr Putin came to Mr Maduro's aid, deploying a team of around 100 uniformed Russian military advisers to maintain the missile systems, advise on drone warfare and act as a geopolitical tripwire. They have stayed.

In 2017 Russia opened a fortress-like building in Managua, Nicaragua's capital, officially to train Central American police to curb drug-trafficking. It is run by Russia's interior ministry. Nicaragua's opposition believes it to be an intelligence post conducting surveillance for Daniel Ortega, the country's dictator. Mr Putin's ties with Cuba are more distant.

Russia has suffered setbacks in Venezuela. The relationship has been marked by mutual corruption: a Kalashnikov factory announced in 2006 has still not been built, and the money for it vanished. Rosneft, a Russian oil giant, secured stakes in Venezuela's oilfields only to announce its withdrawal from the country in 2020 to avoid American sanctions. Its assets there were transferred to the Russian government.

Mr Putin wants to be seen as the leader who made Russia a great power again. So he may be reluctant to retreat from Venezuela. But he lacks the resources to turn it into a successful satellite. His interventions have been cheap. Though there has been talk of Russia setting up a base at La Orchila, a Venezuelan island in the Caribbean, that would be too costly, thinks Mr Rouvinski. Some say Russia would welcome a negotiated solution to Venezuela's political conflict, provided that the interests it has acquired in the country were respected. But that prospect depends on what happens in Russia's own neighbourhood.





**Myanmar's coup, one year on**

## The enemy of my enemy

SINGAPORE

### Myanmar's generals have united the country against themselves

ZIN HTET AUNG had always loathed the Rohingyas, a Muslim ethnic group from Rakhine, a state in western Myanmar. When the Burmese army led mobs on a rampage through Rohingya villages in 2017, burning, raping and killing and prompting some 700,000 Rohingyas to flee to neighbouring Bangladesh, he believed the military campaign was justified. He regarded the minority as "terrorists" and "illegal immigrants". Most Bamar, the ethnic majority, to which he belongs, felt the same way.

But one day last June Mr Zin Htet Aung apologised on Facebook for his views and asked the Rohingyas for forgiveness. His contrition is part of a chorus of mea culpas. Since the army launched a coup on February 1st 2021, many Bamar have publicly apologised for pooh-poohing the plight of Rohingyas and other persecuted ethnic minorities. Demonstrations in solidarity with Rohingyas have taken place in cities all over the country in the past year. "Now we are suffering," says Mr Zin Htet Aung.

"We realise that we are oppressed, that we are all in the same boat."

That is not how Min Aung Hlaing, the commander-in-chief, expected things to go—but then Myanmar's top brass have never been much good at reading the country's mood. The armed forces have repeatedly called elections, and then been surprised when the National League for Democracy (NLD), the party of Aung San Suu Kyi, Myanmar's most famous democracy activist, has won them. In 2008 the generals devised a hybrid form of democracy that entrenched their power and kept down the NLD and Ms Suu Kyi. But the NLD still triumphed in elections in 2015, winning by a landslide, and Ms Suu Kyi found a

way around a rule intended to stop her from leading the government.

By the time the NLD was re-elected five years later by an even bigger margin, Mr Min Aung Hlaing decided he had had enough. Yet in wresting power from Ms Suu Kyi, who always praised the army in public and deferred to many of its whims, the generals have inadvertently created the conditions necessary for a new, less chauvinist politics to take root, one which has the potential to unite Myanmar's many fractious ethnicities—and, perhaps, to evict the army from power.

That is quite an achievement in a country with a long history of enmity between ethnic groups. These tensions were stoked by the British during the colonial era. Within a year of independence in 1948, the army was battling ethnic-minority insurgencies in the country's borderlands. The fighting has continued ever since. Many Bamar have been indoctrinated by decades of propaganda portraying the army as the guardian of the nation, defending it from rebels, traitors and infiltrators. Prejudice against the Rohingyas even found a supporter in Ms Suu Kyi, who defended the army's persecution of that group. Many Bamar, who idolise her, cheered her on. It helped that the violence meted out against minorities was easy to ignore, taking place as it did in the distant, mountainous fringes of the country, far from the Bamar heartland in the central lowlands.

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But when the army cracked down on the protest movement that arose in opposition to the coup, soldiers turned their guns on minorities and Bamars alike. And when resistance showed no sign of ebbing, the army began razing towns and massacring protesters. The junta's forces have killed nearly 1,500 civilians since the coup, according to the Assistance Association for Political Prisoners, a charity based in Thailand. "Your average NLD fan now is much more genuinely sympathetic to what ethnic people have gone through," says Kim Jolliffe, an analyst who specialises in Myanmar's ethnic politics.

This shift is evident in politics, too. After the coup, deposed lawmakers from the NLD formed a shadow government called the National Unity Government (NUG). They promised that it would be different, in style and substance, from the one that had just been ousted. Ms Suu Kyi was unpopular with ethnic minorities, who were disappointed when she failed to devolve power from the highly centralised state. Some Bamar politicians were disillusioned, too, since she ran her party as an authoritarian, refusing to delegate beyond a small circle of geriatric acolytes.

The NUG has, by contrast, taken pains to show that it is listening to its critics. It is staffed with young people and ethnic minorities, and says it makes decisions by consensus. It has symbolically repealed the constitution, which was enacted by a previous junta in 2008, and promised to forge a federal state and to grant Rohingyas citizenship. This conciliatory tone and inclusive approach mark "a new era of politics", says Maw Htun Aung, a 37-year-old activist of Kachin ethnicity who is a deputy minister in the NUG.

These changes are born of pragmatism as much as principle. The parallel government is in a precarious position. It does not control any territory and no foreign governments has formally recognised it. One reason that it has tried to make amends for its treatment of Rohingyas is its desire for legitimacy on the interna-



tional stage, says Mr Aung Kyaw Moe, a Rohingya adviser to the NUG's human-rights minister. The shadow government is also keenly aware that, to have any hope of conquering territory, it must forge alliances with some of the two dozen established ethnic rebel groups, which between them command 90,000 troops. (The Burmese army is thought to number 300,000 soldiers.) That puts these insurgents in the position of "kingmakers", writes Min Zin of ISP, a think-tank in Yangon. Their lingering distrust of the NLD has made negotiations with the NUG more difficult.

### The ties that bind

Nonetheless, since the coup, four rebel groups have provided safe haven to NLD politicians fleeing the army, nominated members to the NUG, engaged in negotiations about a new constitution and worked with the shadow government to deliver humanitarian aid. They have collaborated on the battlefield, too, helping the NUG obtain weapons and advising its leaders on military strategy. Scores of Bamar militias loyal to the shadow government, known as people's defence forces, have sprung up. Rebel groups have trained these insurgents and even fought alongside them. This degree of collaboration between Bamars and ethnic minorities "in a popular democratic movement is unprecedented in the country's history", says Mr Jolliffe.

The junta is struggling. It is deploying its traditional "four-cuts" counter-insurgency method, which involves severing ties between guerrillas and the locals who provide them with food, funding, intelli-

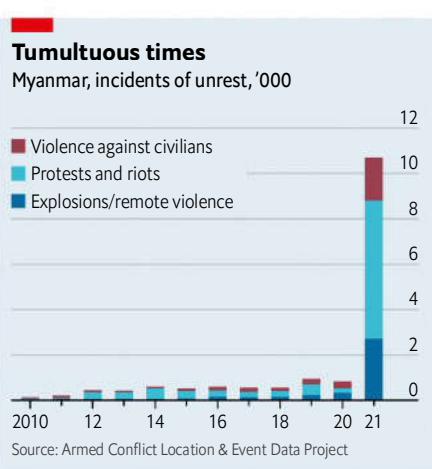
gence and recruits. In practice that means terrorising entire villages; more than 400,000 people have fled their homes. That is not having the desired effect. Instead of pacifying the population, such acts of cruelty are "like a huge recruiting drive for the local defence forces", says Mary Callahan, a historian of the army.

The army is now fighting on multiple fronts: in cities, where underground cells set off bombs almost every day; in the central lowlands, inhabited by Bamars, which have not seen conflict in generations; and in some ethnic-controlled peripheries (see chart). A handful of rebel groups that have not joined the resistance are seizing the opportunity to expand their territory. The junta is unable to pick its battles, is failing to attract new recruits and is alienating the public. Nor has it managed to sign ceasefires with ethnic rebel groups. It does not have momentum on its side, says Matthew Arnold, a researcher on governance in Myanmar. The opposition does.

In the territory that it does control, the junta is finding it difficult to govern. "It is the equivalent of a foreign occupation force," says a former diplomat, one which can only provide "some limited government" through the application of brute force. Its grip on the levers of power is shaky. Since the coup, some 400,000 civil servants have resigned in protest, according to the NUG. Although the figure is no doubt inflated, it hints at the scale of disruption. Poverty is growing (see map). The economy is in turmoil. The World Bank reckons that it is a third smaller than it would have been without covid-19 or the coup. The junta faces a growing budget deficit and may struggle to pay the civil servants who remain in post. Myanmar "is already at a point where it's ungovernable", says Ms Callahan.

The junta's failure to master the situation does not mean that it is likely to be defeated by the resistance, at least in a conventional manner. The army has far more troops and weapons at its disposal. Opposing forces are dispersed across the country, and have not been knitted into any unified command structure. If their movements are guided by a grand military strategy, it is not discernible (though neither is the junta's). Victory will not involve resistance troops marching on the capital.

Instead it will consist of concerted pressure from several directions, forcing the army to withdraw from swathes of the country, a process that would sap morale and stoke division among the top brass, perhaps leading to an internal split. Yet such an outcome could take years. It also would depend on the parallel government persuading ethnic minorities, many of whom are still nursing old grievances, to trust it. Yet one thing is already clear: in the struggle for the hearts and minds of the Bamar majority, the army has lost. ■



## Life in Afghanistan

## Khyber crevasse

Afghans are more pessimistic about their future than ever

WHEN AFGHANS were asked in 2016 to rate their lives on a scale of zero to ten, with zero representing the “worst possible life” and ten the best, they gave themselves a respectable 4.2, the same as Indians and only a little below the median of 5.4 for 142 countries. By the summer of 2021 the score had plummeted to 2.3, making it the most miserable of all the countries polled by Gallup, a research firm, in a long-running series of surveys.

Gallup spoke to a nationally representative sample of 2,002 Afghans between August 8th and September 29th last year, even as the Taliban was completing its takeover of the country. The pollster asked about people’s day-to-day well-being, just as it has done in previous years. Where possible, the researchers spoke in the privacy of people’s homes or at least discreetly out of earshot. The responses paint a grim picture of a population in despair.

Fully 75% of respondents said that there had been times in the past year when they did not have enough money for food, a slight rise from 2019 and a big jump from the 44% in 2016. Asked if women were treated with respect 67% of respondents replied “no”, up from more than half in 2019 and below 40% in 2016. Strikingly, the share of men who replied in the negative has jumped from 39% to 60% in two years.

Afghans are pessimistic about the future, too. When asked in 2016 and 2019, they imagined that life would improve within five years. In 2021 they expected the future to be worse. Less than a quarter thought that Afghanistan was a place where children could “learn and grow”, down from two-fifths in 2019. Unsurprisingly, half said they wanted to emigrate. Among young men the figure was two-thirds. In 2016 a third of respondents said their standard of living was improving.



Baring their hearts to pollsters

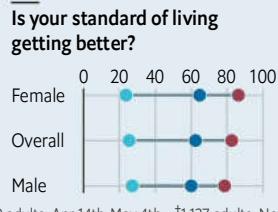
Last year 82% said it was deteriorating.

Indeed, in the four months since the survey the situation has become even more bleak. The UN estimated in October that 18.8m of the country’s 42m people faced acute hunger, 4.3m more than a year earlier. A severe drought, the second in four years, has reduced the wheat harvest. But the immediate cause of food scarcity has been the drying up of foreign money. The country used to receive about \$8.5bn a year, two-fifths of GDP, from abroad before the Taliban took over.

While Afghans go hungry some \$10bn of the country’s foreign reserves is languishing in foreign banks. Those funds could help support the local currency, which has depreciated by 25% against the dollar since mid-August, pushing up the cost of imported staples. But the Afghan government’s foreign accounts have been frozen since the Taliban took power. The rich world would like assurances that the Taliban are no longer the repressive bunch ousted by America 20 years ago. On January 15th a Taliban junior minister said that schools—currently closed to girls over the age of 11—would reopen again at the end of March once segregated classrooms are ready. But for Afghans it is food, not education, that is the most pressing concern. ■

## Bleak state

Afghanistan, % responding “no”



Sources: Gallup; The Economist

\*1,000 adults, Apr 14th-May 4th

†1,127 adults, Nov 3rd-Dec 15th

## Post-Soviet demographics

## Kazakhifying Kazakhstan

ALMATY

How money and migration changed the face of a nation

LIKE MOST autocrats Nursultan Nazarbayev, who ruled Kazakhstan for three decades, thought a lot about how best to honour himself. The 81-year-old resigned as president in 2019 and took on a role pulling strings from behind the scenes, but not before ensuring that the capital city would bear his name. At the start of January days of unrest and violence forced Kassym-Zhomart Tokayev, his successor as president, to promise wide-ranging changes to the regime Mr Nazarbayev had built. But one part of the older man’s legacy will not be easy to undo: the dramatic demographic transformation of the country which he engineered during his decades in power.

When the Soviet Union collapsed in 1991, Kazakhstan was the only ex-Soviet republic where the people after whom it was named were not a majority. Ethnic Kazakhs were just under 40% of the population. Russians were 37%. Other minorities made up the rest. All this was Stalin’s legacy. His famine in the 1930s killed a quarter of the country’s population, and he deported ethnic groups he didn’t trust to Kazakhstan.

By the time Kazakhstan celebrated the 30th anniversary of its independence at the end of 2021, a new census revealed a different country. Ethnic Kazakhs are now 70% of a population of 19m. Ethnic Russians are only 18%. Outward Russian migration and lower birth rates among Slavic minorities contributed to this shift. But a generous government programme designed to persuade foreign-born Kazakhs to move to the country played a big part, resulting in about a million new arrivals since independence.

Mr Nazarbayev launched the programme in the 1990s because he deemed the country’s demographic make-up a threat to its national security. Saying so openly would have alienated both his ethnic-Russian citizens and the government of Russia, with which Kazakhstan shares a border stretching for 7,600 km. So he offered perks such as cash and generous loans to buy homes and businesses in order to lure the millions of Kazakhs scattered abroad back “home”, where many of them had never set foot before.

Foreign-born Kazakhs now make up 6% of the population. Many have settled in seamlessly, especially those from other former Soviet states. Others have struggled with culture, language and politics, including some Chinese-born Kazakhs seek- ►

▶ing refuge from anti-Muslim repression in China's Xinjiang region. They have found that the government's ties with China trump ethnic solidarity.

Like migrants around the world, they have also faced hostility from those already in the country. Some citizens resent the perks foreign-born Kazakhs are offered. To allay such worries the system now encourages migration to designated regions, mostly in the north along the border with Russia, where large groups of ethnic Russians live. The official goal is to tackle labour shortages. But the unspoken aim is to

make these areas more linguistically and culturally Kazakh.

That goal has become more pressing for Kazakhstan's government since Vladimir Putin, Russia's president, annexed Crimea in 2014, using the supposed oppression of Russian-speakers as a pretext. Russia's renewed sabre-rattling on the Ukrainian border has reminded Kazakhs that some Russian nationalists make territorial claims on Kazakhstan, too. Many were anxious when Russian troops briefly got their boots on the ground in Kazakhstan in January, after Mr Tokayev asked Mr Putin for help

restoring order.

Kazakhification frightens the 30% of Kazakhstanis from ethnic minorities. They were terrified by deadly attacks in 2020 on villages inhabited by Dungans, Mandarin-speaking Muslims of Chinese descent. Some fear that ethnic nationalism may be unleashed now that Mr Nazarbayev, who at least combined his efforts at Kazakhification with rhetoric about national harmony, has all but left the scene. As legacies go, ensuring that citizens get on may be as hard to make stick as the new name for the capital—which may soon revert to Astana. ■

## Banyan Put down your truncheons

*Bangladesh shows that sanctions really can improve respect for human rights*

**T**HREE ARE good reasons why women are less likely than men to be at the front of student-led protests making a stand against the regime of Sheikh Hasina Wajed, Bangladesh's steely prime minister, which is wielding truncheons and a patronage system based on graft to extend its 13 years in power. Young men picked up by the security forces can expect a beating. Young women fear being raped. In a conservative Muslim country, the mere fact that a woman has entered a police station or jail unescorted generates a special stigma. Fiancés' families often cancel planned weddings. Reza Kibria, a former IMF official trying to turn student protests into a political opposition, describes his unexpected role as matchmaker for women caught up in the security forces' dragnet.

Until recently, any challenge to the regime looked nearly hopeless. The powerful security forces—which have made or broken governments, when not ruling themselves—have firmly backed Sheikh Hasina, helping her win the last election amid claims of vote-rigging.

Their support for her was not inevitable. The army assassinated her father, Sheikh Mujibur Rahman, who was also the founding father of Bangladesh, in a coup in 1975, along with many of her family. Sheikh Hasina's political career has been about avenging their deaths. In opposition she was a fierce critic of the security services and of their onetime paymaster (and her arch-rival), Khaleda Zia of the Bangladesh Nationalist Party (BNP). Today Mrs Zia, infirm and under house arrest, poses no threat. Sheikh Hasina has purged the army and police of BNP supporters, promoting instead loyalists with a sense of impunity.

The impunity extends, above all, to violence. The most notorious unit of

Bangladesh's thugocracy is the Rapid Action Battalion (RAB). Supposed to go after drug gangsters and terrorists, this paramilitary force has as often settled political scores and hounded the opposition. It is said to have killed over 1,300 Bangladeshis in what are known euphemistically as "crossfire" incidents (read: extrajudicial killings) and abducted hundreds—many of whom later turn up dead.

Yet the stroke of an American pen has brought about a striking shift. Pressed by Congress, the administration of President Joe Biden in December imposed sanctions on the RAB for its human-rights abuses, as well as on a handful of top security officers with links to it, including the country's police chief. Some speculate that other individuals could be next, including the prime minister's powerful son, Sajeeb Wajed, who has an American passport. An atypical silence has descended on the elites, including the normally voluble Mr Wajed. More striking: the number of extrajudicial killings has fallen to zero.

Abrar Chowdhury, who recently retired as a professor from Dhaka University, says

the government is "rattled". Many among the elites send their children to Western universities, funnel ill-gotten cash to Western bank accounts and hope to retire to properties in America, Australia, Britain or Canada. With these perks at risk in the United States, and possibly elsewhere in future, suddenly the elites' support of Sheikh Hasina at the next election, due by the end of next year, can no longer be taken for granted.

Nor, more crucially, can the complicity of the security services. Senior officers are not the problem. They run massive business interests and enjoy all kinds of swag. Silver from a stream of Chinese loans and arms sales has flowed into generals' pockets. The poorly paid lower ranks, in contrast, have only one real route for financial betterment: a tour as UN peacekeepers, of which Bangladesh's are the world's most numerous. Yet calls are growing, both within the Biden administration and by human-rights groups, for the UN to suspend Bangladesh's peacekeeping force until RAB elements are expunged from it.

The American sanctions will not end Sheikh Hasina's aversion to democratic norms. Other Western powers are not guaranteed to back America up. Britain's post-Brexit approach, emphasising former imperial connections, is shamefully limp on human rights. Meanwhile, new regulations crack down harder on social media in Bangladesh, while a draft law erodes further the accountability of an already gutted election commission.

Still, as Mr Kibria puts it, the sanctions mark an easy—and, with ordinary Bangladeshis, wildly popular—victory for America. The victory, in turn, has offered civic groups and democratic-minded politicians an unexpected glimpse of a more hopeful future.





### The Winter Olympics

## Faster, higher, bossier

### China is determined that the games will go smoothly

CHINESE OFFICIALS like to call Beijing the “double-Olympic city”. No other can boast having staged both the summer games and its winter equivalent, the 24th iteration of which will open in the Chinese capital on February 4th. The winter games will arouse less enthusiasm, in China and globally, than the summer ones in Beijing in 2008. But for Xi Jinping, China’s leader, they are of great symbolic importance. They are also fraught with risk. Overshadowed by diplomatic boycotts, a potential war in Europe involving China’s close friend, Russia, and by Omicron’s advance, the event will fray nerves.

These are the first games on Mr Xi’s watch. State media point out how much he has been involved with them from the earliest stage, when China was preparing to submit a bid to the International Olympic Committee (ioc) to host them. Beijing won its bid in 2015 by a thin margin, gaining four more votes from ioc delegates than its rival, Almaty in Kazakhstan. That may be a huge relief in retrospect for the ioc: more than 200 people died this month in Kazakhstan, many of them in Almaty, in un-

rest that was triggered by rising fuel prices. But Mr Xi may now be wishing that Beijing had not been successful.

The games are taking place nearly a decade into Mr Xi’s rule. By convention it should be the year he steps down from his Communist Party roles. But it is expected that he will ignore that unwritten requirement. He will want a well-managed games, praised by the public, which will set the tone for a year that will celebrate his leadership—culminating this autumn in a party congress at which he will be declared, in effect, ruler for as long as he wants.

SARS-CoV-2 poses the biggest challenge. China is doggedly adhering to a “zero-covid” policy aimed at eliminating the virus entirely. But on January 15th the capital reported its first locally transmitted case involving the highly infectious Omicron variant. The city is on edge. Officials have organised mass testing in some areas, in-

cluding of all the roughly 2m residents of Fengtai district.

Only a handful of Omicron cases have been found in the capital and just a few dozen of the Delta variant. But officials are taking no chances. On January 17th the government said tickets to the games would not be sold. These would have been available only to people in China—spectators from abroad having already been banned. Now the government says it will “organise” people to watch the events. Social media in China have swelled with objections.

The government’s botched handling of the coronavirus during the early days of the outbreak in the central city of Wuhan in late 2019 and early 2020 caused panic and widespread resentment. But the zero-covid approach soon proved effective at stopping transmission. Public confidence in the party soared. It probably remains high (there are no reliable polls). Yet there are signs that discontent is spreading as lockdowns become more common, along with tough quarantine measures in some places that are making travel difficult for many Chinese. The lunar new year begins on February 1st. Many people would normally journey great distances to celebrate the holiday with relatives.

Grumbling has been particularly loud in Xi’an, a western city of 13m people where stay-at-home controls were imposed on December 23rd after the discovery of a few hundred Delta cases. People were not even allowed out to buy food. Officials organised deliveries, but some residents com- ►

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plained that supplies were inadequate and that people could not get urgent medical attention. Restrictions were lifted on January 24th, after one of China's longest, toughest and biggest lockdowns.

But several other cities have also imposed tight controls. Social media are filled with complaints about the suffering this is causing, and the disruption to lunar new-year plans. Officials say travel is fine as long it is not between areas affected by covid-19. But they often define those areas broadly. Desperate people in Beijing have been writing "I want to go home" on Weibo, a social-media platform, fearing zealous officials will prevent them from seeing family members in their home towns.

### In the loop

The spectacle may not attract as many viewers as the one in 2008. China's first staging of an Olympic games was popular at home. To bolster its image, the party has long encouraged Chinese to remember pre-Communist days when, as officials like to recall, the country was seen in the West as the "sick man" of Asia. In 2008 it won not only the most gold medals in its Olympic history, but more than any other country at those games, exceeding America's haul by 12. China was proved mighty.

But it is not a winter-sports superpower. Gracenote, an analytics company, says that predicting China's performance at the winter games is tricky. It reckons the country may get only six gold medals. That would see it placed far behind the front-runners: Norway (22), Germany (12) and Russia (11). America is tipped to get seven. China has a good excuse for failing to dominate winter sports. It is a relative newcomer to them. Skiing became popular only in the 1990s with the rapid growth of an affluent middle class: its members fill slopes around arid Beijing, where snow is usually supplied (as it will be this year) by machines. But it remains a niche activity.

The government will try to stoke patriotism by showing off its organisational ability, including the extraordinary lengths to which it will go to prevent the virus spreading from the foreigners. This involves a "closed-loop management system" designed to keep participants separate from everyone else. Buildings inside the "loop" have been sealed off with fences patrolled by guards. The roughly 11,000 athletes, support staff and media from abroad will be closely watched.

It will be difficult to manage. The venues are widely scattered, with the farthest-flung ones located about 200km by road from central Beijing. People travelling between them must use dedicated transport or train carriages. Officials are so nervous of the virus leaking (a few dozen people arriving for the games from abroad have tested positive) that they have told people to

stay away from any Olympic vehicle involved in an accident and wait for "specialists" to arrive.

It may help the party that nationalist sentiment, which it has worked hard to foster, is running high. This makes it easy to blame foreigners, especially Westerners, for any difficulties that China may face. Many nationalists believe the party's conspiracy theories, including one that the virus was created in an American military lab. They rallied round the government after America announced a diplomatic boycott of the games over Chinese human-rights abuses in Xinjiang and elsewhere. Several other Western countries have followed America's lead, announcing that they will not send senior officials to the event. Online forums in China have filled with scorn. Many Chinese netizens accuse the West of politicising the Olympics.

Yet for China the games are highly political. This will be evident at the opening ceremony, to be held at the "bird's nest" national stadium where the summer Olympics began in 2008. State media say the main theme of the performance this time will be the building of a "community with a shared future for mankind"—one of Mr Xi's favourite slogans. Western governments read it as shorthand for efforts to create a world that accepts China's autocratic form of government, ignores its violations of human rights and rejects Western domination of global rule-making. An adapted version of the slogan is China's official motto for the games: "Together for a shared future".

China's efforts to foster Olympic camaraderie could perhaps be spoiled by Russia, whose president, Vladimir Putin, is due to attend the opening ceremony. Mr Xi is doubtless hoping that his friend will not disrupt the games by repeating in Ukraine

what happened in Georgia on the opening day of the summer games in 2008: a Russian invasion. But even if Mr Putin were to be so impolite, China would—as it did then—refrain from issuing any public rebuke (see Chaguan).

It will not be so restrained should anyone dare to challenge the party directly. On January 18th a Chinese Olympic official warned athletes that they could face punishment for "any behaviour or speech" deemed to be against the Olympic spirit or Chinese law. It is far from clear what would happen should athletes balk at strict covid controls. Angry scenes are possible.

Security will be intense. Local governments have been instructed to prevent petitioners from travelling to the capital. These are usually people who want to draw the central government's attention to local grievances, not anti-party activists. But people who may cause embarrassing scenes—even handing out a flyer can be deemed such—are always unwelcome near official festivities. The party is using its most trusted supporters to make sure events run smoothly. Members of the party, or people applying to join it, have been given preference when recruiting volunteers to staff the venues.

China's security forces will remain on high alert for weeks. The Olympics close on February 20th, but the Paralympics will not be held until the next month, from March 4th to 13th. The annual session of China's parliament is normally held in early March, too. In 2020 the government postponed the session until May because of the outbreak of covid in Wuhan. With cases of covid-19 reappearing, it is possible that officials will again announce a postponement. But the Olympics are set to proceed. They will be a tough early test in Mr Xi's hoped-for year of triumph. ■



As close as they'll get

# Chaguan | How China sees war in Ukraine

*Shared hostility to America makes China close to Russia, but wary*



**C**HINA'S RELATIONS with Russia are the strongest they have been for 70 years. When President Xi Jinping welcomes Vladimir Putin, the Russian leader he calls his "best friend", to a planned summit just before the Beijing Winter Olympics open on February 4th, powerful interests will bind the two men. China has capital to invest, technology to sell and an ever-growing appetite for oil, gas and other commodities. Russia's economy, though ailing, complements China's, offering natural resources that can be supplied via pipelines and railways which are—in happy contrast with maritime supply routes—immune to blockade by foreign navies. A sense of history unites the leaders. Both see a world order being reshaped by American weariness and self-doubt, creating chances to test and divide the democratic West. Chinese and Russian diplomats and propaganda organs relay and amplify parallel narratives about the benefits of iron-fisted order over American-style dysfunction. Joint military exercises demonstrate growing trust.

In a recent speech in Australia aimed at rallying "freedom-loving democracies", Britain's foreign secretary, Liz Truss, described China and Russia as aligned and "emboldened in a way we haven't seen since the cold war". In Washington commentators suggest that China and Russia see a shared interest in a Russian armed adventure in Ukraine that tests President Joe Biden's resolve and finds it wanting. Some go further, arguing that Mr Xi might watch an unchallenged Russian attack on Ukraine and conclude that he can safely invade Taiwan, the democratic, self-ruled island of 23m people that China claims for its own. In this telling, China's scruples about Ukraine mostly involve timing. An American news service recently claimed that Mr Xi asked Mr Putin not to attack during the Olympics, citing unnamed diplomats. China's embassy in Moscow called that report "a hoax and a provocation".

These being important questions, Chaguan sought the views of Chinese scholars who specialise in Russia. They call it ignorant to imagine that Communist Party bosses might endorse attacks on Ukraine, let alone see in it a trial run for an invasion of Taiwan. True, Chinese scholars usually grumble when foreigners doubt that China is anything other than a peace-loving giant. Such academics are also duty-bound to reject comparisons between foreign invasions and an assault on Taiwan, whose fate China deems

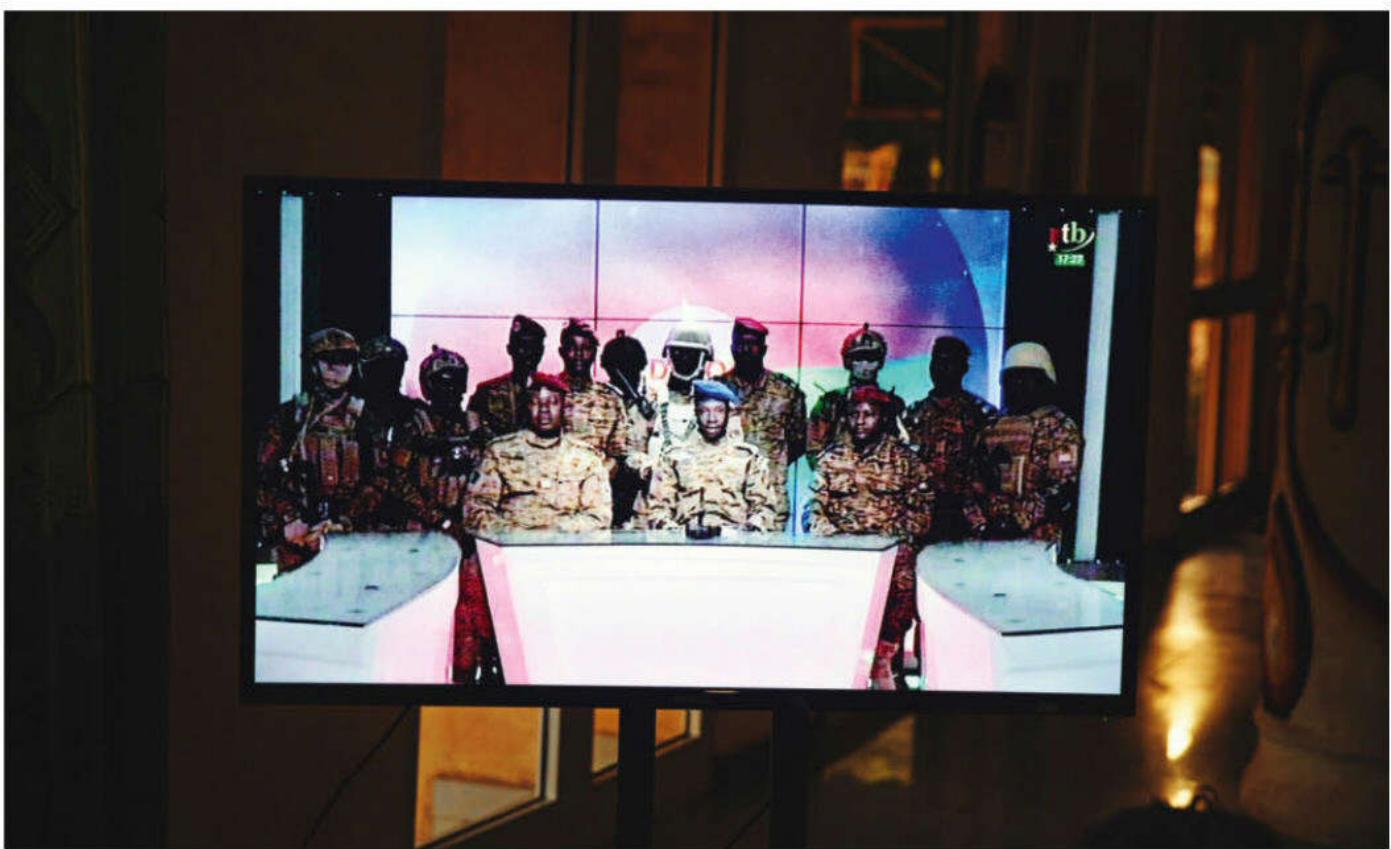
a domestic question. More convincingly, Chinese experts sound sincerely insulted by the idea that conflict in Ukraine would set a precedent for something as grave as war over Taiwan. They do not hide their belief that Russia simply does not matter as much to America as China does. Indeed, they concede that China returns the favour, thinking more about confrontation with America than friendship with Russia. China-Russia ties may be closer than they have been since the days of Mao and Stalin, when the Soviet Union was China's "Big Brother", an overbearing but indispensable patron. That does not make them uniquely important.

China was a study in caution after Russia invaded Ukraine in 2014. In keeping with its obsession with its own territorial integrity, China abstained when the UN Security Council considered the Ukraine crisis in 2014. Chinese officials blamed tensions on plots and meddling by hostile Western forces, rather than Russia. But China has never recognised Russia's annexation of the Crimean peninsula, and has since worked to build trade with Ukraine. China criticised American and European sanctions imposed on Russian officials, banks and companies after 2014. But by and large Chinese banks and companies did not try to bust them, putting access to Western markets and financial systems first. China has helped Russia reduce its vulnerabilities to sanctions, making it easier to use Chinese yuan for some payments rather than dollars. Such initiatives have always been limited by Chinese capital controls, though. In 2014 Russian elites had "very naive expectations" of the help that China would offer, says Alexander Gabuev, a China expert at the Carnegie Moscow Centre, a think-tank. Now the two countries are more realistic about each other, he says, and relations are the stronger for it.

## China and Russia: aligned, but not alike

In China some nationalist professors with large social-media followings proclaim that Chinese firms would surely defy American sanctions imposed over a fresh Ukraine conflict. They predict that if America takes the dramatic step of cutting Russian banks' access to SWIFT, an international payments system, China might build an alternative payments network with Russia, to challenge the dollar's hegemony. Other, more sober scholars are sceptical. Feng Yujun, director of the Centre for Russian and Central Asian Studies at Fudan University in Shanghai, suggests that as a commodities exporter, Russia can survive economic isolation, whereas "China's development hinges on being tightly connected to the world's industrial, value and supply chains." Mr Feng disagrees that China would profit from a Russia that isolates itself further from the West. Russia already seeks China's money, technology, markets and political support. How would China gain from a still more dependent Russia, he asks?

Yang Cheng, an expert on Russia at Shanghai International Studies University, suggests that a major conflict in Ukraine would bring few benefits to Mr Putin. But he also argues that America has few good options. For one thing, sanctions that hit Russian energy exports risk fuelling inflation that hurts America, he says. As for Russia's demands for sweeping security guarantees as a price for peace, Mr Biden can either accept them and duly confirm America's reduced clout, or reject them and risk turmoil in Ukraine. Still, Mr Yang sees no specific benefit to China in such a clash, for he is sure that America's foreign priority will remain "the grand strategy of containing China". He is not alone in his analysis. Seen from China, a skirmish in Ukraine is a risky sideshow, not a window on any future world order. ■



## West Africa

### The juntas and the hunted

OUAGADOUGOU

#### A coup in Burkina Faso will help the Sahel's jihadists

**M**OST COUPS begin with confusion. In Burkina Faso the first sign was gunfire echoing from army bases in Ouagadougou, the capital, on January 23rd. Mutinous soldiers soon emerged, demanding the resignation of the top brass and better equipment for their fight against jihadists terrorising the Sahel. By daybreak bullet-riddled presidential vehicles were visible in the streets and soldiers surrounded the main television station.

Then came clarity and cliché: uniformed men armed with guns and a clunky label, the Patriotic Movement for Safeguarding and Restoration (pictured), announced that they had taken over. The government had been dissolved and the constitution suspended, they said. The president, Roch Kaboré, has not been seen and is thought to be under arrest. In his place came a new strongman, Lieutenant-Colonel Paul-Henri Sandogo Damiba, an infantry officer who last year published a book criticising the way the war against jihadists is being waged.

But the coup itself threatens to undermine the campaign. It is the biggest anti-terrorism operation in the world involving Western forces, now that they have withdrawn from Afghanistan. France has deployed about 5,100 soldiers in the Sahel, a band of scrubby bush along the southern edge of the Sahara. The French troops are backed by commandos from America and from other European countries.

The UN, meanwhile, has a force of about 15,000 peacekeepers in Burkina Faso's neighbour, Mali, which has had two coups of its own since 2020. All of these foreign soldiers are battling alongside local forces to hold back insurgents loosely affiliated

with al-Qaeda and Islamic State.

The fight was already going badly. The jihadists have tormented three of the poorest and most poorly governed countries in the region: Burkina Faso, Mali and Niger. In Burkina Faso more than 1.5m people out of a population of 21m have been forced to flee their homes in the past three years. Almost 7,000 have been killed.

A growing part of the West's strategy has been an effort to build accountable democracies. Corruption and bad government, after all, have spread disaffection across the region, fuelling the insurgencies. France, which in the past was only too happy to prop up friendly autocrats, now emphasises the "return of the state", and is planning to reduce the number of troops it has fighting in Africa.

Other European countries and America, focused on training, have tried to instil Western notions of civil-military relations—whereby the army answers to civilian leaders—and respect for human rights, in the hope that this will reduce the brutality that drives young men to join the rebels.

Yet the recent spate of coups has complicated these efforts. Mali's junta has postponed elections and a handover to civilians until 2025, prompting its neighbours to impose financial sanctions and close their borders with it. Mali has also hired Russian mercenaries accused of human-rights abuses to protect its officials and train its soldiers, which has prompted ➤

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► several Western countries to threaten to withdraw their forces. Even if Burkina Faso's putschists do not fall out so spectacularly with the West, relations are bound to become more fraught.

The region's long-suffering citizens seem to be losing faith in democracy. In Burkina Faso people rose up in 2014 to kick out Blaise Compaoré, who had first taken power in a coup 27 years earlier. Shortly before this just 24% told pollsters from Afrobarometer that they approved of the army running the country. Yet by 2018 sentiment had swung sharply: almost 50% of Burkinabés supported military rule. After the coup on January 23rd people jubilantly danced and drummed in the capital. Some waved Russian flags or burned the French one. The new lot can't be worse than the ousted president, said Aliou Ouedraogo, one of those celebrating.

Mr Kaboré seems to have been well aware of the risk of a coup. Burkina Faso has suffered eight successful coups and many more attempted ones since it gained independence from France in 1960. In December he reshuffled his cabinet and put a general in charge of the defence ministry, replacing a civilian. On January 11th the security forces arrested eight soldiers for allegedly plotting against the government, among them an officer said to have trained with Colonel Damiba.

Insecurity underpins the latest putsch. In June last year jihadists slaughtered more than 100 people in Solhan, a village in the north (see map). In November they killed 49 police officers and four civilians near Inata, another northern town. The soldiers there had run out of food and had been forced to commandeer livestock, according to a memo they sent their superiors. Mr Kaboré boasted of having bumped up the security budget but little extra gear seemed to make it to the frontlines. After the slaughter in Inata angry protesters rallied in the capital against the government and French forces.

The coup's main beneficiaries may well

be the jihadists. The junta will have its hands full consolidating power in the capital and seeing off the possibility of a counter-coup. That may leave a vacuum in the countryside for jihadists to fill.

In Mali the soldiers now running the government have not done a better job than civilians at maintaining security. In fact, the army's withdrawal from embattled towns and bases has accelerated since the coups there, says Héni Nsaibia of Menastream, a consultancy.

The African Union and the Economic Community of West African States (ECOWAS), a regional bloc, have condemned the coup in Burkina Faso and called for the release of Mr Kaboré. Some may see irony in its demand: three of ECOWAS's 15 members—Mali, Guinea and Burkina Faso—are now led by men with guns. Other members may be more worried about the spread of insurgents than about democratic niceties.

Jihadists are steadily moving south from Burkina Faso into Ivory Coast and Benin, where the number of attacks is increasing. Stopping them will require not just better governance but also more cooperation between countries in the region, their armed forces and politicians, and between local armies and their foreign backers. That has never looked more elusive. ■

### Flattening the curve

Uganda, consumer prices  
% change on a year earlier



reform went furthest when pushed by locals who actually believed in it.

Mr Mutebile was used to telling presidents what they didn't want to hear. As a student he stood up in a meeting to tell Idi Amin, a capricious despot, that it was wrong to expel Ugandan Asians. Mr Mutebile subsequently fled the country—disguised, the story goes, as an Asian refugee. For most of the 1970s he studied and taught economics in Britain and Tanzania.

The collapse of the economy back home gave him an obsession with macroeconomic stability. He spoke about it at every meeting; his colleagues said he was "preaching the gospel". In the 1990s, when he had more power than any of the ministers above him, Uganda took an axe to spending, cut tariffs, sold state-owned firms and unified parallel exchange rates. Other African countries made similar reforms, but rarely with such conviction. Mr Mutebile's admirers were in awe of his tenacity. Abebe Aemro Selassie, the director of the IMF's African Department, describes him as a "lion of a policymaker" who laid the ground for rapid GDP growth.

Not everyone was so enamoured. Critics said Mr Mutebile was too close to the authoritarian regime he served. In 2011, despite his grumbling, the central bank helped finance an election-related spending splurge. Inflation subsequently jumped (see chart), and security forces shot protesters in the streets. There were questions, too, about the bank handing over \$741m to buy Russian fighter jets.

But the biggest challenge was one that Mr Mutebile himself acknowledged: Uganda's vaunted stability had not sparked industrialisation or created enough jobs. That is a problem in much of Africa, and younger policymakers are cautiously revisiting ideas of a more interventionist state. They can afford to do so only because "the basics have been handled," argues Damonit Kitabire, an economist who worked alongside Mr Mutebile in the 1990s. The heyday of the free-market generation is passing. Its legacy runs deep. ■

Emmanuel Tumusiime-Mutebile

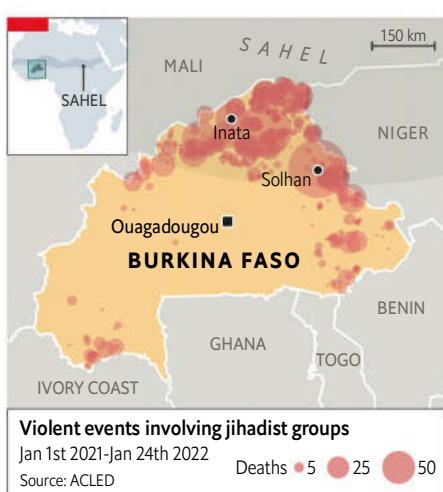
## Market preacher

KAMPALA

A Ugandan economist who changed his country has died

SOMETIMES CHANGING an economy starts with a metaphor. In 1992 Emmanuel Tumusiime-Mutebile, the top civil servant in Uganda's finance ministry, began comparing inflation to indiscipline in the army. He knew that would resonate with Yoweri Museveni, a rebel who had fought his way to power six years earlier. Soon the president was declaring that "inflation is indiscipline." The slogan was pinned on office walls and Mr Mutebile was given a licence to slash spending. Inflation fell from 200% to single digits in a few months.

The formidable Mr Mutebile would spend another decade at the ministry, and two more at the helm of the Bank of Uganda. When he died on January 23rd, aged 72, he was the longest-serving central bank governor in Africa. But his most enduring legacy is those frenetic years in the 1990s when he pushed his country decisively towards the free market. It was a time of fraught, painful change across the continent, often spurred by the World Bank and IMF. As the career of Mr Mutebile shows,



## The war in Yemen

# UAVs over the UAE

DUBAI

## Strikes on the United Arab Emirates may backfire on the Houthi rebels

**A**FTER SEVEN years of fighting in Yemen, the roar and thump of missile interceptors is a familiar sound in Saudi Arabia. But it was a shock for residents of the United Arab Emirates (UAE). Early on January 24th the UAE said it had shot down a pair of ballistic missiles fired from Yemen. Videos posted on social media captured loud booms over Abu Dhabi, the capital.

The Houthis, an Iranian-backed militant group that controls part of Yemen, claimed responsibility. Since 2015 they have been fighting a coalition led by Saudi Arabia, and including the UAE, which invaded Yemen to depose them. A week before the missile attack, the Houthis launched a drone attack on Abu Dhabi's airport and an industrial area. Three workers from India and Pakistan were killed.

That attack triggered a ferocious wave of Saudi and Emirati air strikes in Yemen, many of which killed civilians. The deadliest, on January 21st, hit a prison in Saada, a northern city. Médecins Sans Frontières, a medical charity with employees there, said at least 82 people were killed (pictured). A separate strike on a telecoms facility in Hodeida disconnected Yemen from the internet for four days.

Houthi attacks have become common in Saudi Arabia, which shoots down missiles or drones almost every week. This was the first time the Houthis had successfully targeted the UAE. It reflects their fury at an abrupt battlefield reversal in Yemen, engineered by the Emiratis. And it presents the UAE with a difficult choice: to back off, allowing the Houthis to capture an important city, or to risk more attacks that could inflict real damage on its economy.

For more than a year the main front line in Yemen has been around the city of Marib, 120km (75 miles) east of Sana'a, the capital. It is home to 3m people, one-third of them displaced from other regions, and to Yemen's largest oil and gas reserves. The Houthis have thrown waves of fighters at the city, including children. Casualties have been horrific, but they have slowly worn down the city's defenders.

The UAE had little to do with this. In 2019 it withdrew most of its troops from a war it had come to see as a quagmire. Emiratis had fought largely in south Yemen, which was an independent country until 1990 and retains a secessionist streak. The Houthis have little support there. For a time it seemed the Emiratis were pursuing

de facto partition: they would maintain a sphere of influence in the south, while the Saudi-backed and internationally recognised government struggled against the Houthis in the north.

Last year, however, the Houthis invaded Shabwa, an energy-rich southern province. With Marib teetering and the south under threat, the coalition changed tactics. On December 25th Saudi Arabia agreed to sack the governor of Shabwa, a controversial figure affiliated with Islah, an Islamist party disliked by the Emiratis. His replacement, a tribal figure, has good relations with the UAE (where he lived for years).

The Giants Brigades, a militia backed by the UAE, then moved thousands of its fighters from the Red Sea coast to Shabwa. Their gains were swift: they pushed the Houthis out of Shabwa and went on to seize bits of Marib province as well. Battlefield victories in Yemen are not always durable. Still, the Houthis have suffered a big setback in the past few weeks. Instead of a seemingly inexorable march to seize Marib, they now face a new threat on their southern flank.

The attacks on Abu Dhabi were an ultimatum to the UAE: halt your advance or face further bombardment. The physical danger is modest. Houthi missiles and drones cannot carry big payloads, and the UAE has advanced air defences—bolstered by America, which has thousands of troops at al-Dhafra, an air base south of Abu Dhabi (they fired their own air-defence systems at the Houthi missiles on January 24th).

The reputational risk is far greater. The UAE markets itself as an oasis of stability, seemingly immune to the region's conflicts, even as it has pursued an aggressive foreign policy that embroiled it in them. Investors view it as a safe place to start a business or buy property. The 22m tourists who visited in 2019 had little to worry about beyond sunburn or some bad oysters at brunch. Continued attacks would jeopardise that image.

They could also complicate the UAE's recent efforts at rapprochement with Iran. Tahnoun bin Zayed, the national security adviser, visited Tehran in December. Ebrahim Raisi, Iran's president, has been invited to visit Abu Dhabi. The UAE hoped friendlier ties would allow it to avoid exactly these sorts of attacks. The Houthis are not fully an Iranian proxy—they often act independently. But the attacks on the UAE were made possible by Iranian support. The drones and missiles aimed at Abu Dhabi were probably based on Iranian designs.

Now the UAE must decide whether to press forward or pull back in Yemen. It could reach a deal with the Houthis to keep the Giants Brigades in Shabwa as a defensive force. If Marib falls, however, Shabwa would become more vulnerable. The Houthis could also force the UAE's hand. They have threatened strikes on Dubai, the UAE's business and tourism hub; on January 25th a spokesman for the group warned visitors to avoid Expo 2020, the world's fair that opened in October.

Such attacks would be a serious escalation, which would probably draw the UAE deeper into the war—and perhaps also America, which last year ended support for "offensive operations" by the coalition. All of this, then, could backfire on the Houthis. They benefited from the withdrawal of the UAE, with the coalition's most capable army. Trying to keep the Emiratis out, the Houthis could instead pull them back in. ■



No end to the suffering in Yemen

## Islamic State

# Jailhouse rocked

DUBAI

**A week-long prison battle in Syria was a disaster long foretold**

PRISON BREAKS have played a central role in the mythology of Islamic State (is). In 2007 the jihadist group's predecessor claimed responsibility for a jailbreak at Ba'dush prison, in northern Iraq, that freed 140 detainees. Five years later it launched a campaign called "Breaking the Walls", a series of attacks on Iraqi prisons. The climax, in July 2013, was a simultaneous raid on jails in Taji and Abu Ghraib that freed more than 500 people, mostly Iraqi insurgents. Soon is would seize a large stretch of Iraqi territory and proclaim its caliphate.

In some ways the battle this month at Ghweiran prison, in north-eastern Syria, harked back to earlier times. The jail houses around 5,000 people, many of them Syrians and Iraqis accused of links to is. On January 20th the group attacked and seized it in a well-planned assault.

It took almost a week for the Syrian Democratic Forces (SDF), a Kurdish-led militia, to wrest back control. Hundreds of inmates escaped; not all have been recaptured. Dozens of people were killed in fighting inside the prison and in surrounding neighbourhoods. Some of the dead are thought to be children held in Ghweiran who were used as human shields by is.

The fighting drew in America, which has troops in both Syria and neighbouring Iraq. It sent armoured vehicles to aid the SDF and carried out air strikes. Britain sent special forces. It was the largest clash with is since 2019, when the group was defeated at its final redoubt in Baghouz, near the Syrian-Iraqi border.

is is not the organisation it once was, though. It has not held territory since 2019, and for now seems unlikely to do so. Instead it has morphed into a low-level insurgency—one that has proved remarkably resilient. The UN estimates it has around 10,000 members in Iraq and Syria. It carries out 100 to 150 attacks a month there, according to American officials. Around the time of the prison attack, an is cell stormed an army outpost in eastern Iraq, killing 11 soldiers. In December another cell beheaded an Iraqi police colonel.

The siege at Ghweiran was a predictable catastrophe. Critics have long warned that the prisons in north-eastern Syria were kindling soaked in petrol. Governed by a Kurdish-led administration, the semi-autonomous region is fragile, facing not only is but a hostile Turkey and a Syrian regime that wants to bring it back under central

## Weddings in the Gulf

# Lockdown love

MEDINA

**Get married cheaply, while you still can**

THE COST of a typical Saudi wedding is enough to deter the most passionate lover. Even a modest party involves renting a sumptuous ballroom and inviting hundreds of guests. The bridal dais should be fit for royalty; the cake must have many tiers. Then there are the swordsmen, cheerleaders and musicians. Men and women gather in separate halls, doubling some of the prices. Altogether it might cost 200,000 riyals (\$53,000), though rich Saudis will pay four times that just to hire the top crooners. Many of these marriages will end in divorce. Those that don't are often burdened with debt. "Seven years into my marriage and I'm still paying off bank loans for a two-hour bash," says Rayan al-Sameiri, a teacher in Medina who also



Say yes to the dress

works as a taxi-driver.

Many couples have therefore welcomed covid-19—or, at least, the restrictions that have come with it. In 2020 Saudi Arabia limited gatherings to 50 people or fewer. So couples could downsize their weddings without losing face. Some ditched the zaffa (musical procession) and the arda (sword dance), and chose communal halls over ballrooms. Smaller crowds ate smaller cakes. Travel bans ruled out extravagant honeymoons. All in all a Saudi couple might have spent 90% less on their nuptials. The same was true in much of the Gulf, where couples rushed to grab the discount. The number of marriages leapt by 9% in Saudi Arabia in 2020. They were up in Kuwait, Qatar and the United Arab Emirates, too.

Will modest weddings become the new norm? Few couples complained when the Omicron surge forced Saudi Arabia to reimpose some restrictions. As the outbreak recedes, some still feign concern over the health of in-laws. "A girl always dreams of a five-star marriage, but covid has made us more practical," says Bayan Zahran, a lawyer in Jeddah. "Why fritter away your future with five hours of exorbitant costs?" Some couples are opting for *Misyar* marriages, which impose few obligations on either side. (Licensed by clerics, *Misyar* is also popular with adulterers, who take their mistresses as additional wives.)

The betrothed, though, must still deal with pressure from their family and peers. "Paradise without people is not worth going to," runs an Arabic proverb doing the rounds. The same is true of weddings, say traditionalists.

control. The SDF, by its own admission, struggles to guard the prisons; attempted escapes are common.

Though most of the detainees are Syrian and Iraqi, thousands are foreigners, hailing from around 60 countries. Many countries, particularly in Europe, are reluctant to bring their citizens home, fearing they will be hard to prosecute or monitor. Instead they have been left for years in squalid conditions.

The largest prison camp, al-Hol, houses around 56,000 people, most of them children. Some of the camp's adult detainees still believe in is and work to indoctrinate the young. They enforce a strict dress code, ban smoking and music and torment those who turn away from their ideology, espe-

cially women. Suspected deviants are sometimes tortured or have their tents burned. At least 90 people have been murdered in al-Hol since last January.

Among the prisoners at Ghweiran were perhaps 800 children. None has been charged with a crime; some were transferred from other camps when authorities deemed them too old to stay. Though separated from adults, they are stuffed a dozen or more to a cell and given no schooling.

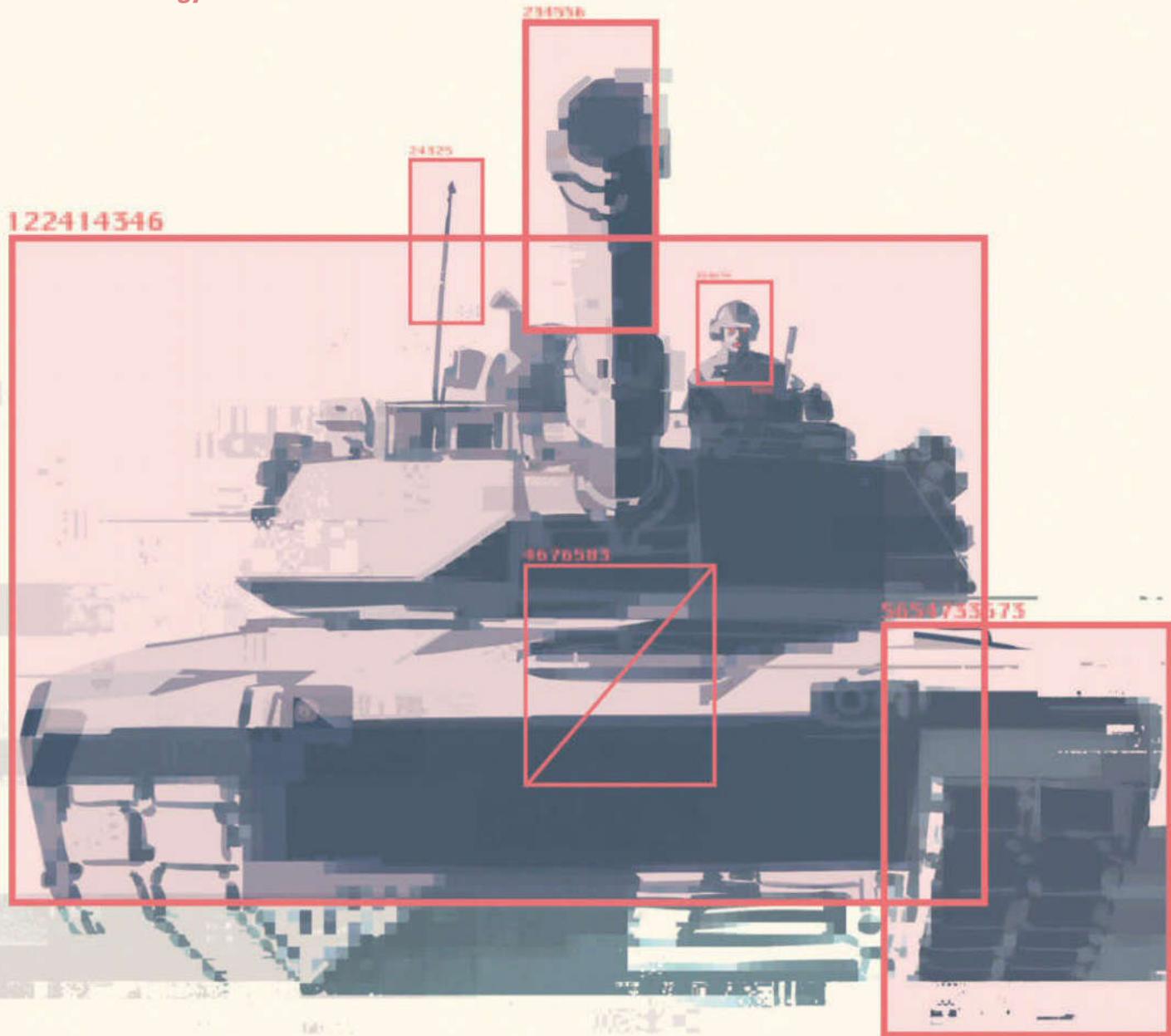
The SDF says it has recaptured the whole prison complex. There were no precise casualty figures. The attack was a reminder that is remains a threat—and that, as long as tens of thousands of detainees languish in north-eastern Syria, more such attacks will follow. ■

# TQ

The Economist  
Technology Quarterly:  
**Defence technology**

→ January 29th 2022

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## Hide and seek

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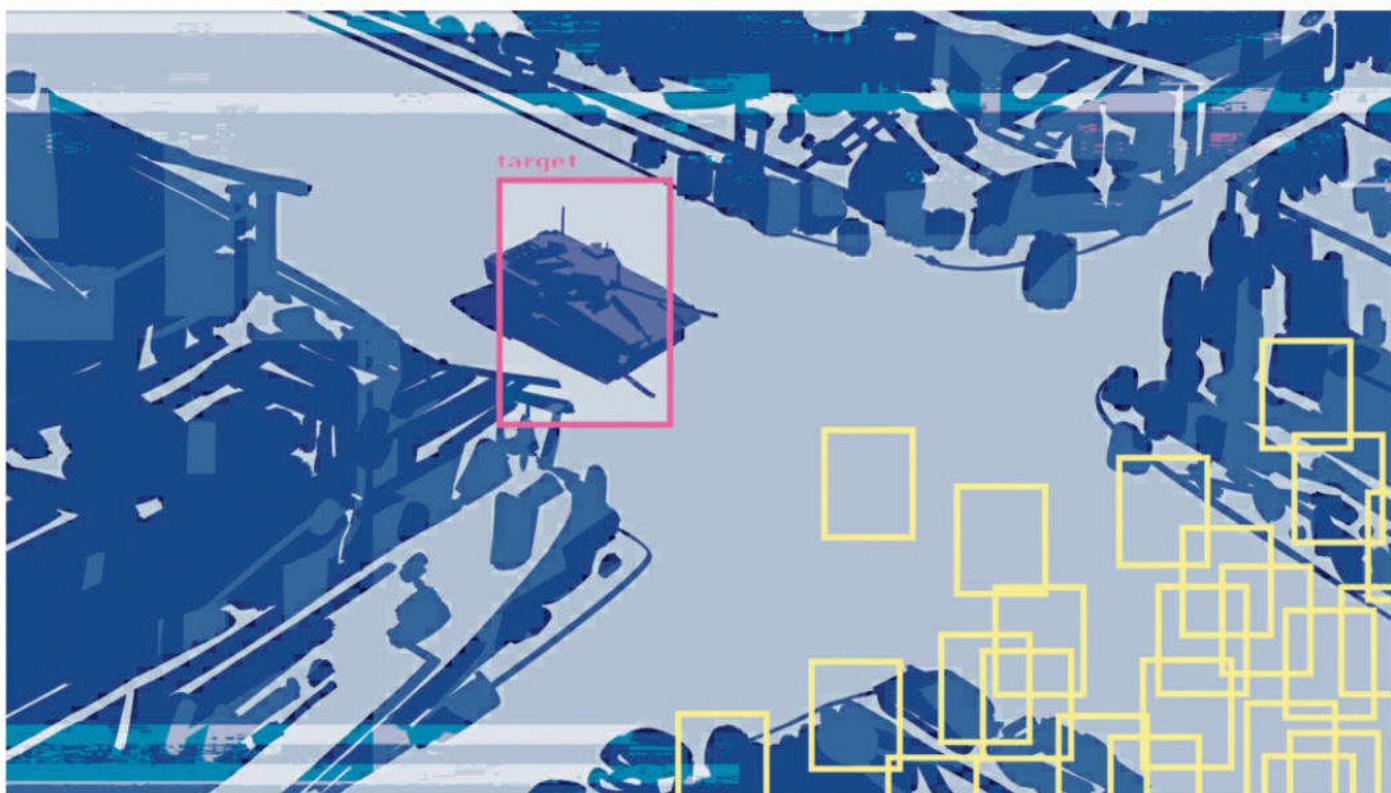
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**Hide and seek**

## War among the sensors

**Is it possible to survive on a battlefield where every weapon has the sensors of a smartphone and they all talk to each other? Shashank Joshi reports**

THE WAR which began when Azerbaijan attacked its neighbour Armenia on September 27th 2020 was a bloody affair, with over 7,000 lives lost. The previous war between the countries, which dragged on from 1988 to 1994, had left Armenian forces occupying much of Nagorno-Karabakh, an ethnic Armenian enclave within Azerbaijan. When, in 2020, the guns fell silent after just 44 days, Azerbaijan had taken back three-quarters of the territory those forces had held in and around the enclave—a victory as decisive as any in recent years.

Azerbaijan had some advantages at the outset. It had a larger population and a bigger military budget, far more artillery pieces and a better equipped air force. That said, much of its equipment dated back to the Soviet era, which is to say to that previous war where it had proved ineffective. And it is a military dictum that, other things being equal, an attacker needs a force perhaps three times larger than the one under attack to prevail.

But the Azeris also had a fleet of drones which included TB2s procured from Turkey and Harops bought from Israel. The TB2s, with a wingspan of 12 metres, were remote-controlled, could launch either bombs or missiles, and stayed in the air for up to 24 hours at a time. The Harops were smaller, stealthier, more autonomous and designed for kamikaze attacks on radars. Between them they blew up more than two-dozen air-defence systems and scores of artillery pieces. Hundreds of armoured vehicles were destroyed. A similar bonfire of armour had played out in Syria's Idlib province earlier that year, where Turkey's TB2s obliterated the Syrian tank fleet in a two-day blitz.

Military leaders across the world paid close attention. "The hallmarks of a different form of land warfare are already apparent," General Sir Mark Carleton-Smith, Britain's chief of general staff, told a conference which took place a year after the conflict. "Small wars...are already throwing up some quite big lessons."

The drones themselves were only a part of the curriculum. The rest looked at the command, control and communications systems that gathered information on what needed to be hit, decided priorities and brought them about. Satellite communications let tactical commanders see what the drones saw and feed them targets identified by other means. In Azerbaijan Turkish radar-spotting spy planes seem to have provided some spotting; Turkey's ground-based KORAL system, which detects and jams enemy radars, helped the tank-busting drones over Idlib.

### Joo joo eyeball

This sort of highly networked warfare is something military technologists have been working on for decades. Its true believers imagine a "battlespace"—think of an old-fashioned, seen-through-binoculars, two-dimensional, ships-soldiers-and-tanks battlefield, but extended vertically all the way up to orbit and electronically well out into infrared and radar wavelengths—in which ubiquitous sensors can pass targeting information to all sorts of "shooters" through seamless communication networks.

Huge investments have provided the great powers—pre-eminently, America—and developed-world allies with some of these wished-for capabilities. As General Mark Milley, America's top mil-

itary officer, put it last year, "You've got an ability to see and an ability to hit at range that has never existed before in human history." Such abilities are likely to matter a lot in some sorts of set-piece conflict. In the wars America has actually been fighting, wars against insurgencies armed with improvised explosive devices (IEDs) and the like, they have proved less of a help.

Now Azerbaijan, a decidedly non-great power, had achieved a similar sort of capability far more cheaply. Similar does not mean truly comparable: a better armed and prepared adversary might have easily seen them off. But that a small war in the Caucasus provided portents of a "transparent battlespace [which is] effectively one giant sensor," as Sir Mark put it, was still an eye opener.

Telecommunications—semaphore, then telegraph, then wireless—have been letting spotters tell shooters of targets the shooters cannot see for centuries. But the modern notion of creating "kill chains" from a range of sensors to a range of shooters on the fly is widely traced to the 1970s. That was when Soviet military theorists began to talk of what they called the "reconnaissance-strike complex"—a networked system in which, for example, a fighter jet might funnel data on a target it could not attack itself to a cruise missile fired from a warship which could.

### Phoning it in

For the culmination of such thinking, consider America's F-35. As well as sneaking past air defences and dropping precision guided munitions on them and other targets, this strike aircraft also gathers scads of information for others and functions as a giant flying router, channelling data to and from nearby aircraft, other forces in the area and commanders who may be half a world away.

The reconnaissance-strike complex has thus come of age. "Today this cycle—reconnaissance-fire-defeat—is literally tens of seconds," boasted Major-General Vladimir Marusin, then Russia's deputy chief of ground forces, in 2015. Still more speed may be available quite soon; hypersonic missiles and speed of light weapons such as laser beams and microwaves are all the rage.

In practice, the time it has taken Russian guns to act on data from Russian drones during the conflict in Ukraine's Donbas region, the conflict to which General Marusin was referring, has not come down quite as far as it might. But it is short enough to make life on the receiving end ever harder. When Mick Ryan, a major-general who led Australia's defence academy until December, says that, "The ability to link sensors to commanders and to weapons

**"Our conception of time on the battlefield has changed profoundly"**  
— General Mick Ryan

over the last 20-30 years has profoundly changed our conception of time on the battlefield," it is the fighting in the Donbas he is thinking of. In the Gulf war, or for that matter along the Ho Chi Minh trail, there was often most of an hour between being spotted and being on the receiving end of an artillery barrage or airstrike. Now, says General Ryan, "If we think we've been spotted, we have ten minutes—and if we're not gone, we're dead."

As technologies get more affordable they spread. Bayraktar, Turkey's TB2 maker, has plenty of customers for its drones (see map).

More important than the change in who uses such systems, though, may be how they are used. Having a few drones allows you to replace a few planes. Having a lot of drones allows you to do things that were not previously possible, such as establishing wide ranging and persistent surveillance systems. And developments outside the military suggest that the trend towards things getting smaller, cheaper and more numerous has a long way to go.

Over the past decade smartphone engineers have been making a wide range of sensors smaller and less energy-intensive with the sort of well resourced zeal only an industry with revenues in the trillions can command. A \$1,000 phone comes not just with a panoply of cameras pointed in various directions and working at various wavelengths but also with one or more photometers, barometers, accelerometers, hygrometers, magnetometers, gyroscopes and microphones. It also boasts radio antennae that pick up signals from navigation satellites, nearby Bluetooth accessories, payment terminals, Wi-Fi networks and even, now and then, mobile-phone towers.

A remarkable amount of the processing power those sensors and networks need sits right there in the phone. More is to be found in the cloud, where it can be fed into artificial intelligence (AI) systems which plot the best route to take in this evening's traffic, translate from Serbian to Portuguese and recognise your friends in pictures.

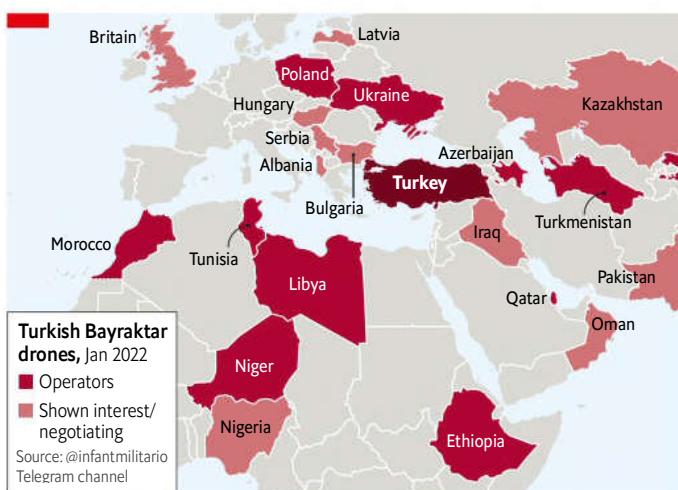
Applied beyond the phone these continuously improving technologies make all sorts of wizardry possible. They have, for example, hugely expanded what can be done with small, cheap satellites, as well as with civilian drones. And they can now be built into artillery shells, or into battledress, or just scattered around the combat zones. "I'm going to have to think very hard about how I can get to within three kilometres of an objective," says a British infantry officer who recently completed an exercise involving cheap, off-the-shelf camera technology capable of recognising humans at long ranges.

This report looks at the "intense competition between hiding and finding" these technologies are making possible, to borrow a phrase from the new "operating concept" for Britain's armed forces announced in 2020. It examines newly accessible and newly affordable ways of seeing, and at ways for the data thus collected to be brought together and understood. It also looks at the stealth, electronic warfare, cyber-attacks and other deception which hiders can use to stay hidden.

### Come together

These changes have tactical implications. The trend towards transparent battlespaces may see basic military tenets rethought. Officers drilled in the importance of massing their forces in order to concentrate their firepower will be learning to fight in smaller, more dispersed units. "Mass potentially can be a weakness," warned General Sir Nick Carter, Britain's then chief of defence staff, reflecting on the lessons of Nagorno-Karabakh.

The same may be true of manoeuvre—a principle which, like that of mass, military thinkers hold dear. "These co-evolving concepts, tactics, and commercial and military technologies are once



▶ again creating a battlespace in which movement becomes extremely dangerous," writes T.X. Hammes of America's National Defence University. "If a unit moves, it will create a signal and can be attacked at much greater ranges than in the past." In his book "Eyes in the Sky", Arthur Holland Michel quotes a defence official describing being under wide-area drone-based video-surveillance as like "the scene in 'Jurassic Park' where Dr Alan Grant faces down a T. Rex: 'Don't move. He can't see us if we don't move.'"

The advantage of surprise, idiomatic since the days of Sun Tzu, will become more difficult to achieve at scale. Coups like China's offensive over the Yalu river in the Korean war, or Egypt's dazzling strike on Israel in October 1973, will be all but impossible. Russia has tried various tactics to confuse those observing its deployments on Ukraine's border, including removing unit markings, shuttling convoys back and forth and shutting down trainspotting websites. The brute fact of the build-up is impossible to hide.

Some go as far as to argue that military offensives may no longer be possible against forces that have embraced all that technology now has to offer: to move will be to be seen will be to be shot. Others suggest that the changes may be less marked than worried officers are imagining. Stephen Biddle of Columbia University points out that as early as the first world war, tacticians learnt how to avoid exposing their forces to modern artillery and air power—capabilities as remarkable then as quick sensor-to-shooter kill-chains are today. The basics of concealment and deception can and will be updated for the digital age. "The Armenians made the mistake of not having thought hard enough about this," says Mr Biddle. "Nobody else is going to make that mistake." ■

#### Synthetic-aperture radar

## All the targets, all the time

**Among all the new ways of seeing available to generals, one stands out**

THE FIRST time that humans observed a battlefield from a celestial vantage point was in June 1794, scarcely a decade after the Montgolfier brothers had invented the hot-air balloon. The French Aerostatic Corps, a motley crew of chemists, carpenters and hangers on (sometimes literally), flew a tethered hydrogen balloon, *l'Entreprenant*, over the battlefield at Fleurus, in what is now Belgium. The spotters on board informed their comrades down below about the disposition and movements of their Austrian enemies by semaphore. France won the battle.

The success was not in itself trendsetting. When France, Britain and Prussia met 21 years later at Waterloo, 30km north of Fleurus, no one looked down but the birds: Napoleon had abolished the Aerostatic Corps in 1799. Military ballooning did not really come into its own until the American civil war, and its importance was short lived. When war returned to the low countries in 1914 the balloon was already beginning to give way to the aeroplane; by the end of the war it had been completely eclipsed. By the time NATO moved its military headquarters to Mons, 40km west of Fleurus, in the 1960s, satellites had entered the picture.

Yet even as the method of elevation changed, the means of sensing did not. What struck the retinas of the French balloonists—visible light—was the same thing that struck the film of the panoramic cameras aboard America's first spy satellites. Film sensitive to the near infrared has sometimes been used to differentiate camouflage (which until recently tended not to reflect those wavelengths) from foliage (which reflects them strongly). Satellites built to spot the launch of ballistic missiles do so by picking



out the longer infrared wavelengths associated with hot rocket exhausts. But most systems for looking down from orbit have relied mostly on visible light.

This has two obvious problems when you are looking down from orbit: night and cloud. Half the world is in darkness at any given time. Most of it is sometimes cloudy and some of it is nearly always cloudy. More than half of Europe is typically obscured at any given time and in parts of South America cloud-free images only appear every decade or so, according to Adam Maher of Ursa Space, a startup based in Ithaca, New York, which uses satellite pictures for business intelligence. Planet, a company which aims to take one-metre resolution pictures of the entire land surface every day, says that about 70% of the surface is cloudy at any one time. Soldiers, sneaky as they are, have been moving troops and equipment under cover of inclement weather for decades.

In the past few years, though, an alternative to visible wavelengths has been making enormous strides. The satellites from which Ursa draws its images are built around radio antennae, not lenses. These orbiting radars illuminate the surface using wavelengths hundreds of thousands of times longer than those of visible light. Such wavelengths pass easily through clouds, fog, smog and, when necessary, camouflage netting before hitting the surface and bouncing back out into space.

The advantages long wavelengths offer in terms of penetration come with compensating drawbacks. The resolution a sensor depends on the wavelength and on the size of its aperture—the mirror or lens in the case of a camera or a telescope, the antenna in a radar. If you lengthen the wavelength, you increase the size of the aperture you need in order to achieve a given resolution. To produce detailed images with radar requires a very large aperture indeed—far larger than anything a single spacecraft can offer.

Synthetic-aperture radar (SAR) provides a way round that problem. Satellites move at quite a clip—typically, in low orbit, around 25,000kph. By taking all the echoes a radar satellite gets from a given target as it passes over it—and processing them into a single image, SAR produces a result as precise as if it had been made using a single aperture as wide across as the distance the satellite travelled while gathering the data—tens of hundreds of kilometres (see diagram on next page).

This technology has been available since the 1960s, and used by spy satellites since the 1980s. But it was limited, expensive and highly classified. It was not until the late 2000s, when India and Israel both had military SAR satellites of their own that America's National Reconnaissance Office, an arm of the Pentagon, declassified the existence of its own such satellites, finally allowing its employees to talk to Air Force officers about them. Civilian space ►

► agencies in America, Canada and Europe used the technology for various environmental missions, but not as a routine way of looking at human activities. It was simply too expensive.

Advances in electronics, spacecraft engineering and on-orbit computation mean it is now possible to put SAR systems with resolutions of a few metres or less onto small satellites at a reasonable price. In 2018 two startups, Capella Space, in California, and ICEYE, in Finland, launched commercial SAR satellites, and the field is now booming. Realising that trying to stop the boom would be pointless, as other countries have similar capabilities anyway, the Pentagon has encouraged it—in part because it greatly increases its own capacities.

### Kings of heaven

Jack O'Connor, who retired from America's National Geospatial-Intelligence Agency in 2013, says that back when everything was classified the amount of available SAR coverage was not sufficient for the sort of analysis that is now normal. More for everyone means more for the spooks. "If you're in a professional intelligence agency, now you have additional sources and you can check the orbits to see do they give me coverage at times and in places I couldn't get before?"

Though intelligence agencies and armed forces tend not to brag about what this makes possible, others are happy to. Russia has been testing a nuclear-powered cruise missile which NATO calls "Skyfall" at facilities in the Novaya Zemlya archipelago, high up above the Arctic Circle. And as the "Arms Control Wonk" podcast put it in the title of an episode last September, "It's always cloudy in Novaya Zemlya". The episode was about the way that Jeffrey Lewis of the James Martin Centre for Nonproliferation Studies at the Middlebury Institute of International Studies at Monterey and his colleagues had used SAR images provided by Capella to show that new tests of the system were being prepared. American intelligence sources subsequently confirmed to CNN that they, too, had clocked the preparations.

The ability to see through poor weather, day or night, lends itself to tracking things that are changing over time. A military build-up like that on the border of Ukraine is the perfect target; the

imagery may not be sharp enough to identify the specific type of tank, but it is good enough to count the number of them.

And changes at a specific site can be analysed with remarkable precision. Radar systems can get data from the phase of the waves they are using in ways that optical systems using ambient light cannot. The "coherent change detection" this allows can show up even minute anomalies. When America discovered that it was losing more of its soldiers in Iraq and Afghanistan to roadside IEDs than any other type of weapon, boffins at Sandia National Laboratory, one of the facilities responsible for America's nuclear weapons, developed Copperhead, a drone-mounted SAR system that used this sort of change detection to spot tiny disturbances in the soil where insurgents might have buried IEDs or the command wires that triggered them. Similar techniques allow satellites to reveal the slight surface subsidence which comes with the building of tunnels for nuclear tests.

Detecting very subtle changes over time is useful for intelligence applications. Detecting blatant ones as they happen is useful for war-fighting ones. Assessing whether bombs have struck the correct targets and what damage they have brought about needs to be done as quickly as possible, lest the other side clean up or obscure the site. India used its burgeoning fleet of SAR satellites for just this purpose after an air strike on Pakistan in February 2019. America's air force did the same thing in tests carried out in December 2020, pointing explicitly to weather conditions in Europe and the Pacific as the motivation.

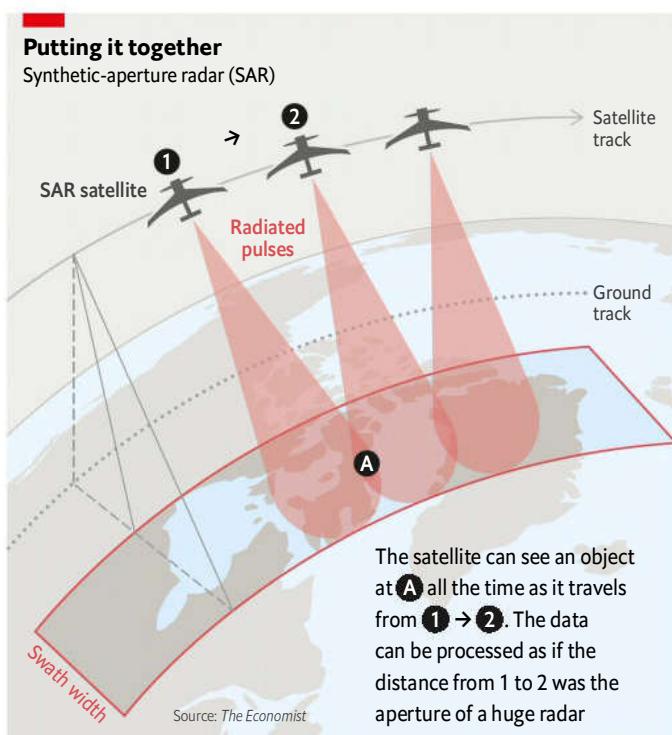
### Dwellers all in time and space

Being able to see a site on a regular basis regardless of the weather also allows armed forces to create archives which will only come into their own in the future. A good example comes from another system the Pentagon developed to counter IEDs: "Gorgon stare" allowed aircraft to take near-continuous video of whole cities over weeks and months. The idea was that, after an attack, it would be possible to run back the tape, as it were, to see when the IED had been emplaced and to trace members of the insurgent group responsible. In principle, SAR archives could provide an analogous ability to turn back the clock in light of new data for select sites all around the world.

Payam Banazadeh, the founder of Capella, says that with the six satellites his company now has in orbit it can check in on any spot on the planet every six hours. The company's planned 40-satellite constellation is intended to get that revisit time down to no more than 15 minutes—less time than it would take for a country to launch a ballistic missile, Mr Banazadeh notes. The satellites cannot operate 24/7: their power-hungry antennae take their sustenance from solar panels, and their batteries are not large enough for them to operate continuously at night. But they do pretty well. The growth of ICEYE, which is currently operating 14 SAR satellites, Capella and other companies means the number of satellites available is rising rapidly, reducing gaps in coverage. All these companies have military customers.

The time it takes to get the information down from space and into the hands of those who need it is also falling quickly, as big data companies like Amazon Web Services pile into the market and expand the number of ground stations. In five years it will be possible to request an image, communicate with the satellite and receive the product in minutes, says Joe Morrison of Umbra, a California firm which launched its first SAR satellite last June. "You'll snap your finger and in that same hour you've got 25-centimetre resolution imagery—maybe 15-centimetre if it's a US government national-security use case."

Umbra hopes to nurture the growth of a downstream industry that could sell analysis based on SAR data to civilian and government customers by making those data cheaper than the optical equivalent offered by companies like Planet and Maxar, an Earth observation company based in Colorado. It plans to sell images co-►



vering 16 square kilometres at a resolution of one metre—good enough to make out a car—for \$500 a time under a Creative Commons licence which lets buyers do as they please with the product. The current price of an optical image of equivalent granularity would be around six times as much, and be sold under restrictive conditions that limit how it could be disseminated and used, he says. Such competition should drive down the price all round—and increase the scope for adding all sorts of value.

Huge amounts of satellite images at relatively low prices provides a pretty much ideal input for the sort of machine-learning algorithms that have powered recent advances in AI: lots of well structured data with which to learn how to recognise all sorts of different things. Such automation allows both new insights and analysis at scale. Mr Maher of Ursa says that his firm might check in on 20,000 facilities once a week for a single client. “It’s less than a full-time job for one person to monitor those sites,” he says.

The capabilities of SAR are just one example, albeit a dramatic one, of the sort of progress being made with all sorts of advanced sensors and the data-processing systems needed to interpret their output. Satellite providers of optical images, hyperspectral data and radio-location services which keep tabs on aircraft and ships are springing up around the world. The ability to use radar to track moving objects from space in real time is getting closer. And pretty much everything which can be done from orbit can also be done with drones closer to the target and capable of responding to new requests almost instantly. There are few places, if any, on the surface of the Earth that are free from such snooping. Below the surface of the seas, though, there is still a redoubt—for now. ■

#### Finding Captain Nemo

## See-through seas?

#### Hiding submarines may get harder

**M**ARITIME MYSTERIES are not unknown on the ragged western flank of the British Isles, buffeted by cruel seas and bitter winds. But the tiny stranded vessel reported to the coastguard on Tiree, the most westerly island of the Inner Hebrides, in October 2020 was particularly mysterious. It bore no markings, broadcast no identifying signal and carried no running lights.

Once pictures showing its distinctive surfboard shape and solar paneling were put online, though, it was quickly identified as a “Wave Glider”—an uncrewed surface vessel (USV) built by Liquid Robotics, a California company owned by the aerospace giant Boeing. First developed to listen to humpback whales, the vessels’ ability to carry sensors slowly through the seas (they have an ingenious way of turning the rise and fall of waves into forward motion) has seen them put to all sorts of uses by researchers and navies alike; over 500 have been sold to date.

Whales are not the only things they listen to. When contacted about the Wave Glider found in Tiree, and others that have washed up on the coasts of Lewis in the Outer Hebrides, Unst in Shetland and Donegal, Liquid Robotics simply said it would let the owners know. But it is a matter of record that in 2016 Wave Gliders were used to detect and track a Royal Navy submarine in an exercise; and it is past those north-western coasts that Britain’s nuclear armed submarines (SSBNs) make their way from their base at Faslane, near Glasgow, to the open ocean.

The idea that submarines loitering in the depths are undetectable is fundamental to modern nuclear deterrence. America, Britain, China, France, India, Israel and Russia act on the basis that

though a nuclear-armed adversary could conceivably destroy their land-based forces in a first strike, it could not wipe out their submarines. A submarine at depth cannot be seen from afar—daylight is all but undetectable at depths of more than a couple of hundred metres. Radio waves fare even worse, making underwater radar a non-starter. Sound carries, but the boats can be remarkably silent; the noise made by a modern SSBN is less than a millionth of the racket produced by the first such boats.

That leaves active sonar, which rather than listening for noises made by its quarry emits sounds designed to bounce off them. This lets an adversary locate a submerged submarine precisely enough to attack it. But it is limited in its range, and by the ways sounds are distorted and dissipated by changes in pressure, temperature and salinity.

This is all taken to mean that weapons on SSBNs can be relied on for retaliation if a first strike devastates everything else. That guaranteed capability to respond is held to keep deterrence stable.

#### From surfboards to Red October

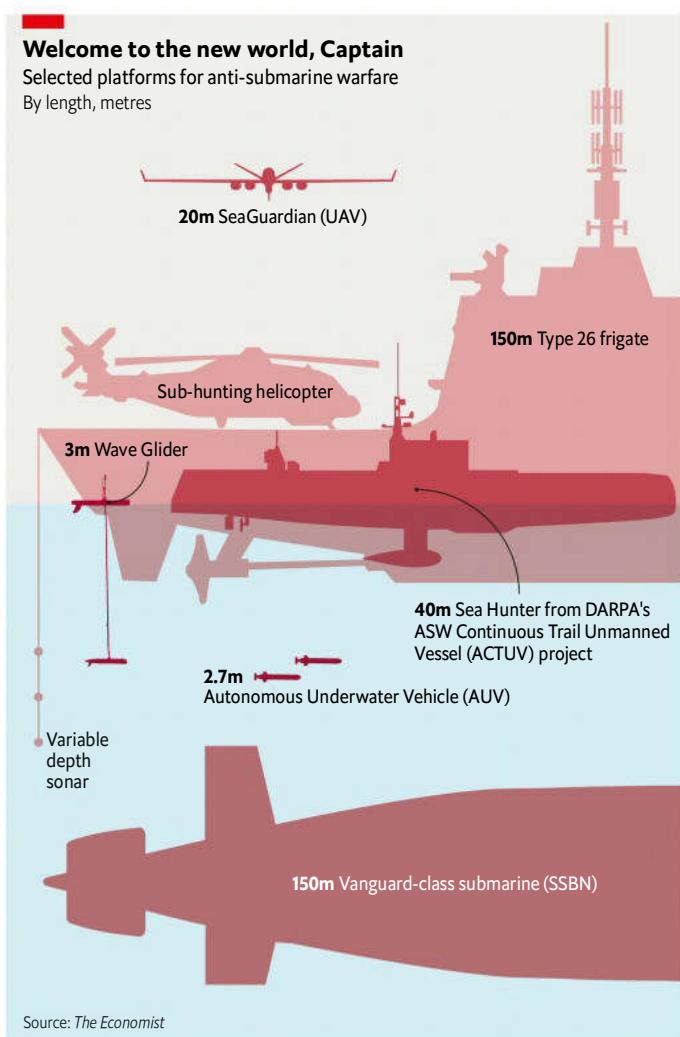
America’s most recent review of nuclear policy concluded that “There are no known, near-term credible threats to the survivability of the SSBN force.” But what is near-term, and for that matter credible, is a matter of opinion. In 2020 a panel of experts assembled by the National Security College of the Australian National University concluded that, “The oceans are, in most circumstances, at least likely...to become transparent by the 2050s.” Trends making it harder to hide above the waves—more numerous and more capable sensors and more powerful ways of sifting through their output—are at play underwater, too.

To put a submarine at risk you must first detect it, then track it. Since the 1980s America and its allies have relied on the hydrophone arrays of the Fixed Distributed System (FDS) for such detection. The sensors, tethered to the sea floor, float at a “critical depth” where acoustical geometry shields them from extraneous noise and makes the faint sounds of a submarine passing overhead stand out. America now has FDS systems in both the Atlantic and the Pacific, with ships, submarines and aircraft available to set about tracking anything they detect.

Owen Cote, a submarine expert at MIT, says that such listening arrays remain, for now, the only truly effective method of detecting a very quiet submarine. Their drawback is that, being quite short range, they cannot cover whole ocean basins. They just cover choke points, such as the gaps between Greenland and Iceland and Iceland and Britain, or the entrances to the Philippine Sea.

Arrays that can be towed behind ships are crucial to tracking what has been thus detected. If they could be made far more nu-





buoys dropped from the air and autonomous underwater vehicles (AUVs)—drone submarines.

Another DARPA project has worked on new ways to follow up such detections. In 2016 it produced a USV called *Sea Hunter*, a robot prototype designed to follow a submarine for thousands of kilometres entirely autonomously while respecting all the international rules designed to avoid collisions at sea. Such vessels, a lot bigger than most surface drones but much smaller, and far cheaper, than a frigate with a crew, could in theory be deployed in fairly large numbers, and in contested waters.

#### Whatever happened to Jonesy?

An ocean that is suffused with sensors above and below the surface and which has sub-tracking robots on the prowl is certainly a more inhospitable place for a submarine—or at least, for one that does not belong to America or one of its allies. Flooding the world's oceans with such sensors is something only a great power can do. As far as most people are concerned, says Mr Cote, "the oceans are opaque, and will probably remain so."

Changing this would require some new technique to supplement what is available, and there is lots of research on detecting magnetic disturbances and very faint wakes, sniffing out telltale chemicals or radiation, and pinging targets with lasers tuned to the blue-green wavelengths which best penetrate seawater. Some of these techniques might work best underwater. Pictures of curious appendages that might hold sensors of various sorts on submarines coming into or leaving port reliably spark discussion in the sub-curious parts of the internet. Others could be deployed from aerial drones, and thus could be used a lot more if such drones became more numerous. But short ranges look likely to remain a problem for all these methods, as does the fundamental challenge of separating signal from noise in big messy oceans.

And submariners could fight back, notes David Blagden of the University of Exeter. A submarine leaving port might "delouse" itself of inquisitive USVs by using technology as rudimentary as a tugboat and rope netting. Should wake detection show promise, submarines could simply head to rougher seas. The low-power transmissions from USVs to satellites or nearby warships could be jammed by other USVs, or by drones.

The last of those tactics speaks to a perennial problem for anti-submarine warfare. The oceans do not just make it hard to gather information; they also make it hard to pass it on. Sensors which spend all their time submerged have either to be hard-wired to cables or to communicate using acoustic modems that are slow, cumbersome and limited in range. This is a real bottleneck for systems trying to make use of AUVs.

This requirement for cables on the sea floor makes geography important. Navies fight above the seabed they have, not the one they would like. In the North Atlantic, America enjoyed the advantage of laying its cables in very deep water—inaccessible to all but highly specialised submarines—and then up a continental shelf that rose, sharply, on to allied territory. By contrast, if China wanted to assemble a sonar net across the Philippine Sea, it would have to lay fibre-optic cable all across the South China Sea, bits of which are shallow enough that cables there are frequently cut by fishing vessels. Those cables would be at the mercy of foreign navies. .

That could make it hard for China to stop submarines getting close to its shores. And sonar systems at choke points like the Luzon Strait could make it difficult for Chinese submarines to slip into the open ocean. Both constraints would be to its disadvantage in wartime. But they would not render its SSBNs useless. Such submarines do not need to be able to prowl every ocean with impunity. They just need an area within range of their missiles' targets but out of bounds to other navies and their sensors—what navies call a "bastion". Seeing through an ocean will be hard enough if you have access to its surface and its depths. Seeing through a sea you can be kept out of is a different kettle of invisible fish. ■

►merous, they might be able to do more detecting themselves. The sensors available for such arrays have improved greatly, according to Bryan Clark, a former submariner now at the Hudson Institute, a think-tank in Washington. New solid-state "vector" sensors measure the velocity and acceleration of water molecules, which means they get more information out of a sound wave than a simply pressure-sensitive hydrophone does. The signal-processing systems required to discern a submarine's screw in the din of the ocean are improving even more quickly.

They are also shrinking. Ken Perry, a retired rear-admiral and vice-president of ThayerMahan, a Connecticut-based firm which builds maritime-surveillance platforms, recalls a time when sonar computers were so large and inefficient that submariners warmed up their coffee on them. Now a surfboard's worth of solar panels can run them and still provide enough juice to transmit the information thus produced. Hence the interest in things like Wave Gliders and ThayerMahan's rather larger USVs, which carry ten times the payload capacity and move a lot quicker.

A fleet of array-towing USVs could cover millions of square kilometres of ocean for "a fraction of the cost of a single frigate or submarine", says Mr Perry, whose company has tested the concept in exercises with America's navy. The bit of the Pentagon charged with pushing technological boundaries, DARPA, is working on an "Ocean of Things" project which would contain thousands of "low-cost floats...that drift as a distributed sensor network". The idea is that armadas of prowling hydrophones could eventually plug into a wider network of sensors, including fixed arrays, sono-

### Signals from noise

## Heads in the clouds

### The difficulties of dealing with lots of data

**Y**OU COULD put forward a thesis that Afghanistan was the most densely surveilled battlespace in the history of humankind," says Mick Ryan, until recently the head of Australia's defence college. "And that didn't seem to help us." For an information advantage to change the course of a war you need more than just a cornucopia of sensors; you need ways to combine their data into information that can be acted on at speed.

Take radar, a technology which changed the course of the war in which it made its debut more than any other new sensor in history. It had applications from the finding of submarines (via their snorkels) to the proximity fuses which made artillery and anti-aircraft rounds more lethal. As its developers used to grumble when nuclear physicists were lauded for their godlike power, "Radar won the war; nuclear weapons just ended it."

But radar's capabilities had to be built into systems that made use of them. The canonical example is the air-defence system used during the Battle of Britain. Its radars were linked to a network of radio receivers, barrage balloons, fighter planes and human spotters through a network of phone lines. The resulting reports were plotted on a map and used to guide fighter planes to their targets with spectacular success.

Over the past decade efforts to embody similar feats of collective intelligence in AI systems have made real progress. In a recent exercise in Poland, the British Army experimented with a command and control system built over eight weeks in collaboration with Anduril, a California-based company which provides both sensors and systems to fuse their data. The system did not just spot targets; it also worked out the closest suitable aircraft that could be used to attack them and presented its results to the force's commanders in the form of clearly delineated options.

This far outperformed the old way of doing things; options for hitting targets were delivered 30 minutes quicker, according to an officer involved in the experiment. And it required a team of just five people, rather than the 25 it used to take. The officer compares the improvement to that offered by satellite navigation with real-time traffic updates. "It's like going from an A-Z...to Waze. You're operating at a ridiculously different speed."

Joseph Votel, a recently retired head of the Pentagon's Central Command, said last year he was struck by how Israeli forces mounting strikes on Gaza in May had been integrating AI into their operations and by "the impact that is having on their targeting cycles". He says Israel is using AI to generate a large range of potential targets for surveillance to whittle down. This lets its forces "disrupt enemy attacks without the need for a lengthy development period or a longer campaign."

America's armed forces, helped by Palantir (an AI company which, like Anduril, takes its name from "The Lord of the Rings") and other contractors, is trying to build such technology into a system which can narrow down a huge range of potential targets and pass information about them freely to where it is most needed. Given the finite capacity of communication systems, not to mention the vulnerability, this requires that an increasing amount of processing be done "on the edge"—that is, on the platform carrying the sensor.

"You'll be amazed  
at the patterns  
it picks up when  
you put bulk  
data together"



In 2016 a Pentagon project called Maven started trying to address the "lots of surveillance but not much to show for it" problem identified by General Ryan. The idea was to automate the identification of people and objects in the petabytes of video footage sent back by surveillance drones. It ended up producing software efficient enough to run on the drones themselves. In Scarlet Dragon, a recent-AI focused American exercise in which a wide range of systems were used to comb a large area for a small target, things were greatly sped up by allowing satellites to provide estimates of where a target might be in a compact format readable by another sensor or a targeting system, rather than transmitting high-definition pictures of the sort humans look at.

In a world where bandwidth is often the biggest constraint such parsimony is a boon. It speeds up kill chains while reducing vulnerability to jamming. At the same time, it puts a greater burden on the automated parts of the system to provide reliable synopses of what they see, which is a worry for people keen to ensure that fully informed and responsible human beings stay on top of all decisions about where and when to blow things up.

### Reforging the shards

However much edge processing may whittle down individual flows, though, the ability for sensors to proliferate and the hunger for more knowledge elsewhere in the system will still mean that command systems need a greater capacity for handling data in bulk. That is why armed forces are spending heavily on cloud-computing services provided by big tech companies to increase their data-handling capacity. In 2019 the Pentagon awarded Microsoft a \$10bn contract for its Joint Enterprise Defence Infrastructure (JEDI). Last year Amazon, which has been supplying the CIA with such services since 2013, got the contract annulled. A new tender issued in November will probably see the work shared among a number of firms. There will be more than enough to go around.

Clouds offer advantages in speed, scale and flexibility. They also help with "data fusion"—combining different pieces of information to reveal things that one source cannot capture, including things no human would think to ➤

▶ look for. "You'll be amazed at the patterns it picks up when you put bulk data together from different sources and run AI algorithms across them," says an official familiar with *Odyssey*, a cloud-computing system being developed by the British armed forces.

Fusion is not just about adding things up; subtraction matters too. In a presentation last year, Brigadier-General Paul Murray put on screen the radar picture available to the North American Aerospace Defence Command (NORAD) on the afternoon of April 15th 2015. It looked like a canvas at which someone had hurled a bucket of blue paint. Somewhere within the mess was the flight path of Doug Hughes, a postman from Florida who had taken it on himself to deliver letters of protest to America's Congress by flying his gyrocopter from Gettysburg to the lawn of the Capitol. Whatever impact this may have had on the legislature, his ability to cross highly restricted airspace unnoticed alarmed NORAD.

Mr Jones's approach was not entirely undetected. But it was captured only intermittently, and amid everything else going on a human looking at the data at the time concluded that it was innocuous. When a system called Pathfinder fused the relevant data from more than 300 sensors and used AI to remove the clutter, though, the errant aircraft's path stood out clearly.

#### To rule them all

Pathfinder's decluttering uses commercial flight plans and weather reports to help sort things out; the integration of such open-source data is crucial to a lot of intelligence and surveillance. Last year America's National Security Commission on AI, chaired by Eric Schmidt, a former CEO of Google, said that the country's intelligence agencies would need to build "a continuous pipeline of all-source intelligence analysis" into "continually learning analytic engines". The results, it hoped, would be insights "beyond the current limits of unaided human cognition". Call it Omnidient Neural-net Engineering for Reconnaissance, Intelligence and National Goal-achievement, or ONERING for short.

Some workers at tech companies do not like the idea of being involved in such things. In 2017 thousands of Google employees signed a letter outlining their unhappiness with the company's role in the Maven project. Microsoft's bid for the JEDI contract faced internal opposition on similar grounds. Many others will also have concerns about data fusion on such a scale, for military or any other purposes.

They might take some comfort, at least for the time being, from the fact that seamlessness is much more easily wished for and invested in than achieved. Different military services and agencies contracting with different companies to build their own clouds and AI systems just the way they want them will be likely to produce the digital equivalent of Babel after God smote it. Military organisations, accustomed to laying out their requirements years in advance and in excruciating detail, are ill-equipped for a world in which computing power has become a subscription service and in which new software can transform the hardware it is running on.

The old-school defence contractors who tend to get tasked with integrating the data are "shockingly bad and wildly insecure", according to Oliver Lewis of Rebellion Defence, an AI provider. "They often use an industrial-era approach designed for building tanks and aircraft that makes it impossible for them to write great software." Interoperability often requires a level of commercial and technical finesse rarely seen in the management of government contracts. "Defence procurement," says one AI executive, "is currently fundamentally incompatible with this new model."

It is not just that the technology is changing, the business environment unfamiliar and large-scale systems integration always hard—particularly so, it often seems, for governments. The systems which fuse and interpret large amounts of data from disparate far-flung sources have to be robust not just in everyday operation but when adversaries are trying very hard to break them down. When it comes to the crunch, the enemy gets a say, too. ■

#### Fierce contests

## Adapt and survive

**Networked sensors mean tactical evolution is certain—and revolution possible**

THESE ARE four ways for those who would hide to fight back against those trying to find them: destruction, deafening, disappearance and deception. Technological approaches to all of those options will be used to counter the advantages that bringing more sensors to the battlespace offers. As with the sensors, what those technologies achieve will depend on the tactics used.

Destruction is straightforward: blow up the sensor. Missiles which home in on the emissions from radars are central to establishing air superiority; one of the benefits of stealth, be it that of an F-35 or a Harop drone, lies in getting close enough to do so reliably.

Radar has to reveal itself to work, though. Passive systems can be both trickier to sniff out and cheaper to replace. Theatre-level air-defence systems are not designed to spot small drones carrying high-resolution smartphone cameras, and would be an extraordinarily expensive way of blowing them up.

But the ease with which American drones wandered the skies above Iraq, Afghanistan and other post-9/11 war zones has left a mistaken impression about the survivability of UAVs. Most Western armies have not had to worry about things attacking them from the sky since the Korean war ended in 1953. Now that they do, they are investing in short-range air defences. Azerbaijan's success in Nagorno-Karabakh was in part down to the Armenians not being up to snuff in this regard. Armed forces without many drones—which is still most of them—will find their stocks quickly depleted if used against a seasoned, well-equipped force.

Stocks will surely increase if it becomes possible to field more ►►



► drones for the same price. And low-tech drones which can be used as flying IEDs will make things harder when fighting irregular forces. But anti-drone options should get better too. Stephen Biddle of Columbia University argues that the trends making drones more capable will make anti-drone systems better, too. Such systems actually have an innate advantage, he suggests; they look up into the sky, in which it is hard to hide, while drones look down at the ground, where shelter and camouflage are more easily come by. And small motors cannot lift much by way of armour.

Moving from cheap sensors to the most expensive, satellites are both particularly valuable in terms of surveillance and communication and very vulnerable. America, China, India and Russia, all of which would rely on satellites during a war, have all tested ground-launched anti-satellite missiles in the past two decades; some probably also have the ability to kill one satellite with another. The degree to which they are ready to gouge out each other's eyes in the sky will be a crucial indicator of escalation should any of those countries start fighting each other. Destroying satellites used to detect missile launches could presage a pre-emptive nuclear strike—and for that very reason could bring one about.

#### **Everybody has a plan until they get punched in the face**

Satellites are also vulnerable to sensory overload, as are all sensors. Laser weapons which blind humans are outlawed by international agreement but those that blind cameras are not; nor are microwave beams which fry electronics. America says that Russia tries to dazzle its orbiting surveillance systems with lasers on a regular basis.

The ability to jam, overload or otherwise deafen the other side's radar and radios is the province of electronic warfare (EW). It is a regular part of military life to probe your adversaries' EW capabilities when you get a chance. The deployment of American and Russian forces close to each other in northern Syria provided just such an opportunity. "They are testing us every day," General Raymond Thomas, then head of American special forces, complained in 2018, "knocking our communications down" and going so far as

"disabling" America's own EC-130 electronic-warfare planes.

In Green Dagger, an exercise held in California last October, an American Marine Corps regiment was tasked with seizing a town and two villages defended by an opposing force cobbled together from other American marines, British and Dutch commandos and Emirati special forces. It struggled to do so. When small teams of British commandos attacked the regiment's rear areas, paralysing its advance, the marines were hard put to target them before they moved, says Jack Watling of the Royal United Services Institute, a think-tank in London. One reason was the commandos' effective EW attacks on the marines' command posts.

Just as what sees can be blinded and what hears, deafened, what tries to understand can be confused. Britain's national cyber-strategy, published in December, explicitly says that one task of the country's new National Cyber Force, a body staffed by spooks and soldiers, is to "disrupt online and communications systems". Armies that once manoeuvred under air cover will now need to do so under "cyber-deception cover", says Ed Stringer, a retired air marshal who led recent reforms in British military thinking. "There's a point at which the screens of the opposition need to go a bit funny," says Mr Stringer, "not so much that they immediately spot what you're doing but enough to distract and confuse." In time the lines between EW, cyber-offence and psychological operations seem set to blur.

The ability to degrade the other side's sensors, interrupt its communications and mess with its head does not replace old-fashioned camouflage and newfangled stealth; they remain the bread and butter of a modern military. Tanks are covered in foliage; snipers wear ghillie suits. Warplanes use radiation-absorbent material and angled surfaces so as not to reflect radio waves back to the radar that sent them. Russia has platoons dedicated to spraying the air with aerosols designed to block ultraviolet, infrared and radar waves. During their recent border stand-off, India and China both employed camouflage designed to confuse sensors with a broader spectral range than the human eye.

According to Mr Biddle, over the past 30 years "cover and concealment", along with other tactics, have routinely allowed forces facing American precision weapons to avoid major casualties. He points to the examples of al-Qaeda at the Battle of Tora Bora in eastern Afghanistan in 2001 and Saddam Hussein's Republican Guard in 2003, both of whom were overrun in close combat rather than through long-range strikes. Weapons get more lethal, he says, but their targets adapt.

Hiding is made easier by the fact that the seekers' new capabilities, impressive as they may be, are constrained by the realities of budgets and logistics. Not everything armies want can be afforded; not everything they procure can be put into the field in a timely manner. In real operations, as opposed to PowerPoint presentations, sensor coverage is never unlimited.

"There is no way that we're going to be able to see everything, all of the time, everywhere," says a British general. "It's just physically impossible. And therefore there will always be something that can happen without us seeing it." In the Green Dagger exercise the attacking marine regiment lacked thermal-imaging equipment and did not have prompt access to satellite pictures. It was a handicap, but a realistic one. Rounding up commandos was not the regiment's "main effort", in military parlance. It might well not have been kitted out for it.

When hiding is hard, it helps to increase the number of things the enemy has to look at. "With modern sensors...it is really, really difficult to avoid being detected," says Petter Bedoire, the chief technology officer for Saab, a Swedish arms company. "So instead you need to saturate your adversaries' sensors and their situational awareness." A system looking at more things will make more mistakes. Stretch it far enough and it could even collapse, as poorly configured servers do when hackers mount "denial of service" attacks designed to overwhelm them with internet traffic.



► Dividing your forces is a good way to increase the cognitive load. A lot of small groups are harder to track and target than a few big ones, as the commandos in Green Dagger knew. What is more, if you take shots at one group you reveal some of your shooters to the rest. The less valuable each individual target is, the bigger an issue that becomes.

Decoys up the ante. During the first Gulf war Saddam Hussein unleashed his arsenal of Scud missiles on Bahrain, Israel and Saudi Arabia. The coalition Scud hunters responsible for finding the small (on the scale of a vast desert) mobile missile launchers he was using seemed to have all the technology they might wish for: satellites that could spot the thermal-infrared signature of a rocket launch, aircraft bristling with radar and special forces spread over tens of thousands of square kilometres acting as spotters. Nevertheless an official study published two years later concluded that there was no "indisputable" proof that America had struck any launchers at all "as opposed to high-fidelity decoys".

One of the advantages data fusion offers seekers is that it demands more of decoys; in surveillance aircraft electronic emissions, radar returns and optical images can now be displayed on a single screen, highlighting any discrepancies between an object's visual appearance and its electronic signature. But decoy-making has not stood still. Iraq's fake Scuds looked like the real thing to UN observers just 25 metres away; verisimilitude has improved "immensely" since then, particularly in the past decade, says Steen Bisgaard, the founder of GaardTech, an Australian company which builds replica vehicles to serve as both practice targets and decoys.

Mr Bisgaard says he can sell you a very convincing mobile simulacrum of a British Challenger II tank, one with a turret and guns that move, the heat signature of a massive diesel engine and a radio transmitter that works at military wavelengths, all for less than a 20th of the £5m a real tank would set you back. Shipped in a flat pack it can be assembled in an hour or so.

Seeing a tank suddenly appear somewhere, rather than driving there, would be something of a giveaway. But manoeuvre can become part of the mimicry. Rémy Hemez, a French army officer, imagines a future where armies deploy large "robotic decoy formations using AI to move along and create a diversion". Simulating a build up like the one which Russia has emplaced on Ukraine's border is still beyond anyone's capabilities. But decoys and deception—in which Russia's warriors are well versed—can be used to confuse.

Disappearance and deception often have synergy. Stealth technologies do not need to make an aircraft completely invisible. Just making its radar cross-section small enough that a cheap little decoy can mimic it is a real advantage. The same applies, *mutatis mutandis*, to submarines. If you build lots of intercontinental-ballistic-missile silos but put ICBMs into only a few—a tactic China may be exploring—an enemy will have to use hundreds of its missiles to be sure of getting a dozen or so of yours.

Shooting at decoys is not just a waste of material. It also reveals where your shooters are. Silent Impact, a 155mm artillery shell produced by SRC, an American firm, can transmit electronic signals as if it were a radar or a weapons platform as it flies through the sky and settles to the ground under a parachute. Any enemy who takes the bait reveals the position of their guns.

The advent of AI should offer new ways of telling the real from the fake; but it could also offer new opportunities for deception. The things that make an AI say "Tank!" may be quite different to what humans think of as tankiness, thus unmasking decoys that fool humans. At the same time the AI may ignore features which humans consider blindingly obvious. Benjamin Jensen of American University tells the story of marines training against a high-

end sentry camera equipped with object-recognition software. The first marines, who tried to sneak up by crawling low, were quickly detected. Then one of them grabbed a piece of tree bark, placed it in front of his face and walked right up to the camera unmolested. The system saw nothing out of the ordinary about an ambulatory plant.

The problem is that AIs, and their masters, learn. In time they will rumble such hacks. Basing a subsequent all-out assault on Birnam Wood tactics would be to risk massacre. "You can always beat the algorithm once by radical improvisation," says Mr Jensen. "But it's hard to know when that will happen."

### The advantages of staying put

Similar uncertainties will apply more widely. Everyone knows that sensors and autonomous platforms can get cheaper and cheaper, that computing at the edge can reduce strain on the capacity of data systems, and that all this can make kill chains shorter. But the rate of progress—both your progress, and your adversaries—is hard to gauge. Who has the advantage will often not be known until the forces contest the battlespace.

The unpredictability extends beyond who will win particular fights. It spreads out to the way in which fighting will best be done. Over the past century military thinking has contrasted attrition, which wears down the opponent's resources in a frontal slugfest, and manoeuvre, which seeks to use fast moving forces to disrupt an enemy's decision-making, logistics and cohesion. Manoeuvre offers the possibility of victory without the wholesale destruction of the enemies' forces, and in the West it has come to hold the upper hand, with attrition often seen as a throwback to a more primitive age.

That is a mistake, argues Franz-Stefan Gady of the International Institute for Strategic Studies, a think-tank. Surviving in an increasingly transparent battlespace may well be possible. But it will take effort. Both attackers who want to take ground and defenders who wish to hold it will need to build "complex multiple defensive layers" around their positions, including air defences, electronic countermeasures and sensors of their own. Movement will still be necessary—but it will be dispersed. Consolidated manoeuvres big and sweeping enough to generate "shock and awe" will be slowed down by unwieldy aerial electromagnetic umbrellas and advertise themselves in advance, thereby producing juicy targets.

The message of Azerbaijan's victory is not that blitzkrieg has been reborn and "the drone will always get through". It is that preparation and appropriate tactics matter as much as ever, and you need to know what to prepare against. The new technologies of hide and seek will sometimes—if Mr Gady is right, often—favour the defence. A revolution in sensors, data and decision-making built to make targeting easier and kill chains quicker may yet result in a form of warfare that is slower, harder and messier. ■

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### Gas exports

## Putin's energy weapon

### How will Europe cope if Russia cuts off its gas?

EVERY FOUR years the European Network of Transmission System Operators for Gas is required to carry out a simulation of disaster scenarios. In the most recent such exercise last year the ENTSOG boffins considered 20 shades of disaster, and concluded that "European gas infrastructure provides sufficient flexibility for the EU Member States to...ensure security of gas supply." Cheering words. But the gasmen did not examine the spectre now haunting Europe. What happens if Vladimir Putin invades Ukraine again, the West hits Russia with sanctions, and Mr Putin retaliates by shutting down all the pipelines carrying Russian gas to the West?

The conventional wisdom used to be that a complete shutdown of piped gas from Russia, which makes up roughly a third of the gas burned in Europe, was unthinkable. Thane Gustafson, author of "Klimat", a thoughtful book on Russian energy, observes that even at the height of the cold war, the Soviet Union did not shut off gas exports. And during Russia's fiercest dispute over gas with Ukraine, in 2009, only the gas flowing through that country was

disrupted, and then only fleetingly.

But a shutdown is no longer unthinkable. Mr Gustafson now says: "I don't think it is unlikely at all that Putin would actually reach for the gas tap over Ukraine." Unlike his Soviet predecessors, the Russian president can afford the cost of a brief energy shock. Jaime Concha of Energy Intelligence, an industry publisher, has crunched the numbers. Not counting any penalties and assuming the average daily price seen in the fourth quarter of 2021, he reckons a complete cut-off of piped gas to Europe would cost Gazprom between \$203m and \$228m a day in lost revenues. So if such an embargo lasted three months (Mr Putin's leverage fades in spring, when gas demand drops to just 60% of that in January), lost

sales would add up to about \$20bn.

A loss of that size would have been devastating for the rickety Soviet economy, which relied heavily on hard currency earned by selling gas to the West. But Russia today has some \$600bn sitting in its central-bank reserves and could easily handle such a blow. And it could even come out ahead financially, in the short term at least. Mere sabre-rattling over Ukraine has already sent prices soaring for gas and oil (the latter accounts for most of Russia's energy revenues, not gas). Without a war, JPMorgan Chase, a bank, forecasts that higher prices will lead to Gazprom making over \$90bn in gross operating profit this year, up from \$20bn in 2019.

If Russia does wield the gas weapon, how much would it hurt the West? If the interruption were limited to gas passing through Ukraine, as in 2009, the rest of Europe would manage fine. For one thing, Gazprom has already slashed the flow of gas through Ukraine. Citigroup, a bank, reckons it is half the level seen last year and a quarter of that in 2019.

What if Mr Putin cuts off all gas to Europe? Some immediate disruption would be inevitable. This would be felt most acutely in Slovakia, Austria and parts of Italy (see chart), reckons David Victor of the University of California, San Diego. Of the big European countries, Germany is the most vulnerable. Because of its climate-motivated push to retire coal-fired power stations and its rash decision, taken in the wake of Japan's Fukushima disaster, to ➤

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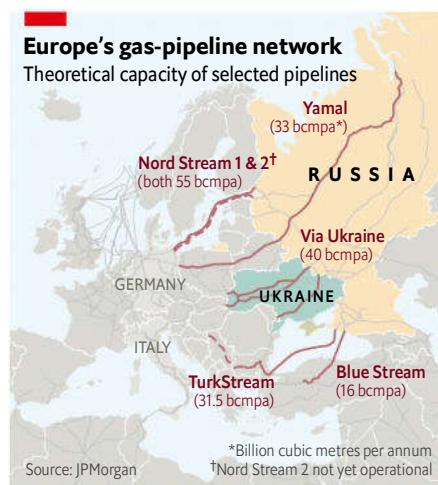
**43** Charlemagne: The mess without

► shut down its nuclear plants, it remains more reliant on natural gas than it need be. It is Europe's largest consumer of gas, which accounts for roughly a quarter of its total energy consumption, with Russia supplying over half of its imports.

The good news is that Europe's energy system is more resilient than it was during the crisis of 2009. Andreas Goldthau of the University of Erfurt in Potsdam points to some useful changes. Pro-competition measures (like a ban on "destination clauses" that forbid the resale of gas) have weakened Gazprom's grip. A dense web of gas interconnectors now links previously isolated countries (see map).

Another source of cheer is liquefied natural gas (LNG). Heavy investments in regasification plants mean that Europe has plenty of idle capacity. Citigroup estimates that with historical utilisation rates for those plants running at 50% of capacity or less, the region can in theory handle enough to replace nearly two-thirds of Russian piped gas imports. So the limiting factor is not regasification capacity, but the available supply of LNG. Since it takes a long time to expand new production and export capacity, Europe's best hope would be to get hold of existing LNG cargoes originally destined for elsewhere.

One investor notes that when European prices shot up threefold between October and December last year "an armada of LNG" sailed to Europe as cargoes were diverted from Asia. This inflow offset a decline in Russian gas imports. Market rumours suggest that a new armada is coming. Chinese state-owned energy firms, envisaging quick profits from high European gas prices, are hoping to sell dozens of LNG shipments. Massimo Di Odoardo of Wood Mackenzie, a consultancy, adds that because the journey from America to Europe is shorter than the one to Asia, LNG tankers



can complete more trips—squeezing an extra 10% or so in export capacity to Europe. All told, he thinks extra LNG could fill 15% of the shortfall that would result from a complete Russian cut-off.

Another source of resilience is the amount of gas held in storage. Last year's bitter winter, along with Gazprom's reluctance to fill storage units it controls in Europe, left gas storage at levels below the five-year norm. Even so, Rystad, an energy research firm, calculates that a continuation of normal weather this winter would leave enough gas in storage by spring to make up for two months of lost Russian gas exports. Some analysts believe the excess might even cover four months of a cut-off, though a cold snap would reduce this buffer quickly.

Europe also has a secret weapon. Mr Di Odoardo points to its massive but little-discussed stores of "cushion gas". For technical and safety reasons, regulators insist that storage units like salt caverns and aquifers maintain a huge amount of gas that is not normally available to put on the market. The analysts at Wood Mackenzie reckon that up to a tenth of this cushion can be used without causing problems. If regulators gave permission, as they might in a war-induced crisis, that would amount to well over a month's-worth of Russian imports.

In sum, Europe will suffer if Russia cuts off the gas; but that price will be paid from the wallet rather than through physical suffering. That cost will be exacerbated, predicts Jonathan Elkind of Columbia University, because "Europe is not starting from calm, but from a market on edge." The continent's energy markets have only just been through an early-winter price shock, and the price outlook for all energy commodities is ugly. JPMorgan Chase predicts that, even without a Russian gas cut-off, Europe will spend some \$1tn on energy this year, up from \$500bn in 2019. If the region were forced to consume its gas stocks to survive a Russian cut-off, it would then

have to spend even more during summer frantically rebuilding its reserves to avoid an energy crisis next winter.

That is an unpleasant prospect. But a bigger price would be paid by Russia over the longer term. One source notes that Gazprom would face "massive" commercial fallout, ranging from penalties payable to customers to a halt in dollars flowing to Russia for contract payments. Gazprom would find it difficult to secure any long-term contracts in Europe after such a display of aggressive unreliability. And the Nord Stream 2 pipeline so cherished by Mr Putin would surely bite the dust. A shutdown might even persuade China, now cautiously importing more Russian gas, that its long-standing concerns about Russian reliability are well founded.

Mr Victor argues that such a brazen use of the energy weapon would probably lead Europe to try much harder to cut its dependence on Russian exports of gas "less because they are insecure and more because the revenue...is what funds Russian bad behaviour." As Mr Gustafson pithily puts it: "If Putin wanted to destroy Gazprom's business in Europe, he couldn't go about it in a better way." ■

## Germany and Russia

### Misplaced sympathy

BERLIN

**Germany's new chancellor dithers over Russia's threats to Ukraine**

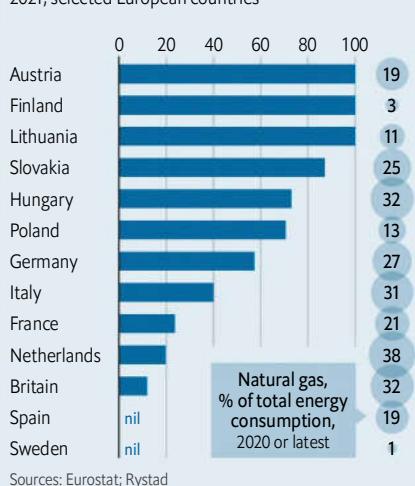
A CAMERA STOOD next to the table, live-streaming the proceedings. But if Vice-Admiral Kay-Achim Schönbach, the head of the German navy, did not know he was speaking on the record, it did not take long to find out. He told a think-tank in Delhi that Vladimir Putin wanted respect, and "probably also deserves" it. The West should recruit Russia as an ally against China, he added; something he, as a "radical Roman Catholic", would welcome.

One viral video clip and a very public brouhaha later, Mr Schönbach was gone. The pace of his departure showed that Germany's government will not tolerate such comments when an unprovoked Russian attack on Ukraine is looming. Yet to many foreign observers the admiral was merely voicing soft-on-Russia sentiments that are widespread among German decision-makers. Ukraine's foreign minister has said Germany's refusal to send his country weapons is "encouraging Vladimir Putin". The wife of a former Ukrainian president proposed a boycott of German cars. Even NATO allies like Poland publicly bristled.

There is much to grouch about. Ger- ►

## Spot the problem

Gas imports from Russia, % of total  
2021, selected European countries

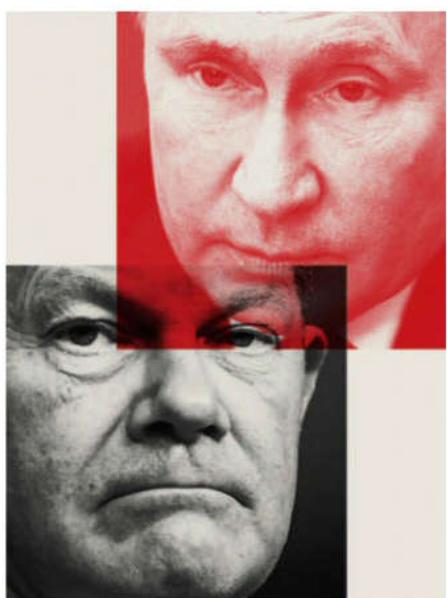


many's refusal to arm Ukraine, or to allow allies to do so, betrays a misunderstanding of the concept of deterrence. It has been deaf to allies' concerns over Nord Stream 2 (NS2), a completed but not-yet-approved gas pipeline from Russia to Germany that bypasses Ukraine, depriving it of leverage and income. The Social Democrats (SPD), who lead Germany's government, are particularly guilty in this telling. Critics spy a party stuffed with *Putinversteher* (Putin sympathisers) basking in nostalgia for the days of cold-war Ostpolitik, when SPD-led governments opened up to the east.

Yet there is little evidence that Germany has gone soft where it matters. The government has signed up to the European consensus that further Russian military aggression against Ukraine will carry "massive consequences", in the words of an EU communiqué last month. There is broad transatlantic concord over potential sanctions, if disagreement on details. Germany has even hinted at a shift on NS2. Asked about the pipeline last week, Olaf Scholz, the chancellor, said "all this will have to be discussed" should Russia invade. His NS2-sceptical Green coalition partners have been clearer still. Few imagine the pipeline will begin operating if Russia does attack.

A bigger problem is the chancellor himself. The three parties in Germany's new "traffic-light" coalition are visibly split on Russia, and Mr Scholz, a taciturn type who tends to speak in abstractions, has allowed a degree of cacophony. He has made no attempt to prepare Germans for trials that may lie ahead should Russia escalate, from rocketing gas prices to a refugee influx. Nor has he responded to Germany's chorus of critics. "This government has a terrible communications problem," says Stefan Meister, a Russia-watcher at the German Council on Foreign Relations in Berlin.

That extends to the international scene.



A comparison with Angela Merkel, Mr Scholz's predecessor, is telling. When Russia annexed Crimea in 2014 Mrs Merkel marshalled the EU's 28 fractious members to impose sanctions. Together with France, Germany established the "Normandy format" with Russia and Ukraine, placing Europe at the negotiating table. Her chancellery co-ordinated closely with Barack Obama's White House whenever Russian forces probed Ukrainian defences. Today Mr Scholz is one European leader among many, Normandy is moribund and the transatlantic relationship looks testy. "It's not that Germany has impeded consensus decision-making in NATO," says John Lough, author of "Germany's Russia Problem". "It's

just that it is not carrying as much water as many of us would like."

Mrs Merkel also enjoyed Mr Putin's respect, even as she came to despise his lies. She discussed Ukraine and eastern European security with Russia's president half a dozen times in her last months in office. In his seven weeks Mr Scholz has done so only once, despite the urgency. Mr Putin now prefers to talk to America over Europeans' heads. By weakening Europe, an equivocal Germany plays plumb into the Kremlin's hands, says Mr Meister. Mrs Merkel learned that Russian menaces were better faced down if Germany led Europe's response. It is an idea in which her successor has so far shown little interest. ■

## Architecture

# Lockdown knockdown

While covid raged, famous European buildings were demolished

**C**OVID-19 HAS been a mixed bag for Europe's architectural treasures. During the pandemic's first year, overnight stays by international tourists dropped by 68% across the continent. Fewer visitors means less wear and tear on monuments, but also less income to maintain them. Gargoyles are not falling off cathedrals yet. But while attention was distracted, authorities have carried out some dubious renovations.

Take the Acropolis. (Xerxes did.) During Greece's second lockdown in October 2020, builders poured wide concrete pathways around its temples. Authorities say the paths improve accessibility. Critics say they are causing floods. One academic accused the site's administration of using the lockdown as a "smokescreen".

At least the pathways are meant as an improvement. Elsewhere heritage sites have been levelled. In May 2020 Albania's government bulldozed the National Theatre in Tirana to make way for commercial development. The theatre was a humble modernist brick building built in 1939, but theatregoers loved it. Protests had blocked the demolition for years. Also felled in 2020 was the y-Block in Oslo, a curvy concrete icon of 1960s minimalism, though its Picasso murals were removed first.

The latter two monuments had been among the seven "most endangered" heritage sites listed annually by Europa Nostra, a cultural association. Its secretary-general, Sneska Quaedvlieg-Mihailovic, says 2020 was the only year in which sites on the list have been demolished. Whether or not city planners deliberately took advantage of the pan-

demic to let the wrecking balls swing, the distraction cannot have hurt.

Europe's biggest heritage-site restoration project is in Paris. Authorities want to repair Notre Dame cathedral, damaged by a catastrophic fire in 2019, before the city hosts the Olympics in 2024. The church's age and fame make it less vulnerable to ill-considered upgrades: governments are less cavalier with 12th-century churches than with 1960s office blocks. Crowdfunding may help, too. Tens of thousands of people have donated to the restoration, and they want to know how their money is being spent. The modernisation plans have touched off controversies in the media. All the better; as Athens has learned the hard way, public discussion before plans go ahead is a good thing.



What would Pheidias say?



### Electoral geography

## Road-testing the French dream

SAINT-BRICE-SOUS-FORÊT

### France's outer suburbs are a crucial presidential battleground

**O**N THE FRINGES of greater Paris, where urban concrete meets farmed fields, lies the suburb of Saint-Brice-sous-Forêt. Gently curved streets of two-storey houses, each with a parking space and garage, cover what were once apple and pear orchards. The narrow high street has just one café, and a "Cheesy Pizza" takeaway joint; but there is a drive-in Burger King on the outskirts. This is what the mayor, Nicolas Leleux, calls "the border of two universes": city and countryside. It captures the worries and hopes of middle France, and exemplifies a crucial electoral battleground for April's presidential poll.

Shy of extremes, the suburb tilts to the centre-right. In 2017 Saint-Brice-sous-Forêt preferred the centre-right presidential candidate, François Fillon, in the first round, but backed the centrist Emmanuel Macron against the nationalist Marine Le Pen in the second. In 2020 it replaced a centre-right mayor with Mr Leleux, a former navy submariner who belongs to Mr Macron's party. Locals, in other words, may be torn at the presidential poll this time between a vote for Mr Macron, assuming he runs for re-election, and his centre-right rival, Valérie Pécresse. A well-known figure locally, she is the president of the Ile-de-France region, which encompasses the city of Paris itself and Saint-Brice-sous-Forêt, 17 kilometres (11 miles) away.

Less than three months before polling day, however, talk is all about covid-19. Nobody spontaneously raises national politi-

cics. Daily new infections are still high across France, and shifting national rules about testing have caused chaos in schools. The mayor has opened a municipal testing centre to try to ease the stress. Residents also worry about heating bills and petty crime. The brutalist tower blocks of Sarcelles, a rough *banlieue* north of Paris, are not far away, and there are nagging concerns about "imported crime". Yet fear of immigration, which the two nationalist candidates—Ms Le Pen and Eric Zemmour—insist tops French concerns, seems largely absent.

Not that everybody is happy with Mr Macron. On a roundabout on the edge of town, ringed by car parks serving a giant hypermarket, Agnès, Josée Laure and Evelyne are standing defiantly in the cold, their hoods up against the wintry drizzle. Next to them lies a yellow-painted concrete block, which reads "*Gilets jaunes* St Brice: we won't give up". It is a vestige of the "yellow jackets" uprising, which emerged across the country in 2018 against a rise in the carbon tax on motor fuel. The protests have subsided elsewhere. But this group is still active. "We put up our banners every Saturday," says Agnès, a 48-year-old health-care worker, "but we pack them up after, and don't leave any mess behind."

Their current gripe is a new national rule, introduced on January 24th, which makes vaccination compulsory for access to restaurants, cafés, long-distance trains and other public places. Only one of the

trio says she is vaccinated; the others consider it an "infringement of our liberties", if not an attempt "to poison the population". Above all, they are indignant at the way Mr Macron has favoured the rich and displayed "contempt" towards ordinary people. As a spur to getting people jabbed, he recently said he wanted to *emmerder* (piss off) the unvaccinated. As for Mrs Pécresse, "she's just the carbon copy" of him.

April's election seems set to be determined on the right, as Mrs Pécresse, Ms Le Pen and Mr Zemmour battle for a place in the run-off against the president. Mr Macron consistently tops first-round voting intentions; the various candidates of the left are trailing far behind. If so, disillusioned left-leaning voters such as those on the Saint-Brice roundabout may well end up abstaining. Josée Laure is considering this. Evelyne says she will vote for Jean-Luc Mélenchon, a perennial hard-left candidate with a knack for the late surge.

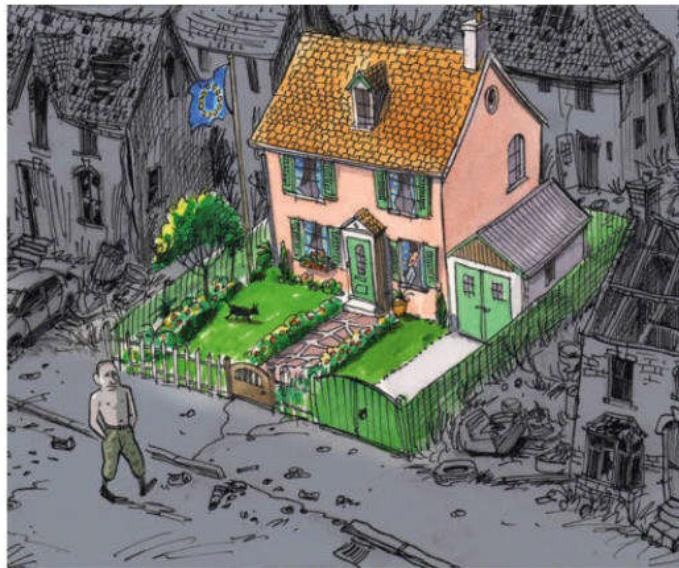
What comes into sharpest relief in Saint-Brice is the collision between the needs of daily life, notably the car, and the desire for a greener future. A place of quiet middle-of-the-road aspiration, it evokes what Mr Leleux calls the "French dream". "People have left the city to come here, not to live in a tower block, but in a house with a little garden, with neighbours, and a place to barbecue." Nearly 88% of households own at least one car. His task, he explains, is to reconcile that dream with the need to reduce car usage. Few can afford an electric vehicle. Mr Leleux is planning cycle lanes and building a bike shelter at the railway station, on a direct line to Paris. Yet on a cold day in January there are no cycles to be seen on the streets.

The Ile-de-France region, says Othman Nasrou, one of Mrs Pécresse's vice-presidents and in her campaign team, is "like a small France": it includes many car-dependent suburbs, so she is familiar with these complexities. Mrs Pécresse has proposed subsidies for households to buy electric cars, and mocked those who deride car use from the comfort of their nearby Parisian metro station. Anne Hidalgo, mayor of Paris and the Socialists' presidential candidate, is on just 3% in national polls.

Fashionable Parisian talk of the ideal "15-minute city" is all very well, says Mr Leleux. The reality is that to buy a *baguette* in under 15 minutes without a car is not possible in much of suburbia. If anybody has learned this, it ought to be Mr Macron, who won a huge majority of the vote in big cities in 2017, but later faced months of *gilets jaunes* protests. For now, insists the mayor, locals credit the president nonetheless with having been a "good captain" in difficult times. In April, it is on the streets of middle France, not the parquet-floored salons of Paris or its tenements, that such a claim will be tested. ■

## Charlemagne | The mess without

*Peace and order reign in the EU, but seldom near it*



PRESS A EUROCRAT hard enough about the EU's many imperfections, and sooner or later you hear a familiar defence. Never mind about coddled French farmers or Polish populists tearing up the rules: the crucial thing about the European project is that it has delivered *peace*. (The emphasis on this word is emotional; a small tear may well up at this point). Replacing centuries of warfare with decades of late-night summits quibbling over fish quotas is the European project's proudest achievement. Fair enough. But peace stops at the EU's borders. Surrounding the club is a zone of turmoil, which Europe seems powerless to soothe.

The prospect of war in Ukraine currently dominates the headlines. But look in just about any direction and Europe's neighbourhood is a mess. Belarus, Europe's last dictatorship, recently flew in migrants from Iraq, dumped them at the Polish border fence, gave them boltcutters and ordered them to try to break into the EU in the hope of causing another refugee crisis. The Belarusian despot is now welcoming Russian soldiers, perhaps on their way to invade Ukraine.

In Turkey, an eccentric autocrat presides over a crashing currency. In the western Balkans, pound-shop demagogues rant and loot. Across the Mediterranean, a mere people-smuggling dinghy ride from the EU, North Africa now mixes a drift away from democracy (Tunisia) with civil war (Libya). Only Norway, Switzerland and occasionally Britain look like functional places. To lose one neighbour to strife or demagoguery may be regarded as a misfortune. To lose nearly all of them looks like carelessness.

To be fair, much of the disarray has been deliberately fomented by one exceptionally aggressive neighbour. Besides grabbing bits of Ukraine and threatening much worse, Vladimir Putin has sown discord across the whole region. He props up a despot in Belarus and may one day swallow the country into Russia. His troops and cash support a breakaway sliver of Moldova, making life hard for its pro-EU government. He has stirred up disarray in the Balkans, not least in Bosnia, where his support for separatist Serb forces has brought the country to the brink of anarchy.

Europe once had a viable strategy to counter such meddling. Countries that wanted to escape from Russia's coercive "sphere of influence" were welcomed into the EU. The prospect of attending

those dull fish-themed European summits, not to mention trading with and receiving subsidies from some of the world's richest economies, was more than enough to lure countries like Bulgaria and Poland into the club. Accession talks required them to adopt hard but mostly sensible economic and political reforms. Being in the antechamber of the EU was itself a stabilising force.

Now the prospects for further EU enlargement are essentially zero. The last country to join was Croatia, in 2013. Britain was the big state keenest to bring in fresh blood, notes Rosa Balfour of Carnegie Europe, a think-tank in Brussels. Today's members are more likely to rue having let in Hungary than to look for ways to include Albania. To places with no hope of EU membership, promises of Russian or Chinese investment may sound rather appealing, though they come with strings attached.

The EU has other carrots, which it has long dangled at countries that had no real chance of joining the bloc; Turkey has officially been a candidate for accession since 1963, though more in theory than in practice. The prospect of visa-free travel may induce governments to clamp down on corruption, say. Europe sends money, and recently vaccines, as part of its "neighbourhood policy", which extends to bits of the Middle East. But the task is low on its list of priorities. The commissioner in charge of such policies comes from Hungary, where the government is notoriously corrupt and hostile to foreigners.

### It could have been EU

The way Europe deals with its neighbourhood is an extension of how it was built. The EU has no standing armies to push its agenda. Even if it had, internal divisions would dilute Europe's influence beyond its borders. The club still comes with 27 different flavours of foreign policy, in addition to one nominally designed at the European level. Some countries focus on the bloc's southern flank, where foreign policy is an extension of domestic imperatives—namely the desire to stem irregular migration. Various grubby deals have been struck with countries including Libya and Turkey to cut down the number of boats attempting the crossing into Europe from their shores. In Libya's case, Italy and France have backed rival warlords: hardly a recipe for fostering harmony.

The lack of unity is even more apparent when it comes to matters of war and peace. Bits of eastern Europe see NATO, and specifically America, as the bedrock of their security. By contrast, France's President Emmanuel Macron relentlessly pushes the idea that Europe must develop its own "strategic autonomy". Russia has long depended on a series of all-weather friends within the EU, notably Greece, Hungary and often Germany and Italy, to play down its wrongdoing. Meanwhile swathes of the continent depend precariously on gas from Russia to keep warm. Domestic politics nearly always trumps foreign relations. Even with 100,000 Russian troops menacing Ukraine, Germany's new coalition is still dithering over whether to toughen its stance towards Russia. France is in pre-election mode, as Italy may soon be.

Perhaps it was inevitable that the EU would be surrounded by dysfunction. All the functional countries in the neighbourhood were qualified to join the club and, apart from Norway and Switzerland, they did so. Thus the club kept expanding until it hit a wall of prickles—the countries that were too turbulent or ill-run to be admitted. That was once a mild irritant. Now its neighbours' instability looks like a risk to the solemnly invoked peace that underpins the whole European project. And that could prompt tears of a different kind. ■



**Boris Johnson**

## Yes man

### An inability to say No has led the prime minister to this parlous moment

THEY HAVE been many implausible elements of Boris Johnson's accounts of the "bring your own booze" gathering hosted in the garden of 10 Downing Street in May 2020, when Britain was under strict lockdown. Among them are his insistence that he "believed implicitly" it was a lawful work event, and his reliance on the excuse that "nobody told me" it would trample the restrictions his own government had imposed. Least credible, however, was his statement to the House of Commons that "with hindsight, I should have sent everyone back inside."

With hindsight, perhaps. Nothing could be more out of character for Mr Johnson than to order aides to drain their glasses and get back to their desks. His career has been marked by an eagerness to be liked, aided by an indifference to truth and a belief that rules are for others. Bombastic on the campaign trail, in private he is conflict-averse. As *The Economist* went to press, he was awaiting the results of an investigation by Sue Gray, a senior civil servant, into more than a dozen lockdown-busting events, including a Christmas bash, a birthday party and "wine-time Fri-

days". On January 25th the Metropolitan Police said it was opening a criminal inquiry in light of information shared by Ms Gray. A desire to say Yes built the prime minister's career, and may destroy it.

A trawl through the archives of his predecessors reveals one word scrawled again and again: No. The most important part of the top job is to shield the vast power and resources at his disposal from lobbyists, hangers-on and peddlers of bad ideas. The ministerial code, which Mr Johnson stands accused of breaching, is a list of Thou Shall Nots. To govern is to choose, and more often than not, it requires choosing not to.

Mr Johnson's inability to say No lies behind a trio of scandals. In August British troops helped airlift dozens of cats and dogs during the evacuation of Kabul. Ben Wallace, the defence secretary, had refused to take them, and in the dash to retreat many Afghans eligible for rescue were left behind. Mr Wallace was overruled; diplomats and soldiers were incensed. Dominic Dyer, an animal campaigner, claimed he had lobbied the prime minister's wife, his friend. "I have no doubt Carrie Johnson gave him a hard time," he said. Mr Johnson denied or-

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dering the rescue; internal emails released on January 26th suggest that he did.

To a Yes man, even a blatant conflict of interest can look irresistible. In December the Conservative Party was fined by the election watchdog for failing to report £53,000 (\$72,000) donated to fund a lavish redecoration of Mr and Mrs Johnson's Downing Street flat. Its source, Lord Brownlow, took the chance to lobby Mr Johnson about hosting a "great exhibition" to showcase Great Britain. Mr Johnson fixed him a meeting with ministers.

As for the parties, there is as yet no evidence that Mr Johnson organised them. Rather, his allies' defence is that he was incapable of saying No to his own office. During one lockdown, Mrs Johnson threw him a birthday party in the Cabinet room. "He was, in a sense, ambushed with a cake," said Conor Burns, a Johnson loyalist.

Mr Johnson's deserved reputation for betrayal is not because he is Machiavellian, but because saying Yes to things he cannot deliver is how he governs. His is an operation heavily reliant on focus groups. Dominic Cummings, a former aide and now a bitter enemy, reprises Bismarck's description of King Frederick Wilhelm's susceptibility to quacks, buffoons and "uninvited backstairs influences". Yet Mr Johnson accepted Mr Cummings's demands to upend the civil service and rewrite procurement laws as the price of his service.

Presented with a plan to prorogue Parliament in 2019, Mr Johnson agreed to it. The move was later ruled unlawful. More recently, he has pandered to one clique of ►►

Tory MPs by promising to protect the foreign-aid budget, and to another by cutting it. He agreed to build a new royal yacht, a scheme promoted by no one except the *Daily Telegraph*, for which he used to write. He said Yes to a grubby scheme to scrap Parliament's standards watchdog in order to avenge Owen Paterson, a friend whom it sought to sanction. (After the manoeuvre failed, he called it a "total mistake".)

Saying Yes is now not just the habit of a lifetime: it is essential for survival. Whatever Ms Gray or the police conclude, his fate will be decided by Tory MPs. If 54 submit letters to a party committee, he will face a vote of no confidence. He has sought to buy off rebels, promising to crack down on irregular migration and abolish the levy that funds the BBC. He is under pressure to reverse a planned increase in payroll taxes, and to row back on greenery. Many Tory backbenchers want him to stay. One says the opposition and press are in cahoots to "undemocratically depose" him; another, that calling for his resignation "only strengthens Putin's hand". Mr Johnson has indulged his party. His fate depends on whether it indulges him in return. ■

#### Monetary policy

## Buzzkill

### The Bank of England is determined to prevent a wage-price spiral

THE GOVERNMENT faces no shortage of crises. As well as the fallout from prime-ministerial parties, it must contend with fizzing inflation of 5.4% in December, the biggest annual increase in almost three decades. Officials are racing for ways to avert a crunch in April, when energy-price rises and higher payroll taxes are due. Public opinion is souring; over half of those polled by YouGov on January 17th thought the government was handling inflation badly, up from a third a year earlier. And on January 27th a report by the Treasury all-party parliamentary committee warned of the potential for a "wage-price spiral".

High inflation worries monetary policymakers at the Bank of England, too. At their next meeting, on February 3rd, they will probably raise interest rates from 0.25% to 0.5%. And they too are concerned by public opinion. All central bankers care about the public's confidence in their ability to control inflation. If that is lost, policymakers fear that expectations of price rises will become self-fulfilling. Workers expecting higher inflation may demand higher pay to compensate. As costs surge, companies may raise prices,

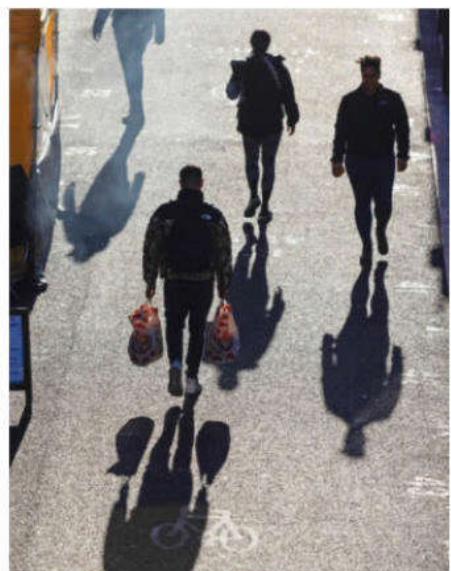
prompting further pay demands. No such wage-price spiral has developed in Britain for decades, despite consumer-price inflation above 5% in 2008 and 2011 (see chart). But the pandemic may have created the conditions for something extraordinary.

So far, household surveys warrant caution, not panic. One published on January 26th showed expectations of inflation in a year's time rising to 4.8%, much higher than the post-2005 average of 2.6%. Ricardo Reis and colleagues at the London School of Economics find that a growing share of households expect high inflation sometime in the next five to ten years, historically a precursor of untethered expectations. But the shift is still small.

Another place to look for brewing problems is in wage trends. Average pay excluding bonuses grew by 3.8% in the three months to November 2021, in part because of tight awards in 2020. After rising from around 3% to 19% between 2019 and 2020, cash freezes as a share of pay awards fell over 2021, according to Income Data Research, a data firm. In a speech on January 21st Catherine Mann of the Bank of England said that although wages in December were slightly above their pre-covid trend, they "showed little signs of spiralling".

Still, there are indications that wage pressure could continue. Very few people who want a job do not have one, which gives those in work greater power in wage negotiations. As food and energy prices rise, employers are bracing themselves for pay demands to grow louder. Neil Carberry of the Recruitment and Employment Federation, an industry group, expects median pay settlements to rise above 3% this year, compared with an average of around 2% over the 2010s.

The most direct evidence of planned price increases comes from companies themselves. Faced with higher costs of raw materials, rising energy prices and bigger pay bills (including as the result of a higher minimum wage), companies surveyed in December outlined plans to raise their prices by 5% in 2022, more than the 4% in-



Gathering evidence for wage talks

crease they reported in 2021. Ms Mann said that "it should be a concern that the costs from 2021 are becoming reflected in price expectations for 2022".

Other reasons to be concerned about Britain's inflationary dynamics include the spread of price increases beyond goods to services. Evidence also suggests that firms facing hot demand raised their prices by more than those facing cooler sales cut theirs. Both add to the risk that price increases will not reverse once all the supply-chain disruption fades. Ms Mann warned that if further shocks hit Britain from abroad, Brexit could make them worse because companies protected by trade barriers from foreign competition might feel safer in raising prices.

These dynamics could peter out on their own. As supply-chain problems subside and energy prices return to more normal levels, goods-price inflation could well sink. Britain's economic recovery may falter, or tax rises could squeeze incomes. Either would make it harder for companies to shunt higher costs onto consumers. Sanjay Raja of Deutsche Bank points out that the profitability of services firms has increased over the past 18 months, giving them headroom to absorb some of the higher costs, should they choose to, rather than pass them on.

The Bank of England seems unwilling to take any chances. In December it raised interest rates to 0.25%, as a defence against a mutually reinforcing escalation of wages and prices. Then data in January showed that inflation in December had been 0.9 percentage points above what it had predicted a month earlier. That was the bank's biggest-ever error in a forecast at that time horizon. Unlike those living and working in Downing Street, monetary policymakers still have time to stop events spiralling beyond their control. ■



## Bagehot | Wrecking ball

*Britain's political pendulum is due a swing away from excitement and towards boredom*



THINGS ARE never dull around Boris Johnson. Since 2019 the prime minister has led the Conservatives to their biggest vote-share since 1979, shaken up politics, taken Britain out of the European Union, endured a pandemic, nearly died, had a child, struck a trade deal with the EU, got married, had another child, and seen his net approval rating swing from +40 to -51 after revelations about potentially illegal parties in 10 Downing Street. His repeated dishonesty—and a police investigation into the high jinks, launched on January 25th—make them the most damaging in a series of scandals. Others include scrounging £53,000 (\$72,000) from donors to redecorate his residence and trying to prorogue Parliament illegally. If Napoleon was history on horseback, Mr Johnson is history on a pantomime horse.

With Mr Johnson holding the reins, politics is exhausting and voters are tired. Little wonder that they are telling pollsters they want a change. Nearly dying tends to win widespread sympathy; attending illegal parties in an unprecedented lockdown and being investigated by the police tend to lose it. The prime minister is to blame for his many errors. But he is also the victim of a supercycle in British politics, in which voters' taste in leaders swings between the charismatic and the boring.

This alternating pattern has lasted for four decades. Margaret Thatcher, Britain's first female prime minister, was replaced by Sir John Major—a man who, as wags like to note, ran away from the circus to become an accountant (his father was a trapeze artist). Sir John, a modest man, handed over to Sir Tony Blair, a messianic one. The theatrical Sir Tony was replaced by the dour Gordon Brown, who was succeeded by the slick, self-confident David Cameron. Theresa May, surely one of the shyest politicians ever to hold high office, was replaced by Mr Johnson, a show-off.

The great German sociologist Max Weber saw such charismatic authority as a "revolutionary force". It rests on the performance of miracles. Thatcher healed the sick man of Europe, breaking militant unions and modernising the British economy. Sir Tony converted Middle England's "small-c" conservatives into Labour voters. Mr Johnson struck a Brexit deal when that seemed all but impossible (admittedly, at the cost of hiving off Northern Ireland). He won "red wall" constituencies in central and northern England

that looked demographically Tory but had stuck stubbornly with Labour until 2019. His party hailed him as its saviour. Its election manifesto was decorated with pictures of men in boiler suits waving placards reading: "WE LOVE BORIS".

But charisma cannot last. It requires frequent demonstrations that the leader still has the magic touch. There is little evidence that Mr Johnson does. His government's announcement that the Royal Navy would help stop migrants crossing the Channel largely served as a reminder that the flow had not yet been stemmed. Picking a fight with the BBC, which voters like, won few friends. Unpopular populism is of no use to anyone. Britons are succumbing to drama fatigue. The Tories were elected on a promise to "Get Brexit Done"—and then, implicitly, to make politics go away again. Instead politics has become impossible to ignore. Mr Johnson's tenure increasingly resembles the grim years of Mrs May: stasis, parliamentary plots and a government unable to govern.

And so Labour is deploying boredom as its secret weapon. Sir Keir Starmer, a former head of the Crown Prosecution Service, revels in the reputation of lawyer-cum-bureaucrat. He likes five-a-side football, the Union flag and the Pineapple, a pub in Kentish Town; he dislikes crime and people who leave football matches early. Under his predecessor, Jeremy Corbyn, the party fizzed with audacious schemes—or madcap ones: free broadband for everyone! Sir Keir specialises in policy-free speeches that amount to little more than an hour of looking presentable in front of a flag.

The Conservatives jostling to replace Mr Johnson are also trying to look as dull as possible. Mr Johnson's road to Number 10 was chaotic; Rishi Sunak, the favourite to succeed him, glided from backbencher to chancellor in only five years. A teetotaller, he celebrated the reopening of the pubs after the most recent lockdown by posing outside an electrical store. Jeremy Hunt, a former health secretary and a contender for the leadership, contrasted his own seriousness with Mr Johnson's silliness in the party's most recent leadership contest. Long-shot candidates for the next one, such as Sajid Javid, the health secretary, are nerdy types. Only Liz Truss, the foreign secretary and one of a handful of front-runners, bucks the trend. She likes to look dashing, using a recent trip to Estonia to be photographed beaming out from a tank turret, even if her advisers would rather she showed off her well-briefed side.

### I just closed my eyes and swung

Mr Johnson's combination of excitement with ineptitude is hardly ideal. But dull people can be failures, too. At a time when the top job required charisma and salesmanship, it was held by Mrs May, who possessed neither. Mr Johnson would have been in his element in 2016, avoiding all talk of Brexit's drawbacks by simply insisting there were none. Mrs May, for her part, might have thrived in lockdown. It is easy to imagine her shutting every pub in the country before ever asking an aide: "Now, what's all this about a virus in Wuhan?" The charisma cycle of British politics gives voters what they want, but not always what the times need.

The big difficulty for boring leaders is that they can struggle to sell their vision. Charismatic ones, by contrast, get the chance to create a new political reality before voters tire of them. Thatcher reshaped the country for the foreseeable future; Sir Tony dominated it for a decade. By pressing ahead with Brexit, Mr Johnson has already set the course of British history for a generation. Whoever replaces him may do little more than tidy up after that upheaval—and give Britons time to catch their breath before the pendulum swings and politics becomes interesting again. ■



A global contest over semiconductors

## Game of chipmacy

The West and its allies are trying to set rules for the world's most complex supply chains—without China dominating the show. It isn't easy

DURING DONALD TRUMP's presidency many people looked afresh at China's technological prowess. Some concluded that it posed a threat to Western economies, and perhaps even to global security. In news headlines Huawei, a brilliantly successful manufacturer of telecoms equipment, became the face of that threat. America accused the firm of acting as a conduit for Chinese government surveillance and control. In 2018 America clobbered Huawei. It banned the export to the Chinese firm of American microchips essential for its products. This seems to have had the desired effect. Last year Huawei's revenues shrank for the first time in a decade, by almost a third.

It was unprecedented for a state to stymie so huge a tech company. Huawei's revenues were about as big as Microsoft's. But the feat was not without costs. Because the Trump administration acted without co-operating closely with America's friends, it prompted investors from far and wide to add missing links to parts of the semiconductor supply chain that are beyond the reach of American law.

Japanese firms, among others, have started quietly marketing their products in such a way as to evade America's Export Administration Regulations, qualifying them as "EAR-free". American firms, many of which sell billions of dollars of equipment to China every year, began looking for neutral territory from which they might continue to export supplies. Singapore and Malaysia led the way. "Who would willingly sign up to be restricted by the us government?" chuckles a lawyer in Washington, who has been navigating tech clients around the new restrictions.

Meanwhile, Chinese firms, spurred on by billions of dollars of investment by the state, have redoubled their efforts to develop their own versions of chip technologies they had previously imported along supply chains linked to firms in America. The way things began to go, it looked as if the American government would steadily lose its grip over the chip supply chain. To avoid that outcome, and to keep a modicum of control over what technology flows into China, it must build a consensus with friendly countries.

Since Joe Biden took office a year ago, his officials have been raising the issue of chip controls whenever they talk to foreign allies. A lobbyist in Washington says that in 25 years he has never seen semiconductors so consistently top the diplomatic agenda. Governments and companies have been setting up forums to align policy over the trade in chips and the equipment and material used to make them.

Some see a parallel with the Organisation of the Petroleum Exporting Countries, better known as OPEC. For decades its members, all oil exporters, have clubbed together to try to control how much oil reaches the world market, in order to influence prices. Today's new forums mark the first steps towards creating a similar set-up to control the export of semiconductors, in the hope of retaining a technological edge over China. It could be called the Organisation of the Semiconductor Exporting Countries: OSEC.

Diplomatic bodies dedicated to forging multilateral agreements over the export of technology already exist. But they are poor at governing the trade in semiconductors. In 1996 the Wassenaar Arrangement was created, among other things to oversee trade that may have a military use. It is the successor to the Co-ordinating Committee for Multilateral Export Controls, known as cocom, the cold-war body that in effect kept a Western embargo on trade with the Soviet bloc. Officials pay lip service to the idea of updating Wassenaar so that it might help control the trade in semiconductors. ►

► But few expect it to play that role, not least because Russia is a member.

So newer forums are springing up. The most formal is the EU-US Trade and Technology Council, set up last June with a working group dedicated to export controls. Semiconductors are on the agenda. A joint statement after the council's first meeting in Pittsburgh in September declared its intention to co-operate in "rebalancing" global chip supply chains. That was diplomatic language for keeping them away from China. The chip industry in the West and parts of Asia that are wary of China has welcomed the discussion, at least officially. It hopes that clearer export rules, applied globally, will reduce uncertainty.

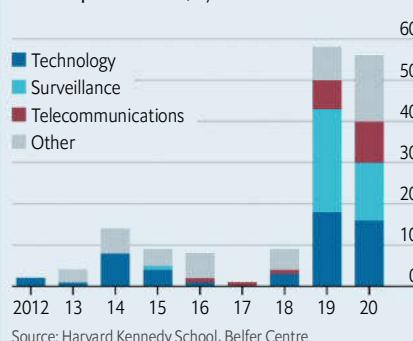
But global chip diplomacy is still weak. When semiconductor trade is discussed, it tends to be tacked onto the agenda of other world forums. Export-control lawyers and government officials huddle, often virtually, in the corridors of meetings of the Quad, a club of countries that embraces America, Australia, India and Japan. In September it announced that one of its goals was to secure the supply chains in semiconductors.

Chips have also come up in the sidelines of meetings to discuss sanctions that might be put on Russia if it were to invade Ukraine (see Briefing). The American administration has briefed the Semiconductor Industry Association on how the sort of export controls used against Huawei could be part of a sanctions package against Russia, to cut off its access to Western technology. Unlike China, Russia has no electronics industry to speak of, so such controls would not hurt it as badly. But it might make it harder for Russia to carry out cyber-attacks on its enemies.

Agreements forged between the governments of the leading countries in the chip supply chain—America, Japan and the Netherlands—still matter more than any talking shop. That trio produces the lion's share of the machinery used to make chips. A consensus between them over trade in chips marked the first step towards constraining China towards the end of Mr

## You can't have that!

Number of Chinese entities added to US export blacklist, by sector



Trump's presidency. A big Dutch company, ASML (originally standing for Advanced Semiconductor Materials Lithography), had been poised to sell its most sophisticated tools to SMIC, China's biggest and beefiest chipmaker. Japanese and American officials rounded on the Dutch government, which duly refused to give ASML a licence to export its cutting-edge machines to SMIC.

American officials with a more hawkish stance on China who want a clean break in the supply chains favour this narrower coalition-of-the-willing approach to diplomacy. Its small number of members planning discreetly makes it easier to move quickly against perceived threats. It also gives America the main say, echoing Mr Trump's go-it-alone attitude to China, rather than taking the time to cajole partners and find ways to write a book of clear rules for trading in chips. The Europeans and the Japanese both want a more formal multilateral approach. But America reckons its ability to react fast to a Chinese threat would inevitably be curbed.

## No stake, no chips

The snag, as a former official in Barack Obama's export team argues, is that the more robustly America wants to respond to China, the harder it is to get America's Western and Asian allies to come along. Without America's friends on board America's hard line on exports threatens to weaken its own companies. That is because it could steer investment to places outside America's reach but which still suit Chinese chipmakers. America is caught between choosing a softer set of controls which may work better in the long run, or a harsher set that could hurt Chinese technology more in the short run but might harm American industry overall. Worse, it might ruin the prospect of American-Chinese chip trade ever reviving in the event that better relations one day resume.

For the moment the administration is seeking a compromise by cutting off Chinese access to chips and chipmaking tools

above a certain level of sophistication. For example, it completely blocks Huawei from getting chips that run whizzy 5G networking equipment but lets it have older technologies. Likewise SMIC can get older chipmaking tools but not the latest versions that can be used for chips that go into iPhones and self-driving cars. America's friends, however, have yet to agree to this compromise, which is still being imposed unilaterally through the American government's export-control rules.

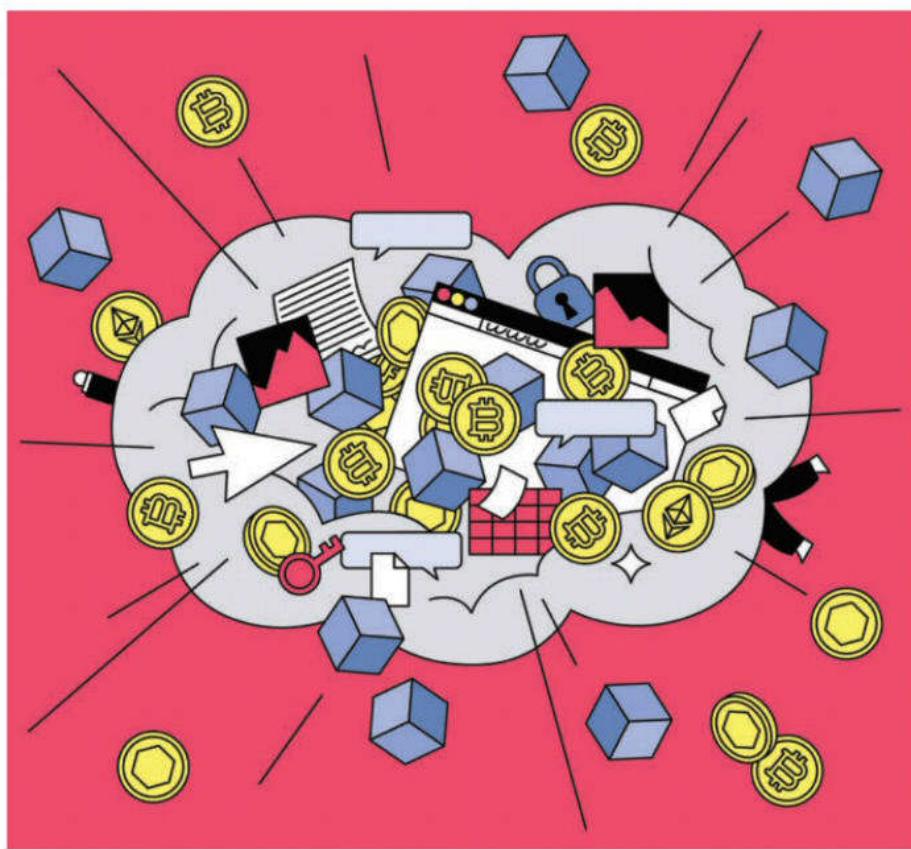
Mr Biden's administration is anyway hamstrung by politics at home, whatever new course America might try to chart with China. "Many are sceptical because they're not sure whether or not Biden will be around," says Richard Thurston, once the top lawyer at the Taiwan Semiconductor Manufacturing Company (TSMC), the world's largest chipmaker. He says the administration may be losing its appetite for energetic chipmocracy for fear that any agreement it makes may be swept away later this year if Congress turns Republican.

Mr Thurston reckons that controlling exports of specific machines and components is unwise anyway, because no net of controls can be drawn tightly enough to stop a determined, powerful country from somehow getting the tools. But it will nonetheless be tricky for China to acquire the knowledge for using those tools to make chips in commercially viable volumes. Mr Thurston suggests that governments, instead of constraining semiconductor supply chains, should focus on protecting trade secrets. American semiconductor companies and those in friendly countries could sell their most advanced chipmaking services to the Chinese market, yet still be able to prevent Chinese firms from developing the most sophisticated manufacturing capacity themselves.

This is not a popular view in Washington, where Mr Biden is all too easily battered by headlines bemoaning the flow of chips and tools to China. Yet an awkward fact is that America's own semiconductor toolmakers still count China as one of their biggest markets. Applied Materials, a Californian firm that makes machines used to etch minute circuits on silicon wafers, sold tools worth \$5bn to China in 2020, more than to any other market.

Meanwhile China keeps making progress. The proportion of global chips sold by China is rising (see chart 1). That is not true for any other major chipmaking country, despite Mr Trump's campaign to snuff out China's indigenous industries and Mr Biden's more multilateral attempts to achieve the same end. America and its allies may yet agree on how to contain China's semiconductor ambitions. But it may prove impossible for one state to control such a complex industry. If so, America may come to regret trying to intervene. ■





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**The future of cyberspace**

## Rewebbing the net

SAN FRANCISCO

**Some venture capitalists want to reinvent the internet. Good luck**

LIKE NEARLY everyone these days, Moxie Marlinspike has created a non-fungible token (NFT). These digital chits use clever cryptography to prove, with no need for a central authenticator, that a buyer owns a unique piece of digital property. Alongside cryptocurrencies like bitcoin, NFTs are the most visible instantiation of “web3”—an idea that its advocates and their venture-capital (vc) backers hail as a better, more decentralised version of the internet, built atop distributed ledgers known as blockchains. Technologists like Mr Marlinspike, who created the secure-messaging app Signal, digital artists, celebrities and even the occasional newspaper have issued and sold them to collectors, often for hefty sums (an immaterial version of *The Economist*'s cover image fetched over \$400,000).

Although it looked as cryptographically sound as any other NFT, though, Mr Marlinspike's token could shift shape depending on who opened it. If you bought it and viewed it on a computer, it transformed into a poop emoji. After a few days the NFT

was taken down by OpenSea, a marketplace for digital artefacts. This played into Mr Marlinspike's hands. For his aim was not to raise cash but to raise awareness. His token showed that NFTs are not as non-fungible as advertised. And OpenSea's reaction illustrated that the supposedly decentralised web3 has its own gatekeepers.

### Can the centre hold?

The Marlinspike caper was the latest turn in perhaps the biggest controversy to erupt in tech-world for several years. On one side sit techno-Utopians, firms offering assorted web3 services and their vc backers. They claim that web3 is the next big thing in cyberspace, that it is truly decentralised—and that it promises juicy returns to boot. Globally, the value of vc deals in the crypto-sphere reached \$25bn last year, up from less than \$5bn in 2020 (see chart on next page). Last week Andreessen Horowitz, one of Silicon Valley's most illustrious vc firms, its biggest web3 champion and a16z for short, was reported to be raising a

\$4.5bn web3-related fund, to add to three existing ones worth a total of \$3bn. A senior partner left a16z this month to set up her own firm focused on web3.

Pitted against them are the sceptics. They range from Mr Marlinspike, respected even among the techno-Utopians, to Jack Dorsey, who founded two platforms of the sort that web3 promises to supersede (Twitter in social media and Square in payments). They argue that a decentralised internet is a pipe dream—“You don't own ‘web3’. vcs and their [limited partners] do,” Mr Dorsey warned last month. And a dangerous one at that for the unwary investor: since November some \$1trn of the value of cryptocurrencies, the most mature province of web3, has gone up in flames.

The feud may seem abstruse. But the stakes are big. It could change the trajectory of the internet—and the multitrillion-dollar business models that it has enabled.

The history of modern computing is of a constant struggle between decentralisers and recentralisers. In the 1980s the shift from mainframes to personal computers gave individual users more power. Then Microsoft clawed some of it back with its proprietary operating system. More recently, open-source software, which users can download for nothing and adapt to their needs, took over from proprietary programs in parts of the industry—only to be reappropriated by the tech giants to run their mobile operating systems (as Google ➤

► does with Android) or cloud-computing data centres (including those owned by Amazon, Microsoft and Google).

The web3 movement is a reaction to perhaps the greatest centralisation of all: that of the internet. As Chris Dixon, who oversees web3 investments at a16z, explains it, the original, decentralised web lasted from 1990 to about 2005. This web1, call it, was populated by flat web pages and governed by open technical rules put together by standards bodies. The next iteration, web2, brought the rise of tech giants such as Alphabet and Meta, which managed to amass huge centralised databases of user information. Web3, in Mr Dixon's telling, "combines the decentralised, community-governed ethos of web1 with the advanced, modern functionality of web2".

This is possible thanks to blockchains, which turn the centralised databases to which big tech owes its power into a common good that can be used by anybody without permission. Blockchains are a special type of ledger that is not maintained centrally by a single entity (as a bank controls all its customers' accounts) but collectively by its users. Blockchains have outgrown cryptocurrencies, their earliest application, and spread into NFTs and other sorts of "decentralised finance" (DeFi). Now they are increasingly underpinning non-financial services.

The portfolio of a16z offers a glimpse of this wild new world. It already includes more than 60 startups, at least a dozen of which are valued at over \$1bn. Many are developing the infrastructure for web3. Alchemy provides tools for others to build blockchain applications, much as cloud computing makes it easy for developers to create web-based services. Nym's "mixnet" is a decentralised network that mixes up messages so that no one else can tell who is sending what to whom.

Other a16z bets are serving end-users. Dapper Labs creates NFT applications such as NBA Top Shot, a website where sports fans can buy and sell digital collectables like depictions of key moments in basket-

ball games. Syndicate helps investment clubs organise themselves into "decentralised autonomous organisations" governed by "smart contracts", which are rules encoded in software and baked into a blockchain. And Sound.xyz allows musicians to mint NFTs to make money.

What all these companies have in common, explains Mr Dixon, is that it is hard for them to lock in customers. Unlike Google and Meta they do not control their users' data. OpenSea (in which a16z also has a stake) and Alchemy are just pipes to the blockchain. If their customers are unhappy, they can move to a competing service. Even if he wanted, he could not keep them from leaving, says Nikil Viswanathan, Alchemy's boss. "As a business, I would love to have proprietary choke points. But there aren't any. We tried to find them."

The idea is that this makes web3 companies try harder to satisfy customers and keep innovating. Whether they can do this while also making pots of money is another matter. It is not clear how much demand exists for truly decentralised projects. That was the problem of early web3 offerings (then called "peer-to-peer" or "the decentralised web"). Services such as Diaspora and Mastodon, two social networks, never really took off. Their successors could face the same problem. A service like OpenSea would be much faster, cheaper and easier to use "with all the web3 parts gone", says Mr Marlinspike.

A more fundamental problem is that even if web3 worked as smoothly as its immediate predecessor, it may nevertheless lend itself to centralisation. Lock-in, reckons Mr Marlinspike, tends to emerge almost automatically. The history of the internet has shown that collectively developed technical protocols evolve more slowly than technology devised by a single firm. "If something is truly decentralised, it becomes very difficult to change, and often remains stuck in time," he writes. That creates opportunities: "A sure recipe for success has been to take a 1990's protocol that was stuck in time, centralise it, and iterate quickly."

Centralisation and lock-in have been incredibly lucrative. In fact, a16z has made billions from Meta, in which it was an early investor; one of a16z's founders, Marc Andreessen, sits on Meta's board to this day. Web3's vc boosters may be counting on something like this happening again. And to a degree, it already is. Despite being a relatively recent phenomenon, web3 is exhibiting signs of centralisation. Because of the complexity of the technology, most people cannot interact directly with blockchains—or find it too tedious. Rather they rely on middlemen, such as OpenSea for consumers and Alchemy for developers.

Albert Wenger of Union Square Ventures, a vc firm that started investing in

web3 firms a few years ago, points to other potential "points of re-centralisation". One is that the ownership of the computing power that keeps many blockchains up to date is often very concentrated, which gives these "miners", as they are called, undue influence. It could even allow them to take over a blockchain. In other systems the ownership of tokens is heavily skewed: at recently launched web3 projects, between 30% and 40% is owned by the people who launched them.

These dynamics, combined with the latest crash that may cool investors' appetite for all things crypto, suggest that web3 will not dislodge web2. Instead, the future may belong to a mix of the two, with web3 occupying certain niches. Whether or not people keep splurging on NFTs, such tokens make a lot of sense in the metaverse, where they could be used to track ownership of digital objects and move them from one virtual world to another. Web3 may also play a role in the creator economy, another buzzy concept. Li Jin of Atelier, a vc firm, points out that NFTs make it easier for creators of online content to make money. In this limited way, at least, even the masters of web2 see the writing on the wall: on January 20th both Meta and Twitter integrated NFTs into their platforms. ■

## Software development

# Going codeless

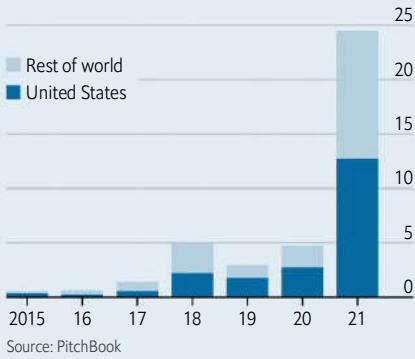
**Firms are letting all workers write software, not just the geek elite**

**I**N 2018 A field technician working for Telstra, an Australian telecoms firm, built an app that unified 70 messaging systems for reporting phone-line problems. The technician did this despite having no coding experience. The interface may look cluttered: the landing page jams in 150 buttons and a local-news ticker—the app equivalent of an airplane cockpit, quips Charles Lamanna of Microsoft, who oversees the software titan's Power Apps platform that made it possible. But it has been a hit. Some 1,300 other Telstra technicians employ it, saving the firm an annual \$12m.

Professional developers (pro devs) might poke fun at the technician's DIY app. But the trend it exemplifies is no joke. Since well before 2017, when Chris Wanstrath, co-founder of GitHub, a coding-collaboration site, declared that "the future of coding is no coding at all", so-called low code/no code (LC/NC) tools have burgeoned. They allow anyone to write software using drag-and-drop visual interfaces alone (no code) or with a bit of code creep-►

## More than a token effort

Crypto venture-capital deal value, \$bn





Calling all coders

▶ing in (low code). Under the hood, this is translated into pre-written or automatically generated code, which then whirs away.

Such tools are in hot demand. Just 25m people around the world are fluent in standard programming languages, reckons Evans Data Corporation, a research firm—one for every 125 people in the global workforce and 1.4m fewer than needed. That shortfall will rise to 4m by 2025, says IDC, a research firm. LC/NC products expand the pool of coders to “line-of-business” employees who seldom speak C++, Java or Python. And beyond. Cheryl Feldman went from a junior position in a hair salon to a technical career at Salesforce, a software firm, thanks to LC/NC. Samit Saini changed jobs after 13 years as a security guard at Heathrow to become an “IT solution specialist” at the airport after making software on Microsoft’s Power Apps.

#### Overcoming language barriers

IDC reckons the low/no coders numbered 2.6m globally in 2021. It expects their ranks to swell by an average of 40% a year until 2025, three times as fast as the total developer population. The number of organisations using Power Apps more than doubled in 2021. It now has 10m monthly users. BASF, a chemicals firm, uses it to let 122,000 workers write software. A study last year by Aite-Novarica Group, a consultancy, found that over half of American insurers have deployed or plan to deploy LC/NC. Unqork, a no-code startup valued at over \$2bn and backed by Goldman Sachs, is convincing other financial firms to take the plunge. Mr Lamanna envisages a global population of a billion low/no coders.

The dream of codelessness is not new. Tony Wasserman of Carnegie Mellon University’s branch in Silicon Valley dates it back to the concept of “automatic programming” in the 1960s. Since then successive waves of simplification and abstrac-

tion have made life easier for programmers by distancing coding languages further from the machine code understood by computer hardware. In the early 1990s Microsoft tried to simplify things further by launching Visual Basic, an early stab at LC/NC. In the next decade firms like Appian, Caspio, Mendix and Salesforce began offering products aimed expressly at line-of-business types.

Recently LC/NC’s potential has been unlocked by the cloud, which lets people connect to data easily and collaborate in real time, says Ryan Ellis, who leads LC/NC products at Salesforce. Last year Amazon Web Services (AWS), the online giant’s cloud-computing arm, introduced Amazon SageMaker Canvas, a set of tools that lets people deploy machine-learning models without writing code. It also offers Honeycode, a no-code app builder, in beta version.

LC/NC used to be chiefly about making pro devs more efficient. Now it is also about pulling more humans into creating applications, says Adam Seligman of AWS. In terms of impact, he says, the latest wave “will race higher up the beach”. For one thing, firms in a hurry to digitise appreciate that when line-of-business people design software, it speeds things up. “A field worker making something for other field workers is hugely valuable as the feedback loop is faster,” says Adam Barr, a former Microsoft pro dev and author of “The Problem with Software: Why Smart Engineers Write Bad Code”. As digital natives enter the workforce they are also demanding automation of repetitive or manual data-entry tasks, often on pain of walking out.

In addition, LC/NC is fast becoming the secret sauce in modern software development, notably in machine learning, says Arnal Dayaratna of IDC. The mastery of Python or Java required for this type of artificial-intelligence (AI) software is daunting even for pro devs. Bratin Saha, who oversees AWS’s machine-learning services, wants SageMaker Canvas to empower regular business analysts—from marketing or finance, say—to deploy machine learning. That could increase the number of AI specialists available to businesses by an order of magnitude, he predicts.

Some scepticism is warranted. Just because non-programmers are able to build an application with LC/NC tools does not mean it will be any good, says Mr Wasserman, just as bug-ridden spreadsheets yield faulty results. They could also become a headache for corporate IT departments if citizen developers collect customer data that are worthless or, worse, that violate privacy. Especially with no code, businesses can find that the functionality they need does not yet exist. No-code platforms make the first 90% of delivering a useful application easy, and the last 5% often impossible, says Tim Bray, a pro dev formerly

of AWS. And many pro devs remain resistant. Although they turn to LC/NC to simplify some tasks, plenty of pros see it as the programming cousin of pin-it-on neckties, in the words of one commentator. Some worry that specialising in LC/NC makes them look like dilettantes, reports Mr Barr.

LC/NC will not displace “full” coding altogether, as its evangelists insist. Pro devs will continue writing their firms’ core products and mission-critical enterprise systems. But they will increasingly be complemented by legions of enterprising line-of-business workers with a software-development string to their bow. For employers, this means greater productivity. For employees, it could be life-changing. In 2019 the Telstra technician became senior business specialist for field digitisation and has since been promoted again. ■

#### The shortage economy

## More pain, no gain

#### Why supply-chain problems aren’t going away

**S**UPPLY CHAINS have seldom featured in companies’ earnings reports over the three decades since globalisation took off in earnest, save for the occasional mention of the benefits of low costs and lean inventories. This earnings season, though, covid-induced shortages are among the first problems mentioned by many firms. The Omicron variant has worsened the logjams by forcing workers, in many industries and the logistics business that weaves them together, to quarantine. And shortages of both staff and materials are contributing to inflation, raising costs across the board.

On January 25th disappointed investors sent GE’s share price down by 6% after Larry Culp, the industrial icon’s boss, said that supply-chain “headwinds” had hit its ►►

#### Getting high on short supply

Companies reporting supply-chain shortages  
Worldwide survey index



► health-care business especially hard. Fourth-quarter revenues declined by 3.5%, year on year. On the same day Gregory Hayes, boss of Raytheon, presented mixed results, noting that the defence firm had “seen its share of supply disruptions”. Others sniff trouble coming. On January 26th Boeing said that supply chains were not a “constraint” because its airliner production was low and inventories full. But, it added, raw materials, labour and logistical challenges were a “watch item”. Hours later Tesla said supply-chain snags had forced it to run factories below capacity.

European firms are not immune. On January 21st Siemens Gamesa, a wind-turbine giant, blamed supply-chain woes for poor results and a profit warning. Vestas, a rival, has voiced similar concerns. EY, a consultancy, reckons that British-listed firms issued 19% more profit warnings in the last quarter of 2021 than a year earlier. A record number blamed supply-chain disruption and rising costs.

Shortages are like nothing seen before (see chart on previous page). A chip crunch knocked nearly 10m units, or more than 10%, off annual car production in 2021 as

firms slashed orders at the start of the pandemic and were pushed to the back of the queue when demand rebounded. Signs of improvement are scarce. This month Toyota said that it would cut output by 150,000 vehicles, or around 18%, in February for a lack of chips. GE blamed part of its health-care arm’s woes on the chip crunch. Large American firms surveyed by America’s Commerce Department reported that their chip inventories had fallen from 40 days in 2019 to less than five days in 2021—and expected no improvement for at least the next six months. The department has ►

## Bartleby Purpose and the employee

*Some people want to change the world. But not everyone*

**W**HAT IS THE meaning of mayonnaise? For Unilever, a consumer-goods giant whose products are all meant to stand for something, the purpose of its Hellmann’s brand is to reduce food waste by making leftovers tasty. For Terry Smith, a fund manager fed up with Unilever’s dipping share price, this is crazy. “The Hellmann’s brand has existed since 1913,” he wrote earlier this month. “So we would guess that by now consumers have figured out its purpose (spoiler alert—salads and sandwiches).”

Mr Smith’s concern is the financial performance of Unilever (in the face of investor disquiet, the firm is now planning management cuts and an overhaul of its operating model). But his underlying point, that doing the obvious job well can be purpose enough, is one that has much wider application. For it is true of colleagues as well as condiments.

The very idea of a purposeful employee conjures up a specific type of person. They crave a meaningful job that changes society for the better. When asked about their personal passion projects, they don’t say “huh?” or “playing Wordle”. They are concerned about their legacy and almost certainly have a weird diet.

Yet this is not the only way to think about purpose-driven employees. New research from Bain, a consultancy, into the attitudes of 20,000 workers across ten countries confirms that people are motivated by different things.

Bain identifies six different archetypes, far too few to reflect the complexity of individuals but a lot better than a single lump of employees. “Pioneers” are the people on a mission to change the world; “artisans” are interested in mastering a specific skill; “operators” derive a sense of meaning from life outside work; “strivers” are more focused on pay

and status; “givers” want to do work that directly improves the lives of others; and “explorers” seek out new experiences.

These archetypes are unevenly distributed across different industries and roles. Pioneers in particular are more likely to cluster in management roles. The Bain survey finds that 25% of American executives match this archetype, but only 9% of the overall US sample does so. Another survey of American workers carried out by McKinsey, a consulting firm, in 2020 found that executives were far likelier than other respondents to say that their purpose was fulfilled by their job.

This skew matters if managers blindly project their own ideas of purpose onto others. Having a purpose does not necessarily mean a desire to found a startup, head up the career ladder or log into virtual Davos. Some people are fired up by the prospect of learning new skills or of deepening their expertise.

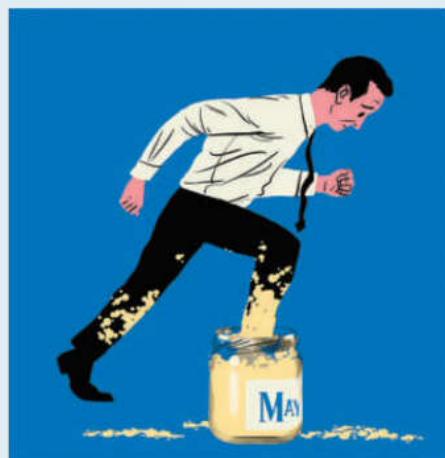
Others derive purpose from specific kinds of responsibility. Research by a couple of academics at NEOMA Business School and Boston University looked at

the experience of employees of the Parisian metro system who had been newly promoted into managerial roles. People who had been working as station agents before their elevation were generally satisfied by their new roles. But supervisors who had previously worked as train drivers were noticeably less content: they felt their roles had less meaning when they no longer had direct responsibility for the well-being of passengers.

Firms need to think more creatively about career progression than promoting people into management jobs. IBM, for example, has a fellowship programme designed to give a handful of its most gifted technical employees their own form of recognition each year.

Another mistake is to conflate an employee’s commitment with good performance. A recent paper from Yuna Cho of the University of Hong Kong and Winnie Jiang of INSEAD, a business school, describes an experiment in which groups of people with managerial experience listened to two actors playing the part of colleagues. One group heard an “employee” saying that he was looking forward to retirement; another group heard the employee saying that he did not want to retire at all. In all other respects the conversations were the same. The observers assigned a bigger bonus and a higher raise to the employee who appeared to have more passion.

There is some logic here. Employees with a calling could well be more dedicated. But that doesn’t necessarily make them better at the job. And teams are likelier to perform well if they blend types of employees: visionaries to inspire, specialists to deliver and all those people who want to do a job well but not think about it at weekends. Like mayonnaise, the secret is in the mixture.



warned that continuing shortages could force factories to close.

The transport of goods is not getting much freer, either. Container-shipping rates are creeping back up to the record levels of last summer. Analysts do not expect much relief before the second half of the year. Shortages of workers are making life harder still. IHS Markit, a consultancy, notes that America's labour force is 4m below pre-pandemic levels. Europe's has been disrupted by reduced movement of migrant workers and Asia's by strict new lockdowns. Raytheon blamed a tight sup-

ply of "castings", vital for jet-engine turbine blades, on a dearth of skilled welders. American Trucking Associations, a trade body, said last year that the industry faced a shortage of 80,000 lorry drivers.

These constraints are all adding to costs of parts, materials and wages. Throw in higher energy prices and industrial companies everywhere face a tough start to 2022. With all these obstacles showing little signs of disappearing, supply chains may well come high up the list of excuses if firms unveil disappointing quarterly results in a few months' time. ■

survey by Morgan Stanley, a bank, found that, partly thanks to the shortages, 55% of chip buyers were double-ordering, which artificially inflates demand. High inflation and looming interest-rate rises could hit economic growth—and chip demand with it. Mr Penn expects the cycle to turn in the second half of 2022 or in early 2023.

This time the glut, when it comes, may not affect all chipmakers equally. TSMC's boss, C.C. Wei, said this month that a correction could be "less volatile" for his firm thanks to its position at the technological cutting-edge. Much of its new capacity is already booked up in long-term agreements with customers such as Apple, which needs a regular supply of the most sophisticated chips for its newest iPhones.

The current cycle may differ from previous ones for another reason. The shortages, and America's tech-flavoured trade war with China, have reminded politicians how vital chips are to the modern economy—and how over-reliant their supply is on a few giant firms. Worries about the sector's excessive concentration have led trustbusters to challenge the \$40bn acquisition by Nvidia, an American chip designer, of Arm, a British one—successfully, if news reports this week that the deal is being scrapped are to be believed.

But governments' favoured way to deal with the over-reliance is to lure more chipmaking home, mostly from East Asia, with subsidies. On January 25th America's Commerce Department issued a report to that effect, urging Congress to pass a bill, already approved by the Senate, that includes \$52bn in handouts for chipmakers. Mark Liu, TSMC's chairman, was frank in 2020 when he said such subsidies were vital to persuade his firm to build a new plant in Arizona, one of only a few outside Taiwan. Intel chose Ohio for its factories partly because of incentives offered by the state. Pat Gelsinger, its boss, has been touring rich places that have made similar offers.

The EU is keen to match the Americans, potentially putting itself on the hook for tens of billions of dollars of its own. It aspires to double Europe's share of chipmaking, currently around 10%. In May South Korea's government talked of a national mission to provide \$450bn of capital spending over ten years to protect and expand its national industry. In November Japan unveiled a scheme of its own, with TSMC thought to be getting some \$3.5bn. China has long nurtured ambitions—infiltrated by American sanctions but so far unsuccessful—to build a fully fledged chip industry (see International section).

Adding taxpayer cash to chipmakers' already rich spending plans, says Mr Penn, could lead them to build even more excess capacity than usual. That should give politicians and chip CEOs pause. The bigger the boom, the deeper the subsequent bust. ■

## Chipmaking

# Party on

## Busts follow booms in the chip business. Governments may make things worse

**A**MID A CHIP shortage that has hobbled producers of everything from toys to wind turbines (see previous article), chipmakers are on a spending spree. On January 13th Taiwan Semiconductor Manufacturing Company (TSMC), the world's biggest contract manufacturer, said it would spend up to \$44bn on new capacity in 2022. That is up from \$30bn last year, triple the number in 2019 and ahead of earlier plans to spend over \$100bn in total over the next three years. Intel, an American rival, plans to burn through \$28bn this year. On January 21st it said it would build two big new factories in Ohio by 2025 at a total cost of \$20bn. An option to build six more later would take the overall price tag to \$100bn. Samsung of South Korea, TSMC's closest technological rival, has hinted that its capital spending for 2022 will surpass last year's \$33bn. Smaller firms, such as Infineon in Europe, are also splurging.

IC Insights, a research group, reckons that, across the industry, capital spending

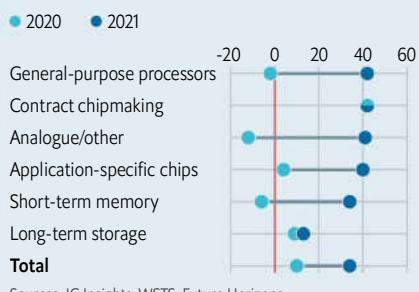
rose by 34% in 2021, the most since 2017. That torrent of money is welcome news for the industry's customers, who have been struggling with shortages for over a year. For the industry itself, it is the latest iteration of a familiar pattern. Bumper revenues, like those reported by Intel on January 26th and Samsung the next day, compel companies to expand capacity. But because demand can change much more quickly than the two or more years needed to build a chip factory, such booms often end in busts. The chip business has swung between over- and undercapacity since it emerged in the 1950s, observes Malcolm Penn of Future Horizons, a firm of analysts (see chart). If history is a guide, then, a glut is on the way. The only question is when.

Soon, many analysts think. Demand for smartphones may be cooling, especially in China, the world's biggest market. Sales of PCs, which boomed during covid-19 lockdowns, also seem poised to weaken, says Alan Priestley of Gartner, a research firm. A

## Chip dips

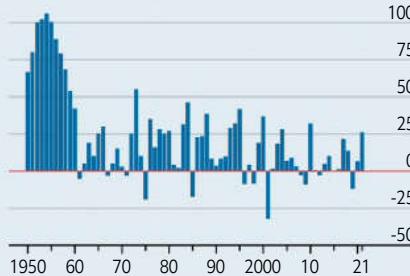
Worldwide semiconductor industry, % change on a year earlier

Capital expenditure, by product type



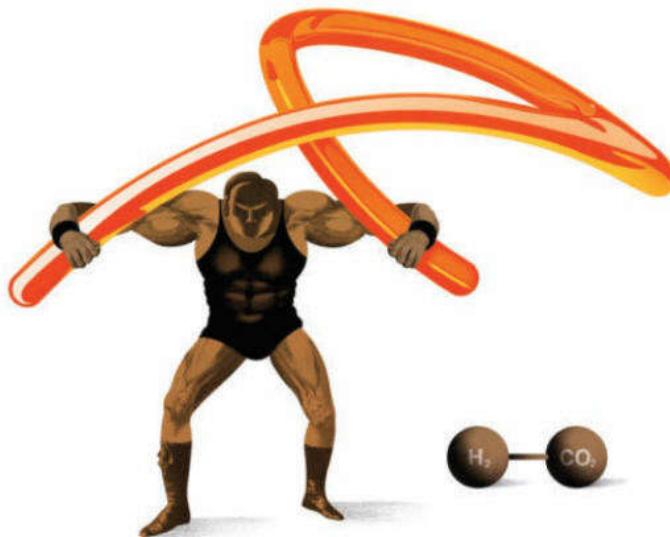
Sources: IC Insights; WSTS; Future Horizons

Revenues



## Schumpeter | The greening of steel

*Lakshmi Mittal transformed an industry. His son has a tougher task*



**L**AKSHMI MITTAL has two passions: the steel industry and his family. His embrace of the first turned a poor boy from Rajasthan into the “Carnegie from Calcutta”, a man who built the world’s second-biggest steel empire from scratch, culminating in a takeover in 2006 of Arcelor, a European champion. The second sometimes sounds like tabloid fodder: lavish weddings in Paris; family homes—one known as the Taj Mittal—on London’s “Billionaire’s Row”. Yet Mr Mittal’s family knows the steel business inside out. Last year Aditya, his 46-year-old son, became CEO of ArcelorMittal. It now falls to him to transform the industry again.

That is because about half of ArcelorMittal’s revenue comes from Europe, where pressure to decarbonise steel production, source of up to a tenth of global carbon-dioxide emissions, is becoming irresistible. The region is laden with coal-burning blast furnaces, the carbon-heaviest of steelmaking technologies. Many are on their last legs. Rather than refurbishing them, some firms are opting to replace these with new direct-reduced-iron (DRI) and electric-arc-furnace (EAF) plants. Blast-furnace steelmaking is doubly carbon-intensive: it uses coking coal to soak up oxygen from iron ore, as well as dirty energy to heat the furnaces. DRI-EAF technology, hitherto dependent on natural gas, can use hydrogen and renewable energy instead. Once scaled up, it could mark a revolution in steelmaking. By jettisoning their once-cherished blast furnaces, European steelmakers hope to start slashing emissions this decade in order to become net-zero by mid-century.

Aditya Mittal still has his 71-year-old father, ArcelorMittal’s executive chairman, by his side. But the challenge ahead is uniquely tough. Whereas the older Mr Mittal made his own luck, Aditya is not master of his own destiny. He needs a vast infrastructure of hydrogen and carbon capture to emerge from nowhere to achieve his ambitions, not to mention a market for expensive “green steel”. Unlike his father, who made his fortune by taking privatised steelworks off government hands, he will not succeed unless ArcelorMittal receives taxpayer support. He is not alone in seeking that. The whole industry believes that rapid decarbonisation will be impossible unless governments foot part of the bill. History, however, suggests the state and steel are unpromising bedfellows.

ArcelorMittal starts with some advantages. For decades the el-

der Mr Mittal bought mini-mills in different parts of the world that used DRI pellets and EAFs rather than blast furnaces and basic oxygen furnaces. The technology is still only a bit-player in Europe. Fuelled by hydrogen and renewable electricity, it could become the dominant one within a decade. ArcelorMittal is not the most advanced among European steel companies in developing zero-carbon mills. It has three low-carbon DRI-EAF projects under way, in Spain, Belgium and Canada. SSAB of Sweden is ahead of it. Yet it has reduced debt to shore up its balance-sheet, giving it the flexibility to increase spending. Moreover, its presence in poorer countries such as India, where steel use per person is a fraction of its level in the West, gives it plenty of growth opportunities.

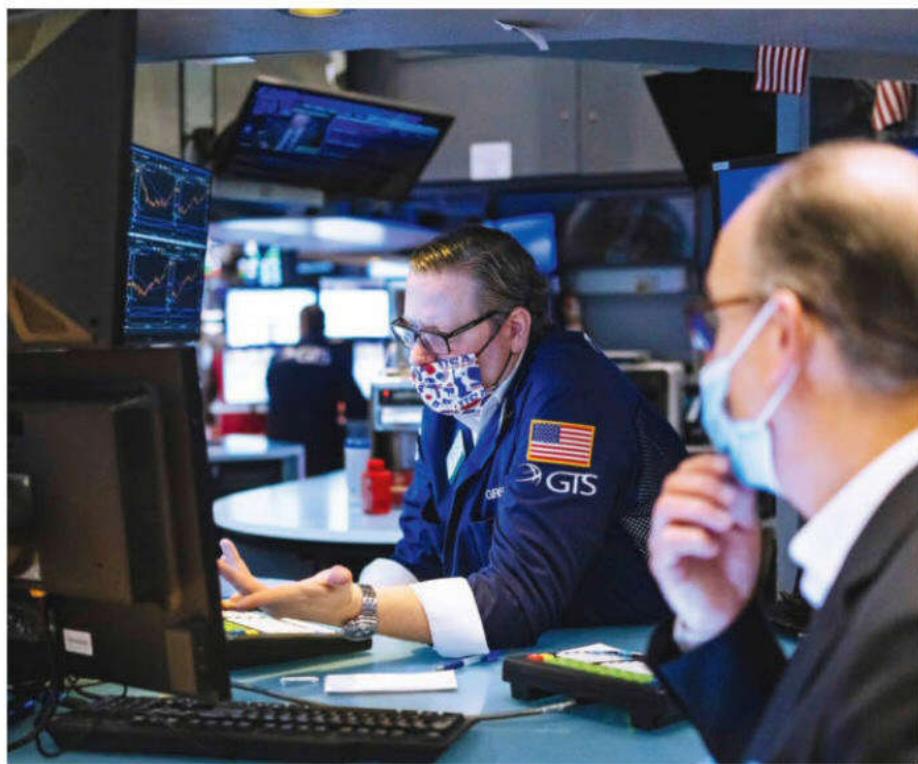
The transition will be costly, though. McKinsey, a consultancy, estimates that decarbonising steel requires investment of \$145bn a year on average for the next 30 years, and could push the cost of making the stuff up by 30%. ArcelorMittal says its three low-carbon plants will cost \$10bn in total by 2030, which is doable for a company with annual capital expenditure of about \$3bn. However, its strengthened balance-sheet is raising investors’ hopes of higher payouts, and it needs to weigh their demands against big investments in green steel. Even with modest government support for capital and operating expenditures, says Jefferies, a bank, returns would be too low to justify a normal steel project.

That is why the industry believes hefty state backing is essential. ArcelorMittal expects governments to fund about half of its \$10bn decarbonisation commitments over the next ten years. Investors argue that subsidies for operational expenses such as electricity bills should be thrown in, too. The same, they say, goes for aid to ramp up production of clean hydrogen, whose price must fall by 60% for clean steel to become cost-competitive with the alternatives, according to McKinsey. On top of that, government money is needed to speed up the roll-out of more renewable energy required to power the clean furnaces. Jefferies estimates that total electricity demand by EU steelmakers will more than double by 2030. The developing world’s blast furnaces, which are younger than Europe’s, will probably be fitted with carbon capture and storage rather than replaced. That nascent technology, too, needs a leg-up from the government.

It goes beyond that. By the mid-2020s, Europe’s steelmakers will begin losing the free allocations of carbon permits they receive under the EU Emissions Trading System. To compensate, they await the introduction of a carbon-border-adjustment mechanism, starting in 2026, which will protect them further from importers selling cheaper dirty steel. They also need governments to help kick-start demand for green steel. Some sectors, such as carmakers, are keen to buy it, believing that they can pass the costs on to carbon-conscious consumers. But the construction industry, the steel firms’ biggest market, is not nearly as enthusiastic. Hence steelmakers say they need lots of public works built with low-carbon steel to justify their investments.

### Kicking the coke habit

Some state action is warranted. In the long run subsidies for electric vehicles may curb emissions by less than curing the steel industry’s coal addiction. But the cure must be judicious. It is all too easy for a closer relationship with governments to degenerate into job-safeguarding schemes, protectionism and a revival of the old revolving door between bureaucrats and business. That is what happened the last time the state and steel were intertwined. Until, that is, the elder Mr Mittal made his fortune prising them apart. ■



## Financial markets

### Forward in fear

#### The reasons behind the current bout of stockmarket turmoil

AS THE STOCK-TRADING screens turned red, one trader was heard to quip that at least some things are falling in price. By the market close on Wednesday, January 26th, the cumulative loss on the S&P 500 index had moved towards 10% for this year, barely four weeks in. The year-to-date decline in the NASDAQ Composite, a tech-heavy index, is well into the double digits. The message from the Federal Reserve, which concluded its scheduled policy meeting on the 26th, is that interest rates must rise soon to tackle high inflation. It has been a rocky start to 2022 for investors.

The day-to-day numbers for the broad indices do not do full justice to the jumpiness of markets. Much of the drama has been beneath the surface, at the stock or industry level. Technology shares in particular have fared badly. The FTSE 100 index of British stocks, which is light on technology and heavy on oil and commodity firms, has been more resilient than American indices (see chart 1). Prices have swung wildly during each trading day. On Monday, for instance, trading began in New York with a big sell-off, which then intensified. At one point the NASDAQ was down by almost 5%.

Then stocks suddenly rallied. The NASDAQ finished the day up by 0.6%. On Tuesday share prices fell again. On Wednesday the S&P 500 had posted a handsome increase before Jerome Powell, the Fed's chairman, gave his press conference. By the time he had finished speaking, it was in the red.

Behind all the minute-to-minute lurches is a market that is somewhat forward-looking. And what has the market now to

#### → Also in this section

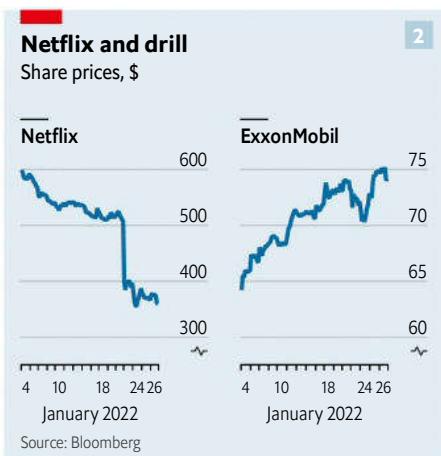
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look forward to? Quite a lot of trouble, it would seem. In six months' time, the easy money that has supported stock prices for so long will be firmly on the way out. The economy will be weaker. Corporate profits will be feeling the squeeze from decelerating revenue growth and from rising wage costs. There are, in short, more reasons for alarm than hope. No wonder markets are so jittery.

Start with the Fed, which is never far from investors' thoughts. After spending much of 2021 playing down any immediate need for tighter money, the Fed changed its tune quite abruptly. It sounded a more hawkish note at its monetary-policy meeting in December. The minutes of that meeting, published on January 5th, made clear to investors that rates would soon be going up. The reasons for the volte face are straightforward. Inflation is uncomfortably high. It can no longer be dismissed as transitory. And the labour market is fast running out of workers. Speaking on the 26th, Mr Powell emphasised the risks to price stability and did not dismiss the idea of a rapid series of interest-rate increases. A 0.25% rate rise at the Fed's next meeting on March 15th-16th seems nailed-on.

In response to the change in tone, markets have priced in more rapid policy tightening. The rise in long-term real interest rates has been notably sharp. Yields on ten-year Treasury inflation-protected securities (TIPS), which were around -1% at the start of the year, are now approaching -0.5%. Stockmarkets have had to adjust to this. Higher long-term rates reduce the ➤





► present value of future corporate cash-flows, making shares less valuable. The effect is especially marked for the shares of tech companies, which are priced for profit growth long into the future. Hence the violence of the NASDAQ's decline.

The Fed is not the only concern. Much of the run-up in markets last year was predicated on a stronger economy and handsome revenues and profits. Extraordinary growth in America was fuelled by low interest rates, pent-up demand and a bumper \$1.9trn fiscal-stimulus package. These impulses are fading. On January 25th the IMF cut its forecast for GDP growth in America by 1.2 percentage points, to 4%, for 2022, as part of its generally more sombre outlook on the world economy. There are already hints that a sharper slowdown could be under way. Activity in America's service industries has fallen to an 18-month low, according to the latest survey of purchasing managers. Retail sales slumped in December. Consumer confidence is low. Some of this can be put down to Omicron. But the fear is that it also reflects an ebbing in underlying demand.

As investors consider the demand outlook for the coming months, there is a lot less to excite them. Profits will be squeezed by a slowing economy, and thus slowing revenue, but also by rising costs. Higher commodity prices add to the raw-material bill. A bigger headache is labour. The tight jobs market is bidding up the salaries of scarce workers. "There is real wage inflation everywhere," lamented David Solomon, boss of Goldman Sachs, on a call to investors last week. His bank had just reported a blowout year for profits, but the nerves of investors were jangled by the one-third increase in Goldman's wage bill last year. Other businesses that also rely more on brainpower than physical capital will feel the pinch—another reason why tech shares, especially those of fledgling firms, have come under selling pressure.

A third concern is valuation. Stocks in America look terrifyingly expensive. A measure popularised by Robert Shiller of

Yale University puts America's stock prices at a steep 36 times their earnings, adjusted for the business cycle. That is above the reading before the 1929 crash (though still lower than the valuation reached during the dotcom boom of the late 1990s). A reckoning had long seemed due, especially for expensive-looking, unproven businesses. ARK Innovation, an exchange-traded fund that invests in young tech firms, has become shorthand for the more speculative end of the market. It is down by more than 50% from its peak. There is scepticism about familiar names, such as Netflix and Zoom, which did well from the stay-at-home economy, but have suffered recently. Investors are taking refuge in hitherto unloved oil stocks, which offer protection against inflation, such as ExxonMobil (see chart 2). "In short", notes Michael Wilson of Morgan Stanley, a bank, "the froth is coming out of an equity market that simply got too extended on valuation."

Might anything improve the market mood? There are some bits of good news that investors might eventually cling to. Omicron may prove to be the final wave of the pandemic; its effects may be transient.

As it fades, so might the labour bottlenecks behind much of the recent inflation. There are tentative signs that China's economy is bottoming out. The EU's "Next Generation" fund, which will disburse €750bn (\$880bn) to member states, still has a lot of fiscal fuel in the tank. A lot of the better news comes from outside America, though. It may not do much for the NASDAQ. And it is hard to feel bullish about Europe with Russian troops amassed on Ukraine's border (see next story).

Investors nursing hefty losses might have hoped for a less hawkish tone from Mr Powell. Instead he sounded far more worried about rising consumer prices than falling share prices. A volatile stockmarket should not be of first-order concern to policymakers. A market correction might even suit the Fed's purposes, if it brings the people who have retired early on their share-price gains back into work. The Fed would have more reason to worry should the corporate-bond market become badly unstuck, because it is vital for funding. But so far corporate-bond spreads have been stable. It is stock prices that are jumpy. And it is hard to see that changing soon. ■

## Commodities

# Material moves

NEW YORK

**Traders are bracing for war in Ukraine. Just how bad could things get?**

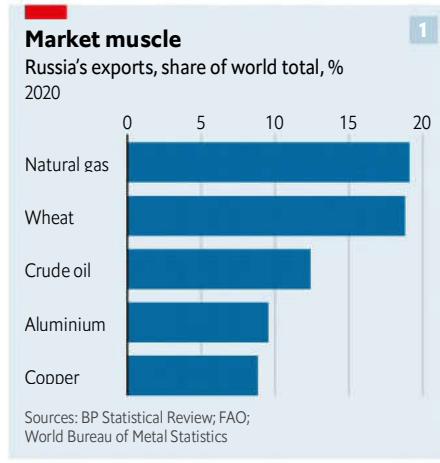
"**I**F RUSSIAN TANKS cross the border, markets will freak out." That is the considered judgment of Helima Croft, head of commodity strategy at RBC Capital Markets, an investment bank, and a former analyst at America's Central Intelligence Agency. Were Russia to invade Ukraine, the biggest impact would first be felt on European gas markets. But Ms Croft is not alone in thinking that the shock waves would

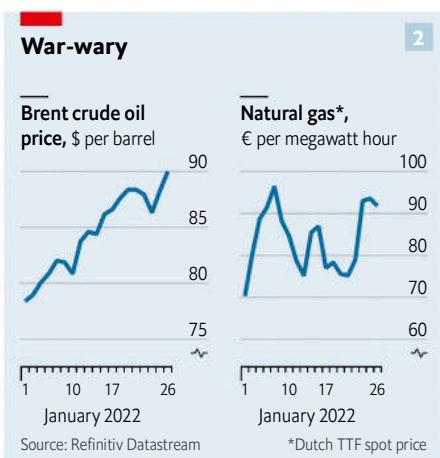
spread far more widely.

The potential for disruption stems from Russia's huge importance for commodity markets (see chart 1). It is the world's biggest exporter of natural gas, and the second-largest exporter of oil. It supplies nearly a tenth of the world's aluminium and copper, and produces a range of other metals, including 43% of the world's palladium, a component of catalytic converters. It is also the largest exporter of wheat.

The worst-case scenario is that the flow of these vital raw materials is cut off as tensions escalate. That could happen because Russian exports, or the payments infrastructure needed to facilitate them, are hit by Western sanctions. Alternatively, Russia could itself decide to halt some exports—notably of gas—in an attempt to cow its opponents (see Europe section).

The mere fear of disruptions has sent prices higher. On January 26th Brent crude oil approached \$90 a barrel, a seven-year high; the European benchmark for natural gas stood at about €90 (\$101) per megawatt hour, compared with €70 at the start of the year (see chart 2 on next page). The copper price is flirting with its multi-year peak. ■





secure supplies, especially among the large importers of northern Africa and the Middle East.

Some countries, such as China and Iran, might bypass Western sanctions and buy Russian metals and grains at discounted rates. That could in principle offer relief by satisfying some demand. But China and Iran together imported 17m tonnes of wheat last year, hardly a match for Russian and Ukrainian exports of 59m tonnes. Falling grain stocks in America and Europe and bad weather in South America threaten to starve the market further, says Geordie Wilkes of Sucden Financial, a broker. Moreover, Russia is a big producer of urea and potash, important ingredients for fertilisers. An export embargo would give grain prices a further leg-up.

For as long as tensions stay high, the pivotal role of energy in the economy means price rises will spill over to other markets, even if sanctions are not ultimately deployed. Expensive power has already caused some aluminium smelters to close in Europe. A surge in gas prices could cause more furnaces to shut down. It could also hit fertiliser production on the continent—for which gas is used as both raw material and fuel—hampering the next growing season.

If the tensions are resolved altogether, then it might be possible to imagine markets cooling off. Europe endured a natural-gas price shock last year, but a warm winter means that “a lot of angst has been taken out of the market, even though we still remain at very elevated price levels”, says Saad Rahim of Trafigura, a trading firm. But the tightness of supply means that prices will cool off only a bit. Ms Kaneva reckons that the risks with oil are asymmetric. If peace prevails, the oil price would merely drop to \$84 per barrel. But if war breaks out, “everything just goes up massively”. ■

The tightness of commodity markets makes prices all-too-sensitive to war talk. During the global financial crisis of 2007–09 both global industrial production and commodity prices plunged in tandem, notes Macquarie, another bank. The pandemic, by contrast, has been accompanied by a surge in both manufacturing output and raw-material prices. Unexpectedly robust demand and supply-chain disruptions fuelled a 20% rise in the broad Bloomberg Commodities Index in 2021. The prices of a dozen of its elements, from cobalt and coffee to cotton and coal, shot up by even more.

Oil demand is roaring back towards pre-pandemic levels, even as supply has been slow to rise. Many members of the Organisation of the Petroleum Exporting Countries and its allies (which include Russia) are struggling to meet their quotas for increased production, because of under-investment and covid-related complications. America’s shale firms have discovered capital discipline, favouring investor returns over drilling. The result is that global spare production capacity is falling to precariously low levels. Spare capacity for many metals, too, is limited.

If war breaks out, the oil price could rise to \$120 a barrel, reckons Natasha Kaneva, head of commodities strategy at JPMorgan Chase, a bank. Ross Strachan of CRU, a consultancy, says aluminium prices could rise to all-time highs. The precedent for the impact of geopolitical tensions on prices is not exactly heartening. When America imposed sanctions on Rusal, Russia’s largest aluminium producer, in 2018, prices of the metal were turbo-charged.

Russia and Ukraine together export about 29% of the world’s wheat, and a big chunk of Ukrainian cultivation takes place in the regions that are most exposed to invasion. Carlos Mera of Rabobank, a Dutch firm, says withdrawing such volumes from the market would have an “extraordinary” impact, because the demand for wheat is so inelastic. Prices could easily double, he reckons. That would trigger a struggle to



### The global economy

## Acquired immunity?

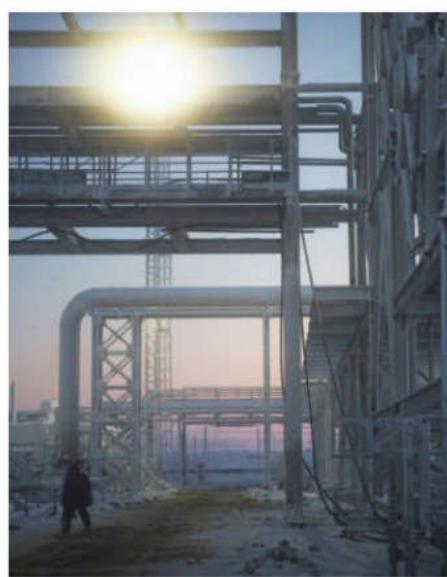
SAN FRANCISCO

**How Omicron is affecting the economic recovery**

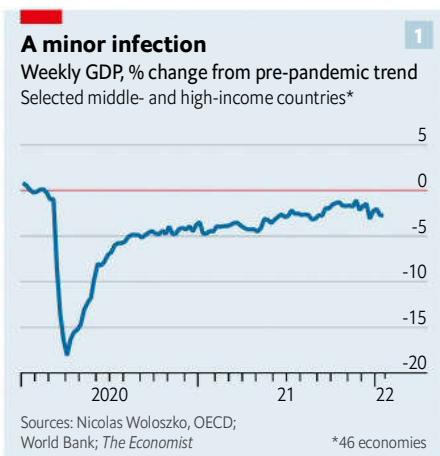
IN NOVEMBER almost began to feel like the early days of the pandemic all over again. Global stockmarkets fell as news of what would come to be known as the Omicron variant filtered out and investors feared either another round of restrictions, or that people would shut themselves away. Two months on, Omicron’s impact is slowly coming into focus. So far it is, largely, better than feared. Markets are skittish, but because of the prospect of higher interest rates, rather than covid-19. Goldman Sachs, a bank, has constructed a share-price index of European firms, such as airlines and hotels, that thrive when people are able and willing to be in public spaces. The index, a proxy for anxiety about the virus, has surged relative to wider stockmarkets in recent weeks.

High-frequency economic data back up the cautious optimism. Nicolas Woloszko of the OECD, a rich-country think-tank, produces a weekly GDP index for 46 middle- and high-income economies, using data from Google-search activity on everything from housing and jobs to economic uncertainty. Adapting his index, which has been a good predictor of the official numbers, we estimate that GDP across these countries is about 2.5% below its pre-pandemic trend (see chart 1). That is a little worse than in November, when GDP was 1.6% below trend, but better than a year ago, when output was nearly 5% below it.

A few factors explain why the worst fears about the variant’s economic effects ►



Caught in the crossfire



with covid-19 or because they had the disease themselves. At the end of 2021, 138 National Basketball Association players were unable to work for covid-related reasons, though this number has since dropped. In San Francisco a small but growing number of shops, which had already been struggling with a labour shortage, are closing early for lack of staff.

Measuring the effect of such absences on output is hard, but it looks likely to be limited—and short-lived. For a start, several factors might offset their impact. Some of the workers who are isolating will be able to toil from home. If a restaurant is closed, prospective diners may still have other places to visit. And for a time at least, co-workers who are uninfected can take up some of the slack. The overall drag could therefore be modest. Research published earlier this month by JPMorgan Chase, another bank, for instance, speculated that absences could reduce Britain's GDP in January by 0.4%.

Moreover, with case numbers falling both in Britain and in some cities in America, Omicron's economic effects look likely to fade rapidly. Forward-looking surveys also suggest that firms are not too worried. There is little sign, for instance, of a decline in business confidence (see chart 2).

Despite a better overall performance than expected, the global economic recovery from the lockdowns of 2020 is still uneven. The gap between the best and worst performers is as wide as it has ever been. As South Africa's Omicron wave has collapsed, GDP has risen and is now in line with its pre-crisis trend. Britain's economy seems to be recovering fairly quickly.

Other places are still struggling, however, whether because of a slow roll-out of boosters, low population immunity or plain bad luck. According to the OECD's measure, the Spanish economy is still roughly 7% smaller relative to its pre-covid trend. Omicron has not done too much to knock the global economic recovery off course. But some places still feel a long way from normal. ■



### German banking

## Rescue mission

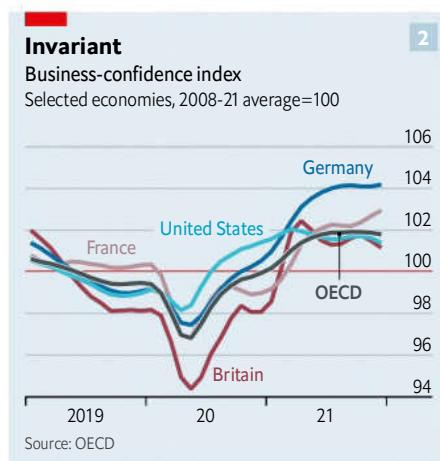
BERLIN

### Has Deutsche Bank turned the corner?

WHEN IN APRIL 2018 Christian Sewing took over as chief executive of Deutsche Bank few thought he would last very long. The bank, one of Europe's biggest by assets, had been through four chief executives in six years, and its very survival was at stake. It was unable to make enough profits to generate anything resembling a decent return for investors, and seemed to be frequently ensnared in costly litigation. There was talk of the bank being taken over, and even wound down.

Mr Sewing is, impressively, still in his job—and his contract was extended last year, to 2026. On January 27th he presented the bank's annual results for 2021 at Deutsche's headquarters in Frankfurt. They seemed to confirm that the lender has stabilised at last. Mr Sewing reported a pre-tax profit of €3.4bn (\$3.8bn) and a net profit of €2.5bn for 2021. In the final three months of the year it made a net profit of €315m, a year-on-year increase of 67%, beating analysts' expectations. Across 2021 as a whole "we delivered our best result in ten years", said Mr Sewing. Shareholders seem to agree. Since its record low in March 2020, Deutsche's share price has almost doubled.

Has Deutsche turned the corner? A year after he took over Mr Sewing announced his grand plan for saving the 152-year-old bank that once financed Germany's industrialisation. It would be "the most fundamental transformation" of the bank in decades, he promised in July 2019. He said he ►►



▶ have so far not come to pass. The great uncertainty with Omicron relates to whether the bad (greater transmissibility) outweighs the good (lower virulence), and thus whether there is a damaging surge in hospitalisations and deaths from covid-19. So far, though, few governments apart from China's, which is still wedded to its zero-covid strategy, seem to believe that additional drastic restrictions on people's movements are required.

A quantitative measure produced by UBS, a bank, ranks global restrictions from zero to ten and finds that the average global score has risen from 3 to 3.5 in recent weeks. Only one rich country, the Netherlands, moved into a proper lockdown (though this was relaxed on January 26th). UBS also finds that the share of international travel routes with covid-related entry restrictions, at 31% globally, has barely budged since October.

More people also seem happy to take risks. Goldman Sachs produces an "effective" lockdown index, which takes into account not only governments' diktats but also people's choices. So far its global index has tightened to about the same level as during the Delta wave of last summer, despite four to five times as many daily infections. Even in places where the rapid spread of covid-19 is a novelty, people are largely carrying on as normal. Cases in San Francisco were in the low double digits for most of the autumn. Although the city now averages about 2,000 a day, gyms and restaurants remain busy. Our global "normalcy index", which looks at how people's behaviour has changed relative to pre-covid norms, dropped in recent weeks, but now seems to be recovering.

Today's case numbers suggest that about 5-10% of Americans currently have covid-19. Such high prevalence has created a new difficulty that did not exist with previous variants: a widespread absence of workers. According to a survey conducted at the turn of the year by the Census Bureau, 8.8m Americans were out of work either because they were caring for someone

would shrink its investment bank, and shut down the trading of shares altogether. And he announced that he would cut costs by €5.8bn a year, a quarter of the total, to €17bn in 2022. Eighteen thousand jobs, a fifth of the payroll, would go.

Mr Sewing's restructured bank consists of four pillars. The two biggest in terms of revenue are its retail arm and its investment bank. After its merger in 2018 with Postbank, a German postal bank, Deutsche remains the country's biggest retail lender. The investment bank, which is still substantial, brought in more than a third of revenue last year, a chunk of it from trading fixed-income securities, currencies and commodities.

The two other pillars are a corporate bank that provides mainly European businesses with services such as cash management and trade finance, and DWS, Germany's biggest asset manager, which is mostly owned by Deutsche and is, according to analysts, its most consistently profitable business.

"Mr Sewing has done a good job in a tough environment," says Stuart Graham, an analyst at Autonomous Research who argued in a report in 2018 that Deutsche Bank's business model was broken beyond repair. The period when Deutsche was frequently in trouble with the law seems to have passed. Credit-rating agencies such as Fitch and S&P upped many of Deutsche's ratings last year, arguing that its strengthened business model, sound asset quality, decent funding and liquidity positions, as well as its adequate capitalisation, inspired confidence.

Still, no one thinks Deutsche is out of the woods yet. Last year's boom in fixed-income trading was unexpected and may not last, says Jon Peace of Credit Suisse, a bank. Deutsche needs to start bolstering capital to prepare for Basel 4, a new set of regulations that will take effect in 2025. Moreover, its costs are still high compared with its peers. Mr Sewing must cut them further if he is to meet his ambitious targets.

The big question is whether Mr Sewing will reach his goal of a return on tangible equity of 8% and start to pay shareholders a bounty of up to €5bn in dividends this year. The bank made no payments for 2019 and 2020, and only a small one for last year.

As a result, Deutsche has not persuaded shareholders that it generates enough profits to provide an adequate return. The bank is therefore still trading at less than half of its book value. And analysts are doubtful that Mr Sewing's target can be reached. Jochen Schmitt at Metzler, a German bank, predicts a 4.8% return on equity this year; the consensus forecast among analysts is 5.5%. Deutsche may have come a long way since hitting rock-bottom. Nevertheless, Mr Sewing may not be able to look back with satisfaction just yet. ■

## Financial influencers

### MoneyToks

NEW YORK

Personal finance is a viral hit

**V**IDEOS TAGGED #moneytok have had 10.6bn views on TikTok—more than #tacotuesday, #gossip and #cookingtiktok. Creators can use the tag to signal that their posts are part of a genre on the short-video platform that offers financial advice. In posts lasting less than a minute, Mandi Woodruff-Santos posts career and investment tips to her 27,500 followers. Ms Woodruff-Santos, who was born in Atlanta, Georgia, says that her working-class parents did not discuss investments at the dinner table, and her education left her with little knowledge of how to manage a credit card or to negotiate a raise. Now she and other influencers help their followers with their money woes.

It has not quite gained the notoriety that Reddit, an online forum frequented by many retail punters, earned during the spectacular rise of GameStop stock last year. But TikTok, which has 1bn users worldwide, is introducing many young Americans to the world of savings and investment. Nearly a quarter of investors aged 18 to 40, and 41% of those between 18 and 24 years old, have sought financial advice on the platform, according to a survey conducted last year by Magnify Money, a website.

Videos can rely mainly on text ("HOW TO BEAT CREDIT CARDS" or "Adulting 101"), or might feature cute kids or dancing. Some creators use their experience to explain financial concepts. Mark Tilbury, the boss of a retail firm, has amassed 7m followers with his explana-

tions of the strategies of Fortune 500 companies. Other creators draw on personal experience. Tori Dunlap—who founded Her First Book, which offers money tips and paid financial courses to women—says she grew up in a family that talked often about finances. "I became the go-to friend for money questions," says Ms Dunlap, now a money-wise pal for some 2m followers. Still others tout the earnings potential of stocks, such as videos of day-traders in California posing with their sports cars after striking gold in the markets.

As with social media more broadly, the problem is that posts can be misleading or inaccurate. TikTok has some rules to monitor content: users can flag posts and creators must label branded content from which they stand to profit. Those clicking on #moneytok are warned that investing comes with risks. But some videos are as short as 15 seconds, leaving little time for nuanced discussions of those risks. Only about 10% of top influencers mention financial qualifications in their TikTok biographies or on their personal websites, according to a study by Paxful, a cryptocurrency-trading platform. Day-traders posting on TikTok flaunt large gains, but few might admit to nursing losses, as they may be doing after the market turmoil of recent days. The popularity of #moneytok certainly speaks to users' enthusiasm for finance and investing. The hope is that social media nurtures, rather than destroys, that interest.



What makes the market tick?

## Free exchange | From QE to QT

*Quantitative tightening is no substitute for higher interest rates*



CENTRAL BANKERS almost everywhere are tightening monetary policy to fight inflation. Markets expect interest rates to rise by about a percentage point in America and Britain, and by a tenth of a point in the euro area, over the course of the year. But modern central bankers have more than one lever at their disposal. Many in the rich world are preparing to put into reverse the almost \$12tn of quantitative easing (QE), or bond-buying, they have conducted during the pandemic. On January 26th the Federal Reserve said it would end QE soon and gave guidance for the first time about how it might shrink its balance-sheet, a process dubbed quantitative tightening (QT). Reversing trillions of dollars of asset purchases might seem like a powerful way to contain inflation. In fact QT will be an unreliable tool.

Having cut interest rates nearly as far as they could go during the global financial crisis of 2007-09, central banks began experimenting with QE, which was a relatively new and poorly understood tool. But when the time came to tighten they preferred to follow the normal path and raise interest rates, rather than risk the unknown by starting QT. So they maintained the size of their balance-sheets by reinvesting the proceeds from maturing bonds. It was not until rates hit 1-1.25% in late 2017 that the Fed let its balance-sheet "run off", by stopping reinvestments. The Bank of England in 2018 said it would start QT after rates hit 1.5%—a threshold it never reached.

The Fed's strategy seemed to work, but because its bonds matured only gradually, it was slow. In the roughly two years for which it was in place, the central bank's stock of assets fell by \$710bn. QT this time will start from a much higher base. The Fed has bought plenty more bonds during the pandemic: it now holds some \$4.5trn more in assets than in 2019. Were the glacial pace of reduction to be repeated, the next crisis would probably strike before the balance-sheet had shrunk by very much.

But the thinking has changed. "The period of time between stopping purchases and beginning run-off will be shorter, and... the run-off can be faster," Jerome Powell, the Fed's chairman, said on January 11th. The Bank of England plans to stop reinvesting the proceeds of maturing bonds when rates reach just 0.5%, which may happen in February (see Britain section). Even the European

Central Bank's balance-sheet is expected to shrink as it scales back emergency loans to banks, forecasts Goldman Sachs, a bank.

What explains the desire for a quick QT? Andrew Bailey, governor of the Bank of England, has warned of a "ratcheting up" of the bank's presence in bond markets if it never scales back its holdings. A committee of the House of Lords has accused the bank of having a "dangerous addiction" to buying bonds. Most central banks also face the prospect, as rates rise, of paying interest on the reserves they have created in order to buy bonds via QE. They would in effect be shouldering part of their governments' debt-interest costs—a role that could become uncomfortable.

Some central bankers also think that QT could allow them to fight inflation without raising interest rates as much as would otherwise be necessary. "I would prefer a flatter funds-rate path and more adjustment on the balance-sheet," said Mary Daly, president of the San Francisco Fed, earlier in January. The theory is that QE holds down long-term bond yields, so reversing it will cause them to rise, slowing the economy.

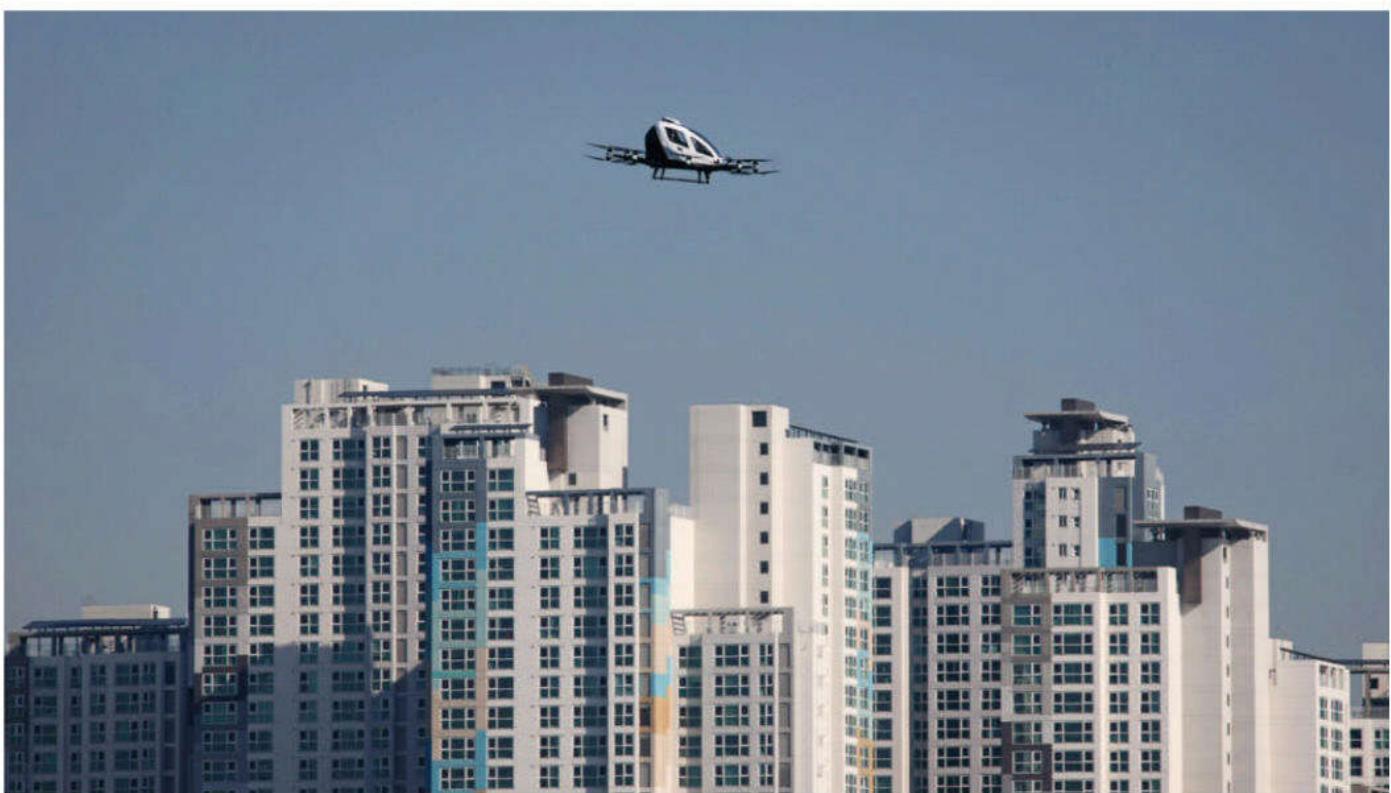
However, despite the enormous size of QE—and the universal agreement that it rescued markets in spring 2020—the evidence that it has a sustained, large effect on long-term bond yields is thin. In theory the Fed's bond holdings compress the term premium, the component of long-term bond yields that compensates investors for locking up money for a long time. But, says Dario Perkins of TS Lombard, a research firm, the term premium does not seem to track central banks' balance-sheets. Instead it closely follows the dispersion in forecasts of inflation, suggesting that it reflects inflation risk. If QE does not have lasting relevance to bond yields, neither should QT. The ten-year Treasury yield was lower, not higher, by the end of the last round of QT. In other words, although the Fed held fewer bonds, their price had risen.

There is one way in which balance-sheet policy has an obvious and immediate effect: by offering a signal to investors about central bankers' probable interest-rate decisions. In a downturn bond-buying indicates that things are really bad and so interest rates will stay low for a long time; slowing or reversing QE can signal that rate rises are coming. Perhaps the most famous market reaction to a balance-sheet announcement, the "taper tantrum" of 2013, happened primarily because traders drew inferences about the path of short-term rates from what Ben Bernanke, then the Fed's chairman, said about plans to slow the pace of bond-buying.

In the late 2010s, central bankers tried to mute such signals. It was common to refer to the Fed's QT as happening "in the background". As inflation surged in 2021, however, they showed less discipline. Dissenters on the Bank of England's monetary-policy committee voted to end QE early. In recent weeks rate-setters' speculation about QT may have helped convince traders that the Fed really is serious about tightening policy, contributing to sharp falls in asset prices. In its latest plan the Fed has said that interest rates are its primary policy tool. But it has struggled to articulate whether or not more QT means fewer rate rises.

### Balance and imbalance

Perhaps it is good that investors have woken up to the Fed's plans for rates. Yet pivoting to using QT and rate rises as substitutes, as Ms Daly suggests, could put the signalling mechanism into reverse. More QT would mean fewer rate rises, not more, so could cause bond yields to fall. QT would have become, bizarrely, a source of stimulus—the last thing a central banker with an inflation problem should want. ■



## eVTOLs

### Race to the sky

#### Flying taxis are lining up on the rank for certification

**T**HIS IS THE next revolution in flying," says Mark Henning, a graduate of the Technical University of Munich and a 25-year veteran of the aerospace industry. Mr Henning is excited about his new job. After running projects for Airbus, a giant European aircraft-maker, he has joined AutoFlight, a Chinese firm, where he is responsible for getting the company's small electrically powered air taxi approved by Europe's air-safety regulators.

Mr Henning is not alone in betting that electric vertical take-off and landing (eVTOL) aircraft have a bright future. Other aeronautical engineers have thrown in their lots with some 200 such projects around the world, attracting \$5.1bn in investment last year, according to McKinsey, a consultancy (see chart on next page). Most are working on designs that resemble hovering drones—using multiple small rotors to take off and land like a helicopter. The idea is that, being simpler, cheaper, greener and quieter than combustion-engined helicopters, eVTOLs will be well suited to operate short-range passenger services across large urban areas, such as flying

people between airports and city centres.

At first, regulators scratched their heads as to how these new flying machines could be allowed to take to the sky—especially as some will operate without a pilot on board. However, after working with companies in the field, aviation authorities are starting to finalise the safety standards by which eVTOLs will be governed. This gives the most serious contenders an opportunity to get ahead in the race to become airborne.

#### Rules and regulations

As AutoFlight's new European managing director, Mr Henning is setting up an operation at Augsburg airport in Germany to further the development of Prosperity I, the company's air taxi. So far, the Shanghai-based firm, which has a background in

making cargo drones, has flown a "proof-of-concept" version only. Prosperity I can seat three passengers and a pilot. It is a hybrid between a helicopter and a fixed-wing plane. It takes off and lands vertically, using multiple rotors, but these are switched off when it is cruising. At that point a "pusher" propeller at the back takes over, to provide forward thrust, and thus lift via the wings. This arrangement makes more efficient use of the aircraft's battery, giving Prosperity I a range of some 250km.

A prototype will be test-flown in Germany in order to obtain what is known as a type certificate from the European Union Aviation Safety Agency (EASA). This signifies the airworthiness of a new aircraft. Although AutoFlight is also seeking certification in China, the company reckons the addition of European approval will help speed the machine's entry into service in other markets, too. It hopes to complete the approval process by 2025.

Other companies aim to lift off much earlier. EHang, another Chinese maker of eVTOLs, hopes one of the air taxis it is developing, the EH216 (pictured), will obtain a type certificate from the Civil Aviation Administration of China (CAAC) this year. It has been working with the agency on a test programme that has involved more than 20,000 trial flights.

The EH216 looks like an old-fashioned bubble car surrounded by small rotors. It seats just two passengers and has no pilot. Though it flies autonomously it is monitored by a control centre on the ground, ►

#### → Also in this section

**62 Keeping data both private and useful**

**63 Save the rhino, save the plant**

**64 A new type of camera**

► which can take over in order to land it in an emergency. It has a range of 35km between charges, and a top speed of 130kph.

EHang has formed partnerships for trial flights in several cities, including Guangzhou in southern China, where the firm is based. Once a type certificate is obtained, the company plans to offer commercial air-taxi and sightseeing flights from these places, along with parcel deliveries.

### Crossing continents

For eVTOLs to operate commercially and at scale in most countries, three kinds of regulatory approval will be required, says Jennifer Trock, who is based in Washington, DC, and leads the aviation practice of Baker McKenzie, a law firm. Besides a type certificate, firms will also need production certification, which permits manufacturing of an aircraft to begin at volume. And, in order to carry fare-paying passengers, an airline-style operating licence is required.

Though there are bilateral safety agreements between EASA, CAAC and America's Federal Aviation Administration (FAA), the three agencies which dominate the world's aviation market, certification by one does not automatically apply elsewhere, especially for new designs like eVTOLs. This, says Ms Trock, gives makers two options if they wish to sell their aircraft in another market. They can set up a local operation and apply for another certificate, as AutoFlight is doing. Or they can submit to a full technical validation of the certificate they have obtained in another country, though this might involve further test flights.

There is also uncertainty about how the rules will differ from place to place. After examining some 150 designs, EASA concluded that eVTOLs were neither aeroplanes, nor helicopters, nor both. It therefore decided to make them a "special category" of aircraft, with their own set of regulations. The FAA, by contrast, says it can certify them by tailoring its existing rules where necessary. It has set up a unit called the Centre for Emerging Concepts and Innovation to work with eVTOL companies to

establish detailed safety requirements.

Nonetheless, enough regulatory progress has been made for eVTOL pioneers to remain optimistic. In America, Joby Aviation hopes next year to become the first to obtain type certification from the FAA. It is making a dozen or more aircraft at a new manufacturing plant in Marina, California, to step up its flight-testing programme. Joby's air taxi, which seats four passengers and a pilot, uses multiple rotors to take off and land. It then tilts the rotors forward when cruising, so they work like propellers. One of the company's backers is Uber, a firm that currently makes its money organising terrestrial taxi rides.

Hot on Joby's heels is Archer Aviation, also Californian. Archer plans a commercial ride-sharing service using a four-pas-

senger-plus-pilot design, to start in 2024. One of its investors is United Airlines. In Europe, Volocopter, a German firm, is testing a multirotor eVTOL in both crewed and uncrewed form. It hopes to provide air-taxi services for the 2024 Olympic games in Paris. Lilium, another German firm, is working on an all-electric seven-seater.

And it is not only new firms which are getting into the business. Airbus is developing ideas for eVTOLs. So is Boeing, its American rival. On January 24th, Boeing invested \$450m in Wisk Aero, of San Francisco, which is developing yet another autonomous eVTOL. Larry Page, a co-founder of Google, is backing this firm, too. With so much effort and money going into this new form of aviation, some of these birds will surely fly. ■

### Data privacy

## Your secret's safe with me

### The UN is testing new technology that processes data confidentially

**D**ATA ARE valuable. But not all of them are as valuable as they could be. Reasons of confidentiality mean that many medical, financial, educational and other personal records, from the analysis of which much public good could be derived, are in practice unavailable. A lot of commercial data are similarly sequestered. For example, firms have more granular and timely information on the economy than governments can obtain from surveys. But such intelligence would be useful to rivals. If companies could be certain it would remain secret, they might be more willing to make it available to officialdom.

A range of novel data-processing techniques might make such sharing possible. These so-called privacy-enhancing technologies (PETS) are still in the early stages of development. But they are about to get a boost from a project launched by the United Nations' statistics division. The UN PETS Lab, which opened for business officially on January 25th, enables national statistics offices, academic researchers and companies to collaborate to carry out projects which will test various PETS, permitting technical and administrative hiccups to be identified and overcome.

The first such effort, which actually began last summer, before the PETS Lab's formal inauguration, analysed import and export data from national statistical offices in America, Britain, Canada, Italy and the Netherlands, to look for anomalies. Those could be a result of fraud, of faulty record keeping or of innocuous re-exporting.

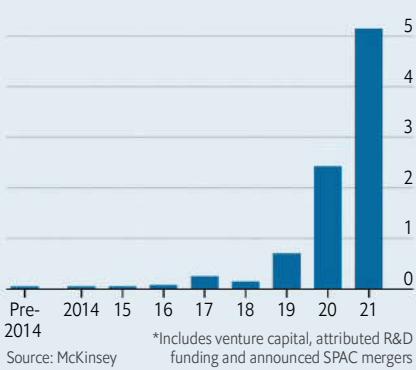
For the pilot scheme, the researchers used categories already in the public domain—in this case international trade in things such as wood pulp and clocks. They thus hoped to show that the system would work, before applying it to information where confidentiality matters.

They put several kinds of PETS through their paces. In one trial, OpenMined, a charity based in Oxford, tested a technique called secure multiparty computation (SMPC). This approach involves the data to be analysed being encrypted by their keeper and staying on the premises. The organisation running the analysis (in this case OpenMined) sends its algorithm to the keeper, who runs it on the encrypted data. That is mathematically complex, but possible. The findings are then sent back to the original inquirer.

That inquirer thus receives its answers, but never has access to the information on which those answers are based. Moreover, for extra security, the results are processed by another PET, called differential privacy. This employs elaborate maths to add a smidgen of statistical noise to a result. That makes the findings less precise, but means they cannot be reverse-engineered to reveal individual records. It also permits the organisation releasing the findings to set a so-called "privacy budget", which determines the level of granularity disclosed by the data. The result is a belt-and-braces approach. In the argot of the field, SMPC provides input privacy, while differential privacy offers output privacy. ■

### It's a bird...it's a plane...

Air-taxi investments\*, \$bn



In a second trial using the same data sets, the PETS Lab arranged for Oblivious Software, a company in Dublin, to test “trusted execution environments”, also called “enclaves”, as a form of input privacy. To set these up data are first encrypted by their keeper and then sent to a special, highly secure server that has been built in a trustworthy way, so that every operation can be tracked and its memory fully cleared after the job is done.

Once safely stored in this server’s hardware, the data are decrypted and the desired analysis performed. For extra security, cryptographic hashes and digital signatures are applied, to prove that only authorised operations have taken place. The output is likewise statistically blurred, using differential privacy, before being sent back to the original inquirer.

In the tests, both approaches did indeed spot anomalies. For example, although American and Canadian records of the value of wood pulp traded between the two countries were basically the same, their data on the value of the clock trade differed by 80%. “Tech-wise, it worked,” gushed Ronald Jansen of the UN statistics division, who administers the new lab.

Whether it works bureaucratically remains to be seen. But the putative benefits would be great. The use of PETS offers not only a means of bringing together data sets that cannot currently interact because of worries about privacy, but also a way for all sorts of organisations to collaborate securely across borders.

The PETS Lab’s next goals are to dive more deeply into trade data and to add more agencies to the roster. This all comes as many governments take a bigger interest in PETS. In December America and Britain announced they plan, this spring, to launch a “grand challenge” prize around PET systems. The sharing of data—and their use—may now be getting easier. ■



It's in here somewhere!



### Conservation

## Save the rhino, save the plant

If Sumatran rhinoceroses vanish, other forest organisms may do so, too

ALL SPECIES of rhinoceros are in trouble, as poachers kill them to take their horns. But Sumatran rhinos are *in extremis*. Fewer than 80 remain alive, and that handful is scattered between three groups in Sumatra and one in Borneo. This is terrible news for the species itself. But Kim McConkey and Ahimsa Campos-Arceiz at the University of Nottingham, in Britain, think it has wider ramifications—for, as they explain in a paper in *Biotropica*, several plant species also depend on Sumatran rhinos for their survival.

A large proportion of a Sumatran rhino’s diet is fruit. The evolutionary bargain between frugivores and plants is that the plants coat indigestible seeds with tasty and nutritious pulp as payment for the frugivores’ dispersal of those seeds by defecation far from the plant that produced them. Some plants, indeed, go further. Their seeds will not germinate unless they have passed through an animal’s digestive system. This arrangement works well as long as suitable frugivores are available. But for plants with large seeds, these need to be big animals. And of those, there may be a restricted supply.

Dr McConkey and Dr Campos-Arceiz suspected that this might be a problem for a number of South-East Asian plants which live in the range once occupied by Sumatran rhinos. Nor is this a theoretical threat. Madagascar hosts many endangered plants, including baobabs, palms and members of the Proteaceae (a group represented elsewhere by the macadamia nut

tree) known by botanists as orphans of extinction. The reason for this moniker is that the large frugivores, such as giant lemurs, which used to disperse their seeds were exterminated when people arrived on the island in the first millennium AD.

In the case of Sumatran rhinos, an alternative means of seed dispersal may be available. The local elephants are certainly large enough to eat the seeds in question. If they actually do so, then the problem is diminished. But, when Dr McConkey and Dr Campos-Arceiz began their study, the extent to which elephants’ and rhinos’ diets overlapped was unknown.

To investigate, they and their colleagues scoured 18.5km of forest trails in Way Kambas National Park, in Sumatra, for rhino faeces. Over the course of two and a half months they discovered 48 piles of the stuff (29kg in total), and sifted through these for seeds, which they brought back to their laboratory for identification.

They also delved into history. First, they interviewed members of the Orang Asli, a group of people indigenous to Peninsular Malaysia, across the Malacca Straits from Sumatra—and to its forests, in particular—to obtain their recollections. Sumatran rhinos still existed in the Malay Peninsula less than 20 years ago, and though they are now gone, memories of the animals, including what they ate, remain.

To cap things off, the researchers then ran a literature search in which they examined the accounts of explorers, hunters and scientists who had come across Sumatran rhinos in other parts of South-East Asia during the early 20th century, when they ranged more widely still. They noted down every observation concerning the animals’ diets. Once this was done, they ran a similar investigation into the diets of the local elephants, to determine how much overlap there was.

The result was not good. Elephants turn out to be picky eaters. Rhinos were the only recorded dispersers of 35% of the large-fruited species found in the regions where data were available.

To put it another way, of 79 plants known to have their seeds dispersed by rhinos, elephants disperse only 57. Seeds of the remaining 22 are therefore restricted, if no rhinos are around, to germinating where they fall. So, if a local population of one of these plants is destroyed for some reason, it is unlikely to be replaced. And there is also a risk of local inbreeding. Indeed, three of the species the researchers identified are already listed as threatened.

Precisely why elephants do not eat the fruits of these 22 plants is unknown. But whatever that reason is, it looks as if almost two dozen South-East Asian plants should be joining the list of orphans of extinction. Short of a deliberate campaign of planting, their days seem numbered. ■

## Photography

# Prometheus unframed

**A new type of camera could prove valuable for robots, drones and driverless cars**

CONVENTIONAL CAMERAS focus light onto a recording medium to preserve an image as a field of tiny dots. The media have changed over the years from plates of silver to plates of glass to acetate films to charge-coupled devices. The dots, meanwhile, have gone from being grains of chemicals to electronic pixels. But the principle has stayed the same. And moving pictures are simply streams of such images shown in sequence.

This arrangement is known as a frame camera. But there is now an alternative, the event camera. Unlike a frame camera, an event camera does not activate the dots simultaneously, using a physical or virtual shutter. Instead, a dot responds only when the nature of the incoming light changes.

Since changing light is frequently a consequence of movement, these cameras often record events rather than objects—hence their name. Though the data they record can, if desired, be used to reconstruct images of objects (see picture), they have other, better, uses, particularly if the camera in question is, itself, in motion.

For example, an event camera's *modus operandi* provides a quick and easy way of determining the rate at which objects are moving through its visual field—known in the argot as “optical flow”. Optical flow shows both how fast the camera is travelling and how close other things are to it, for nearby objects change position in its field more rapidly than do distant ones.

Insect eyes are natural examples of in-

struments optimised to record optical flow. That is why house flies are so good at judging speed and height—and also how close an approaching swatter is. Taking their lead from these animals, Guido de Croon of the Delft University of Technology, in the Netherlands, and his colleagues used an event camera on a drone to judge speed during landing. This allowed the drone to make a controlled landing faster than was possible with a frame camera.

### Events, dear boy

A frame camera shooting 20 images a second supplies data at 50-millisecond intervals. Event cameras, unconstrained by such a fixed timetable, can respond in microseconds. Davide Scaramuzza, director of the Robotics and Perception Group at the University of Zurich, has, like Dr de Croon, been working with event cameras mounted on drones. Collision-detection cameras usually take 50–200 milliseconds to react. His team used an event camera to cut this below four milliseconds, enabling faster manoeuvring whilst avoiding obstacles.

Response time is equally important for self-driving cars. Dr Scaramuzza's team are working on event cameras for this application with what he terms a “top-tier” company in the automotive sector.

Event cameras bring benefits besides speed. Frame-based moving-picture cameras capture redundant information, such as areas of unchanging blue sky. To avoid wasting disk space and bandwidth, images

taken this way are often compressed by special software, such as MPEG, for storage or transmission. But event-camera images do not require compression. According to Dr Scaramuzza, they are about 40 times as efficient in this respect as frame cameras.

On top of that, event cameras are practically immune to motion blur. Capturing images of speeding bullets is no problem, and they can film the hare and the tortoise at the same time with equal clarity. They could thus solve the perennial problem of extracting unblurred stills from closed-circuit television feeds.

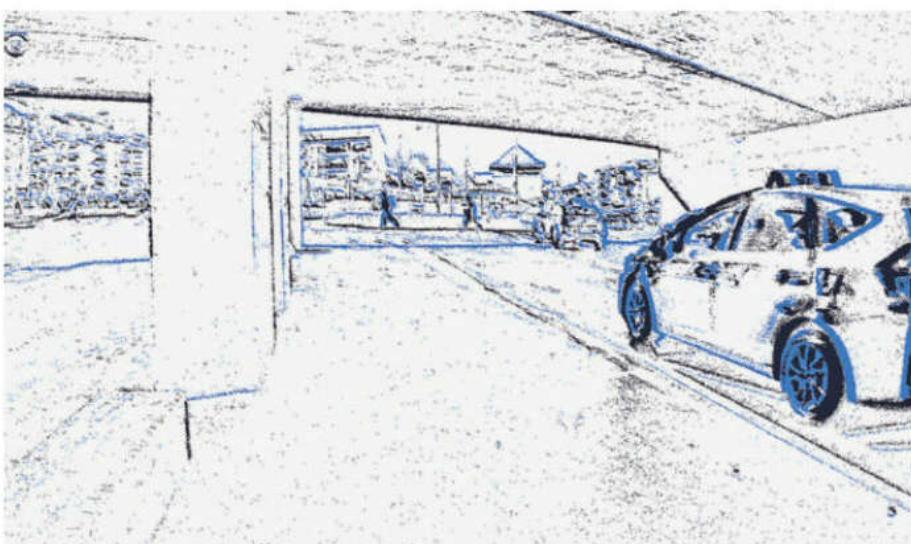
Yet another advantage of event cameras is that they cope easily with bright and dim lighting in a single image. A frame camera on a self-driving car might miss a pedestrian in a shadow beside a well-lit street—with disastrous consequences. An event camera will catch the slightest movement, even in deep shade.

These benefits make event cameras attractive, but they are still fairly new and unknown. The first commercial examples, which appeared in 2014, had a resolution of just 100x100 pixels. Versions branded as “high resolution” appeared in 2019, but all things are relative. The 640x480 pixel resolution of these machines matches that of Apple's QuickTake camera of 1994. Something closer to real high resolution may be coming soon, though. Both Samsung and Sony are working on event cameras for the mass market. Sony's will have a recording field measuring 1,280x720 pixels.

Military establishments are interested, too. America's army, air force and space force all have event-camera projects. They are especially attracted to infrared versions. These would help identify targets rapidly by looking at their heat signatures. Besides having superior movement-detecting abilities, event cameras need less processing power, so generate less signal-confusing heat. This is an even bigger advantage for cameras that are cooled by liquid nitrogen, to increase their sensitivity.

Looking further ahead, both Dr de Croon and some of the military researchers are linking event cameras to “neuromorphic” processing units (computer processors supposedly built in imitation of the ways that brains work). Like event cameras—and unlike conventional computer processors, which are governed by the tick of an internal clock—neuromorphic processors are asynchronous. Combining the two seems to work well, and to promise fast, low-power visual processing.

Event cameras could thus be important elements of an automated future, guiding drones that deliver goods, helping to pilot cars (wheeled or flying) that carry people around, and giving vision to robots in homes and on streets. They may not be much cop for selfies. But they might still be wildly successful. ■



Joining the dots



The BBC at 100

## The reflective screen

To understand the British, tune in to their broadcaster

**T**HE PRIME minister is “seething”. Newspapers have accused the BBC of siding with foreigners. In Parliament, a Conservative MP collars the chairman of the publicly owned broadcaster to declare: “You, sir, are a traitor!” (“Stuff you!” he retorts.) The talk in Downing Street is of cutting off the corporation’s funding.

This could be a scene from 2022, as Boris Johnson’s government denounces the “Brexit-Bashing Corporation” and threatens to abolish the licence fee that pays its way. In fact the bust-up occurred 40 years ago, when the BBC’s coverage of the Falklands war enraged Margaret Thatcher (though she continued to enjoy “Yes Minister”, a BBC political comedy). Worse disputes took place in 1956, amid the Suez crisis, and during the General Strike of 1926. When, on that occasion, the BBC eventually toed the government line, Stanley Baldwin, the prime minister, sent round engraved cigarette cases by way of thanks.

**The BBC: A People’s History.** By David Hendy. Profile Books; 656 pages; £25

On the broadcaster’s centenary, David Hendy’s lively new history is a reminder that the BBC’s present struggles—government rows, culture wars, foreign rivals and more—are modern manifestations of old problems. His account of the corporation also makes for an incisive history of Britain’s 20th century. Asa Briggs, who wrote the definitive, 4,000-page record of the BBC’s first 50 years, said that “to write the history of broadcasting...is in a sense to write the history of everything else”. The glowing screen of the BBC casts a revealing light on its audience.

Today the corporation’s 22,000 staff work in more than 40 languages and run eight national television channels, 50-plus radio stations and the world’s most-visited English-language news website. But its

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first experiments in “radiating”, as broadcasting was then known, were amateurish. The boxy studio was just big enough for a microphone and a piano. The director of programmes and his deputy took turns to read children’s stories as “Uncle Arthur” and “Uncle Caractacus”. At a public showing of the first televised play, in 1930, the giant screen of 2,000 light bulbs melted.

Yet the BBC’s young staff soon realised they controlled something powerful. “It was quite clear that if you got some madman in front of the microphone he could do a hell of a lot of damage,” wrote Cecil Lewis, one of its founders. Twenty years later, the first study of viewing habits found households being shaped by broadcasting schedules: changing mealtimes and bedtimes, evening chores abandoned, less drinking in pubs and more at home.

### Signs of the times

The BBC was forged in the aftermath of the first world war, which marked its founders—literally in the case of John Reith, the first director-general, who had taken a sniper’s bullet in the cheek in France. But the second world war would change the BBC even more. By 1944 it broadcast in 46 languages, and by the end of hostilities counted 20m listeners in Europe. It co-operated with the Ministry of Defence to smuggle coded messages into news re-

ports or pieces of music. On D-Day more than 1,000 acts of railway sabotage were initiated via the BBC. Things didn't always go to plan: as one producer put it, "They would play the other band...and the wrong bridge would get blown up in Poland."

The BBC's wartime output also reflected changes at home. As wirelesses spread to poorer households, the programming became more down to earth: "The Kitchen Front" gave advice on making cheese from sour milk and cooking bracken fronds. It was also forced to become more fun. During the first winter of the war, up to a third of Britons tuned in to Nazi broadcasters such as William Joyce, nicknamed Lord Haw-Haw, who played livelier music than Reith's austere BBC. The BBC retaliated with the Forces Programme, which combined news with lashings of variety and music, and less God than in the past. This winning mixture continued after the war.

The loosening of social attitudes in wartime was nothing compared with what was to come. One cultural battlefield was race. The stationing of 130,000 African-American GIs in Britain had obliged the BBC to make its programming more racially sensitive; but in 1950, following viewers' complaints, its controller of television ruled that "love songs between white and coloured artists must be very scrupulously considered". The blackface "Black and White Minstrel Show" continued until 1978, more than a decade after a petition had called for it to be axed.

Even bigger battles were waged over sex. The BBC was to blame for a national "moral collapse" in the 1960s and 1970s, believed Mary Whitehouse, a legendary campaigner against "permissiveness" on television. By then TV aerials—the "devil's forks", as they were known to some—were sprouting on every rooftop. Reith himself, now retired, lamented after the launch of the music show "Top of the Pops" in 1964 that the BBC "follows the crowd in all the disgusting manifestations of the age". When Yoko Ono read a poem about her miscarriage on the radio in 1968, the chairman of the BBC's governors, Charles Hill, objected on the grounds that she and John Lennon were not married.

Yet in the same year the BBC was bold enough to broadcast Harold Pinter's "Landscape", a play deemed too filthy for theatres. Earlier it had launched "That Was the Week That Was", part of a national boom in satire that included *Private Eye* magazine and the "Beyond the Fringe" stage show. A sense of anti-authoritarian impertinence became so ingrained at the corporation that the *Sunday Telegraph* noted the rise of an "anti-Establishment establishment", an echo of today's right-wing complaints about the liberal elite.

Broadcasting also reflected, and enabled, an erosion of class divisions. In 1937

ordinary subjects could listen to the coronation of George VI, thanks to 58 BBC microphones in and around Westminster Abbey. Sixteen years later, BBC cameras were let in to film the coronation of Elizabeth II. Palace officials enforced a boundary of 30 feet (nine metres), but hadn't reckoned on zoom lenses, which the BBC swapped in after the rehearsals. In 1997 Princess Diana's funeral was a test of the BBC's nascent website, which experimented with audio and video clips for the occasion.

Mr Hendy, a professor at the University of Sussex, combines a historian's sense of sweep with the eye for colour of the TV producer he once was. His is an authorised account, meaning the BBC gave him archive access but had no editorial control. It is heavy on the BBC's first half-century, which makes up three-quarters of the book; the internet appears 500 pages in.

Perhaps for this reason it is unpersuasive on how the corporation should deal with Hollywood's streaming services,

which already outperform the public broadcaster among young audiences. Mr Hendy thinks the BBC should get bigger (implying a higher cost to the public). Netflix, though, spends more than five times as much on content as the BBC. How much more should young viewers be compelled to pay for an entertainment offering they have mostly rejected?

Still, in its 100 years the BBC has shown a knack for survival. Winston Churchill and Thatcher both tried to nabble it, and failed. Continental broadcasters and pirate-radio stations wooed audiences but were beaten back. Commercial television stations outperformed the BBC at first, before it developed more popular programming. The age of YouTube presents a challenge to a broadcaster that aims to inform and educate, as well as entertain. But this balancing act, too, is not new. "The BBC must lead, not follow, its listeners," wrote Reith, "but it must not lead at so great a distance as to shake off pursuit." ■

### Clothing and textiles

## Finely spun yarns

### A clothes maven finds out where they come from

**Worn: A People's History of Clothing.** By Sofi Thanhauser. Pantheon; 400 pages; \$30. Allen Lane; £20

THE STATE of a person's linens was once a proxy for the state of their soul. A guide to manners of 1740 advised readers that if their clothes were clean "and especially if your linen is white...you will feel your best, even in poverty." By the early 1780s, simple cleanliness was not enough for some. Fashionable Parisians sent their

dirty laundry across the Atlantic to Haiti (then the French colony of Saint-Domingue), to be bleached in the equatorial sun with a touch of indigo.

The result had "a fineness and an azure whiteness entirely different from the linen of France" and "drew everyone's eyes". Still, linens used next to the skin, especially in the bedchamber, could not escape the taint of the illicit. Alleged fornicators and adulterers in the American colonies had to do penance by standing in churches or marketplaces while wearing only bed sheets. ►



The end of the Silk Road

Sofi Thanhauser opens "Worn" by evoking her love of clothing, particularly the bargains she picked up second-hand as a girl in Martha's Vineyard. "A loden coat. A Barbour jacket. A pink silk cocktail dress from the 1950s with a cream-coloured taffeta lining..." Her passion and magpie-like eye for clothes and the stories they contain led her to write this book. It makes no claims to be definitive; rather it follows the thread of her interests, travelling from bygone centuries to the present, and from Phoenix, Arizona, to the Yangzi Delta in China. Throughout, she explores the complex systems woven between the producers of cloth and its consumers.

Each of the five sections of "Worn" tackles a different raw material—linen, cotton, silk, synthetics and wool—and is divided into chapters in which Ms Thanhauser visits a related site or explains an aspect of the textile's manufacture. The result is a book that bulges at the seams with finely spun descriptions of the places and people she encounters.

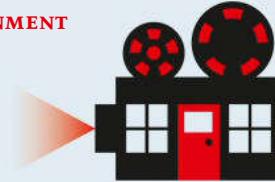
In Lubbock, Texas, the author meets a wealthy farming family in a blue, white and brown landscape denuded of all greenery by the liberal use of paraquat, a defoliant similar to Agent Orange, which makes cotton easier to harvest. Edwin and Linda, her hosts, live in a mansion as "waxed and echoless as a funeral parlour". A girl in red leggings and pearl earrings in Choloma, Honduras, walks along a road "thwacking the back of her wrist against her palm rhythmically": a tic to ease the pain of a 12-hour shift operating a sewing machine. In Yangzi the author sees silk cocoons being sorted by grade and then unspooled by keen-eyed young women. (The silk filaments are so fine that they are all but invisible to the naked eye.)

As she points out, stories and myths about cloth and clothing—from the Greek Fates to Rumpelstiltskin via those luminous, blue-white Parisian linens—are often really about other things: avarice, status, pride, the difficulty of finding true love, or the helplessness of humanity in the face of forces beyond its control. "Worn" is no different. Ms Thanhauser emphasises the experience of workers, usually women, who are enmeshed in lucrative global industries linked to textiles and clothing.

They include medieval linen-weavers who were reviled for their efforts to form guilds, and rayon workers exposed to lethal carbon disulphide, which caused "devastating neurological symptoms akin to end-stage syphilis". Some Uyghur Muslims in the Xinjiang region of China have reportedly been forced to make goods for well-known Western companies. A knowledgeable and fascinating book, "Worn" makes for uncomfortable reading, no matter how spotless your linens. ■



## HOME ENTERTAINMENT



### Roman life hacks

## Ancient and modern

**Read Pliny the Younger, advises our revived feature on classic books and art**

**T**HE PLINYS were well ahead of you. You may think it is terribly contemporary and efficient to go for a walk with your AirPods in and an audiobook on. It is also very Roman. For as Pliny the Younger records, people were doing this (*mutatis mutandis*) in those days too. While "going about anywhere", the author's uncle, Pliny the Elder, instructed someone to follow him, clutching a book and reading out loud. This happened as the elder Pliny ate, as he sunbathed, even at the baths; he was an antique audiobook enthusiast.

The reasons for this habit were much the same as those modern metropolitans might cite if you tapped them on the shoulder and asked them to explain the headphones. Namely: saving time. Pliny's uncle knew the world was wide and that life was short. How better, then, to make the most of both than to multitask? The elder Pliny even travelled by chair, rather than walking, so his secretary could sit alongside him, book in hand (gloved hands in winter). "You need not", he told his nephew, "lose these hours."

People don't read Pliny the Younger much any more. Some still pick up Marcus Aurelius (for the philosophy) and Catullus

(for the smut). Horace remains popular for those fridge-magnet phrases: *carpe diem* is his, so too are *nil desperandum* and *dulce et decorum est*. Even among the classically inclined, though, Pliny is out of fashion. His back story is so uninspiring, for one thing. The elder Pliny was a sometime military commander, at least, but the younger one was neither emperor nor soldier nor famed lover, but merely a lawyer. In other words, he resembled the numberless boring bureaucrats of today. And what could be interesting about that?

Everything, is the answer. If you really want to understand an empire—to feel its muscle and its might, sense its power beneath your fingers on the page—then forget the poets and poseurs. What you need are its laws and its lawyers. Their prose may not be fine or fancy. Their topics aren't elevated. They talk about beggars and beatings and the price of bread. They rule on who could wear purple (imperial household only) or jewellery (not actresses), or, later, who could dress as nuns (not prostitutes). And as Pliny the Younger shows, their observations can be riveting.

Flip through his correspondence and there, in Letter 10.96, you find the first mention of Christians in the work of any Roman author. They are irksome, Pliny thinks, and they pray too much. Pick up Letter 6.16, and there is the only eyewitness account of the eruption of Vesuvius in 79AD ("flames blazed"). Occasionally there are dull parts—he was a lawyer after all. But the good bits are breathtaking.

There is one more reason to read Pliny the Younger in 2022. Flick to Letter 1.6 and you find an early championing of working from home (WFH). Or rather Working While On A Boar Hunt, the equivalent for well-off Romans. Like most people who WFH, Pliny found he got a lot more done. "The mere fact of being alone in the depths of the woods in the silence", he wrote, "is a positive stimulus for thought." The same might be said of being alone with him. ■

**Down with the mega-rich**

## The wealth of nations

### Davos Man: How the Billionaires Devoured the World.

By Peter Goodman.  
Custom House; 480 pages; \$29.99 and £20

**I**N JANUARY 2021 Marc Benioff, the billionaire founder of Salesforce, a software firm, delivered his verdict on the pandemic's first year. "We have to say it," he declared to those observing the virtual proceedings of the World Economic Forum (WEF), an annual gathering of the elite in Davos, Switzerland: "CEOs are definitely the heroes of 2020."

The grandest of them were certainly among its winners. In that year, as millions of people died of covid-19 and many more faced severe hardship, the collective wealth of the world's billionaires rose by \$3.9trn, reports Peter Goodman, global economics correspondent for the *New York Times*, in his new book. The incongruity of the fortunes of the rich soaring amid mass suffering is no accident, he reckons. Despite fervent claims to the contrary by the mega-rich, Mr Goodman says, their pursuit of wealth has undermined society's capacity to deal with crises and left the world in its present troubled state.

Mr Goodman is a veteran journalist who has covered economics for several papers and from postings around the globe. "Davos Man" is well-written and well-reported, and dedicated to exposing the falsity of what he calls the "Cosmic Lie"—the notion that what helps the rich become richer benefits everyone. To discredit it, Mr Goodman juxtaposes the view from the luxury stomping grounds of the billionaire class with vignettes from working-class neighbourhoods—pairing a yacht-riding titan of fast fashion with a jobless textile worker, the spacefaring Jeff Bezos with an overworked Amazon package-picker.

He focuses on a handful of representative billionaires such as Mr Bezos and Stephen Schwarzman, the co-founder and CEO of Blackstone, a private-equity firm, towards whom the author appears to harbour a particular animus. He serves up juicy quotes capturing Mr Schwarzman's unrepentant glee at the financial opportunities created by the pandemic ("There's always a way of making money in these types of volatile situations"). The author also documents the way some private-equity firms piled into the health-care sector—and slashed hospital capacity—in the years before the advent of covid-19.

The text vibrates with anger. The sense

of outrage that radiates from the page is initially off-putting, but becomes ever easier to share over the course of the book. It is stoked not only, or even primarily, by the ways the plutocrats build their fortunes. Mr Goodman's disgust is spurred more by gymnastic feats of tax avoidance, the occasionally staggering lack of empathy and self-awareness, and the towering injustice of extreme wealth alongside terrible adversity. Thus the spleen vented at the WEF, which in Mr Goodman's description functions like billionaire therapy: a place where the very rich go to reassure themselves that they are the solution to social ills rather than the problem.

But the book is not altogether persuasive. Its arguments are weakened by a determination to pin most of the world's ills on the mega-rich. Private-equity barons may be responsible for turfing longtime tenants out of properties in order to flip them and turn a profit, but not for the high cost of housing generally, which has far more to do with middle-class homeowners' success in limiting dense development. Neither is immense wealth necessarily a product of tax-dodging and rent-seeking. Mr Bezos, for example, would not

be a billionaire if millions of consumers were not so keen to shop with Amazon.

Indeed, "Davos Man" itself shows that there is plenty of blame to go around. Mr Goodman documents how xenophobia and racism flourish in places left behind by economic change, and how the charges often levelled at refugees and immigrants—that they are troublesome freeloaders—are baseless. But he sees nativism as another black mark against billionaires, rather than an ethical failure by people who may have suffered, but have not lost their capacity for moral reasoning. Similarly, he quotes a cab driver from Sunderland, in northern England, who admits of Brexit: "No one here really understood [it]...We just knew that people in London had been fucking us for as long as we could remember...It was our chance to fuck them back."

The reckless use of individuals' civic rights, as much as the sins of the billionaires, has landed some countries in dire straits. Mr Goodman ends by arguing that a better world is possible through the "thoughtful use" of democracy. It is, but only if voters are more interested in taking responsibility for improving their lot than in searching for scapegoats. ■

### Musical posterity

## He on wings could rise

### A masterpiece that flopped in 1750 at last returns to Covent Garden

**H**OW LONG can it take for a flop to become a smash? In the case of one of George Frideric Handel's oratorios, the answer is around 250 years. In February 1750 the composer turned 65. A few weeks later the London audience which, for almost four decades, he had regaled with operas in Italian and sacred choral works in English,

snubbed his latest offering. For the opening night of "Theodora", the theatre at Covent Garden was half-empty.

Luck was against him: a pair of minor earthquakes had kept music-lovers at home. But "Theodora" was anyway a tough sell—a stately, sombre drama about a virtuous Christian heroine, martyred for her faith under a despotic Roman governor. "Never mind," the German-born maestro reportedly quipped of the disappointing house; "the music will sound better."

By May of the same year, Handel had bounced back. Charity performances of his earlier oratorio, "Messiah", established it as the hall-filling favourite it remains. Yet he had packed the long-neglected "Theodora" with ravishing music at least the equal of its more famous forerunner. The composer rated "He saw the lovely youth", sung by a chorus of persecuted Christians, above "Hallelujah" in "Messiah". The fearless and principled women—the heroine and her friend Irene—stand melodiously firm against the worst horrors of tyranny. Handel scattered the work with seemingly simple yet transcendently graceful arias, ►►



Gorgeous George

The  
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▶ among them "As with rosy steps the morn", "With darkness deep" and "Oh, that I on wings could rise".

On January 31st the Royal Opera House will welcome "Theodora" back to the Covent Garden stage for the first time since that ill-starred debut. As Handel's less-celebrated music-dramas returned to favour in the late 20th century, singers learned to love the oratorio's ardour and tenderness. Its crowning triumph came in 1996, when the maverick director Peter Sellars staged it at the Glyndebourne Festival. Updating the action to an American military base, he

drew performances of scorching intensity from his cast. Live, or on DVD, the production and singers, including Dawn Upshaw in the title role, shook spectators to their core. Julia Bullock, who will take the same part at Covent Garden, remembers that "it really changed my life".

Katie Mitchell, the director of the new production, promises a feminist reading of a work that has the bravery of unbowed women at its heart. Handel's settings, from a libretto by Thomas Morell, lend a spell-binding loveliness to this tale of conscience and resistance. Harry Bicket, the

conductor, describes it as "heartfelt, introspective, achingly beautiful music", about "people who are struggling with absolute moral problems". Yet though it salutes the martyrs' courage, "Theodora" also looks forward to a time beyond divisions of faith. "Liberty, and peace of mind/May sweetly harmonise mankind," sings a sympathetic Roman soldier.

It has taken more than a quarter of a millennium. But with its enduring emotions, set to music that stops time, Handel's grave and warm late masterpiece deserves its Covent Garden applause. ■

## Johnson Remembrance of times past

*Losing native languages is painful. But they can be recovered*

**M**EMORY IS UNFAITHFUL. As William James, a pioneering psychologist of the 19th and early 20th centuries, observed: "There is no such thing as mental retention, the persistence of an idea from month to month or year to year in some mental pigeonhole from which it can be drawn when wanted. What persists is a tendency to connection."

Julie Sedivy quotes James in a poignant context in her new book "Memory Speaks". She was whisked from Czechoslovakia with her family at the age of two, settling eventually in Montreal. In her new home she became proficient in French and English, and later became a scholar in the psychology of language. But she nearly lost her first language, Czech, before returning to it in adulthood. Her book is at once an eloquent memoir, a wide-ranging commentary on cultural diversity and an expert distillation of the research on language learning, loss and recovery.

Her story is sadly typical. Youngsters use the child's plastic brain to learn the language of an adoptive country with what often seems astonishing speed. Before long it seems to promise acceptance and opportunity, while their parents' language becomes irrelevant or embarrassing, something used only by old people from a faraway place. The parents' questions in their home language are answered impatiently in the new one, the children coming to regard their elders as out-of-touch simpletons who struggle to complete basic tasks.

For their part, meanwhile, the parents cannot lead the subtle, difficult conversations that guide their offspring as they grow. As the children's heritage language atrophies, the two generations find it harder and harder to talk about anything at all.

Children often yearn desperately to fit in. Often this can mean not only learning the new language, but avoiding putting off potential friends with the old. Children, alas, can also be little bigots. At the age of five, researchers have found, they already express a preference for hypothetical playmates of the same race as them. They also prefer friends who speak only their language over those who speak a second one as well.

In theory, keeping a language robust once uprooted from its native environment is possible. But that requires the continuance of a rich and varied input throughout a child's development—not just from parents, but through activities, experiences, books and media. These are often not available in countries of arrival. Parents are themselves pressed to speak in the new language to their children, despite evidence that their ungrammatical and halting efforts are not much help.

But a dimming language may not be as profoundly lost as speakers fear when, as adults, they visit elderly relatives or their home countries and can barely produce a

sentence. Though the language may not be as retrievable as it once was, with time and exposure it can be relearned far faster than if starting from scratch.

This depends, naturally, on the length of time someone spent speaking their first language as a child. Those who are older when they emigrate may keep their languages without great effort (though none is entirely safe from attrition). Those who leave at younger ages may find their grasp of grammar weakening, but will still have a large dormant vocabulary that can be reawakened, and are likely to speak with a near-native accent when they do. Most remarkably, even children adopted across international borders in the first years of life, before they can properly speak themselves, show enhanced ability to learn sounds that are native to their birth-country languages, after not hearing them for most of their lives.

Many bilingual people report feeling that they have different personalities in their different languages; overwhelmingly they say that their first language is the one most imbued with emotion. It is scarcely surprising that losing a mother-tongue leaves behind an ache like that of a phantom limb.

The official pressure on newcomers to abandon their old languages used to be much worse. Today, some democracies with long histories of immigration try to be more accommodating. Schools may bolster pupils' multilingualism by, for example, getting them to write stories or poems in their home languages and explain them to the class. Such symbolic support shows the children that they are not considered divided souls or outsiders, but full members of their new communities—and ones blessed with a precious gift.



**JKUAT INDUSTRIAL PARK**  
INNOVATIONS FOR DEVELOPMENT

**JKUAT Industrial Park Limited**

**INTERNATIONAL REQUEST FOR EXPRESSIONS OF INTEREST.**  
(For Original Equipment/Design Manufacturers (OEMs/ODMs)

Name of Procuring Entity: **JKUAT INDUSTRIAL PARK LIMITED.**  
Assignment Title: **Expression of interest for manufacturing and supply of semi knocked down kits (SKDs) for digital devices.**  
Reference No.: **EOI/JKUATIP LTD/PROC/01/2021-2024.**

1. **JKUAT Industrial Park Limited** intends to engage OEMs/ODMs, in a strategic partnership to manufacture and supply semi knocked down parts for digital devices and laptop assembly in full consistency with the Terms of Reference (TOR) found in the following website [www.jkumatindustrialpark.com](http://www.jkumatindustrialpark.com) under tenders section

2. **JKUAT Industrial Park Limited** now invites eligible OEMs/ODMs to indicate their interest in said partnership. Interested OEMs/ODMs should provide information demonstrating their capability and capacity for this engagement. The shortlisting criteria is found in the TOR referred to under (1) above.

3. Further information can be obtained at the email address provided below during office **0900 to 1700 East African Time**. Any clarification or addendum shall be posted in the website referred to under (1) above.

4. Expressions of interest must be delivered in a written form to the address below (in person, or by postal mail, or by e-mail) by **Friday, 18<sup>th</sup> February 2022 at 1130 am, East African Time.**

**Addressed to:**  
**Official Contact Person:** Managing Director - JKUAT Industrial Park Limited  
**Physical Address:** P.O Box 62000-00200 Nairobi, Kenya  
**Physical Location:** JKUAT COHES Building 4<sup>th</sup> floor, Main Campus Juja  
**Web Address:** [www.jkumatindustrialpark.com](http://www.jkumatindustrialpark.com)  
**Email Address:** [tendersip@jkuat.ac.ke](mailto:tendersip@jkuat.ac.ke)

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## Economic data

	Gross domestic product				Consumer prices		Unemployment rate	Current-account balance	Budget balance	Interest rates	Currency units	
	% change on year ago latest	quarter*	2022†	% change on year ago latest	2022†	%	% of GDP, 2022†	% of GDP, 2022†	10-yr govt bonds latest, %	change on year ago, bp	per \$ Jan 26th	% change on year ago
United States	4.9	Q3	2.3	3.8	7.0	Dec	4.3	3.9 Dec	-3.7	-7.8	1.9	80.0
China	4.0	Q4	6.6	5.3	1.5	Dec	2.3	5.1 Dec <sup>§</sup>	2.3	-4.7	2.4 §§	-56.0
Japan	1.2	Q3	-3.6	3.2	0.8	Dec	1.3	2.8 Nov	3.1	-7.0	nil	-8.0
Britain	6.8	Q3	4.3	4.3	5.4	Dec	3.7	4.1 Oct <sup>††</sup>	-2.6	-6.5	1.1	77.0
Canada	4.0	Q3	5.4	3.7	4.8	Dec	3.3	6.0 Dec	0.1	-7.5	1.8	102
Euro area	3.9	Q3	9.4	3.9	5.0	Dec	2.7	7.2 Nov	3.2	-4.1	-0.1	46.0
Austria	5.7	Q3	14.6	4.1	4.3	Dec	2.4	5.3 Nov	1.8	-3.1	0.2	57.0
Belgium	4.9	Q3	8.4	3.3	5.7	Dec	2.2	5.9 Nov	0.6	-4.3	0.3	60.0
France	3.3	Q3	12.6	3.9	2.8	Dec	2.3	7.5 Nov	-1.2	-5.0	0.3	59.0
Germany	2.6	Q3	6.9	3.3	5.3	Dec	3.5	3.2 Nov	6.5	-2.7	-0.1	46.0
Greece	13.7	Q3	11.3	4.5	5.1	Dec	3.2	13.4 Nov	-4.0	-4.3	1.7	103
Italy	3.9	Q3	11.0	4.3	3.9	Dec	2.7	9.2 Nov	3.5	-5.5	1.4	79.0
Netherlands	5.2	Q3	8.7	2.8	5.7	Dec	3.8	3.8 Dec	9.0	-4.1	-0.2	36.0
Spain	3.4	Q3	10.9	5.5	6.6	Dec	3.2	14.1 Nov	1.3	-5.4	0.6	48.0
Czech Republic	3.0	Q3	6.4	4.3	6.6	Dec	4.6	2.3 Nov <sup>‡</sup>	2.1	-5.1	3.2	193
Denmark	3.7	Q3	4.3	3.0	3.1	Dec	1.6	2.8 Nov	8.5	-0.2	0.1	56.0
Norway	5.1	Q3	16.1	3.4	5.3	Dec	3.0	3.6 Oct <sup>##</sup>	8.5	0.2	1.4	76.0
Poland	5.5	Q3	9.5	4.9	8.6	Dec	6.2	5.4 Dec <sup>§</sup>	0.9	-3.1	3.9	276
Russia	4.3	Q3	na	2.4	8.4	Dec	5.0	4.3 Nov <sup>§</sup>	7.1	0.7	9.8	318
Sweden	4.5	Q3	8.2	3.0	3.9	Dec	2.4	7.5 Nov <sup>§</sup>	3.7	-0.3	0.3	25.0
Switzerland	4.1	Q3	6.8	3.0	1.5	Dec	0.9	2.4 Dec	5.6	0.1	nil	48.0
Turkey	7.4	Q3	11.3	3.4	36.1	Dec	31.4	10.9 Nov <sup>§</sup>	-1.7	-3.6	21.6	883
Australia	3.9	Q3	-7.5	3.3	3.5	Q4	2.6	4.2 Dec	1.6	-4.6	1.9	83.0
Hong Kong	5.4	Q3	0.5	3.0	2.4	Dec	2.0	3.9 Dec <sup>##</sup>	1.2	-1.0	1.6	84.0
India	8.4	Q3	54.1	7.0	5.6	Dec	4.6	7.9 Dec	-1.6	-5.9	6.7	71.0
Indonesia	3.5	Q3	na	5.3	1.9	Dec	3.5	6.5 Q3 <sup>§</sup>	-0.5	-4.9	6.4	17.0
Malaysia	-4.5	Q3	na	4.5	3.2	Dec	2.8	4.3 Nov <sup>§</sup>	3.3	-6.2	3.7	103
Pakistan	4.7	2021**	na	3.3	12.3	Dec	8.0	6.9 2019	-5.5	-6.4	11.6 †††	166
Philippines	7.7	Q4	16.1	5.3	3.6	Dec	3.9	7.4 Q4 <sup>§</sup>	-2.9	-7.2	5.0	202
Singapore	5.9	Q4	10.7	3.8	4.0	Dec	2.2	2.6 Q3	17.6	-2.0	1.8	77.0
South Korea	4.0	Q4	4.5	2.8	3.7	Dec	1.9	3.5 Dec <sup>§</sup>	4.2	-2.7	2.6	80.0
Taiwan	3.7	Q3	1.1	3.2	2.6	Dec	2.4	3.7 Dec	14.6	-0.7	0.7	37.0
Thailand	-0.3	Q3	-4.2	2.8	2.2	Dec	1.8	1.5 Dec <sup>§</sup>	1.8	-6.9	1.9	67.0
Argentina	11.9	Q3	17.3	2.3	50.9	Dec	51.6	8.2 Q3 <sup>§</sup>	0.9	-3.2	na	na
Brazil	4.0	Q3	-0.4	0.3	10.1	Dec	7.6	12.1 Oct <sup>§§#</sup>	-0.7	-7.3	11.4	362
Chile	17.2	Q3	21.0	3.0	7.2	Dec	6.9	7.5 Nov <sup>§§#</sup>	-2.4	-3.5	5.7	309
Colombia	12.9	Q3	24.9	5.0	5.6	Dec	4.2	10.8 Nov <sup>§</sup>	-4.9	-6.5	8.8	391
Mexico	4.5	Q3	-1.7	2.6	7.4	Dec	5.3	4.0 Dec	-1.4	-3.5	7.6	240
Peru	11.4	Q3	15.0	2.8	6.4	Dec	5.7	6.4 Dec <sup>§</sup>	-2.7	-2.6	6.1	236
Egypt	9.8	Q3	na	5.4	5.9	Dec	6.3	7.5 Q3 <sup>§</sup>	-3.9	-6.9	na	na
Israel	4.5	Q3	2.7	4.3	2.8	Dec	2.8	4.3 Dec	4.8	-3.2	1.4	54.0
Saudi Arabia	-4.1	2020	na	4.5	1.2	Dec	2.0	6.6 Q3	4.5	1.4	na	na
South Africa	2.9	Q3	-5.8	2.1	5.9	Dec	4.7	34.9 Q3 <sup>§</sup>	-0.3	-6.3	9.3	57.0

Source: Haver Analytics. \*% change on previous quarter, annual rate. †The Economist Intelligence Unit estimate/forecast. §Not seasonally adjusted. ‡New series. \*\*Year ending June. ††Latest 3 months. #3-month moving average. §§5-year yield. †††Dollar-denominated bonds.

## Markets

In local currency	% change on:			index Jan 26th	%			% change on:		
	Index	one week	Dec 31st		one week	Dec 31st	2020	index Jan 26th	one week	Dec 31st 2020
United States S&P 500	4,349.9	-4.0	15.8					Pakistan KSE	44,955.1	0.3 2.7
United States NAScomp	13,542.1	-5.6	5.1					Singapore STI	3,271.6	-0.4 15.0
China Shanghai Comp	3,455.7	-2.9	-0.5					South Korea KOSPI	2,709.2	-4.7 -5.7
China Shenzhen Comp	2,329.2	-4.6	nil					Taiwan TWI	17,674.4	-3.0 20.0
Japan Nikkei 225	27,011.3	-1.7	-1.6					Thailand SET	1,643.4	-0.9 13.4
Japan Topix	1,891.9	-1.5	4.8					Argentina MERV	85,782.1	2.7 67.5
Britain FTSE 100	7,469.8	-1.6	15.6					Brazil BVP	111,289.2	3.0 -6.5
Canada S&P TSX	20,595.9	-2.9	18.1					Mexico IPC	51,037.1	-3.4 15.8
Euro area EURO STOXX 50	4,164.6	-2.4	17.2					Egypt EGX 30	11,499.9	-1.8 6.0
France CAC 40	6,982.0	-2.7	25.8					Israel TA-125	2,033.4	-3.4 29.7
Germany DAX*	15,459.4	-2.2	12.7					Saudi Arabia Tadawul	12,182.5	-0.6 40.2
Italy FTSE/MIB	26,619.3	-2.7	19.7					South Africa JSE AS	73,797.3	-3.1 24.2
Netherlands AEX	752.4	-2.6	20.5					World, dev'd MSCI	2,979.7	-3.8 10.8
Spain IBEX 35	8,620.2	-1.8	6.8					Emerging markets MSCI	1,211.4	-2.3 -6.2
Poland WIG	68,035.2	-3.8	19.3							
Russia RTS, \$ terms	1,324.4	-6.4	-4.5							
Switzerland SMI	12,098.3	-3.4	13.0							
Turkey BIST	1,951.2	-4.5	32.1							
Australia All Ord.	7,248.1	-5.3	5.8							
Hong Kong Hang Seng	24,289.9	0.7	-10.8							
India BSE	57,858.2	-3.7	21.2							
Indonesia IDX	6,600.8	0.1	10.4							
Malaysia KLSE	1,515.8	-1.0	-6.8							

Sources: Refinitiv Datastream; Standard & Poor's Global Fixed Income Research. \*Total return index.

## Commodities

The Economist commodity-price index	2015=100	Jan 18th	Jan 25th*	% change on month	% change on year
Dollar Index					
All Items	166.7	171.4		5.6	8.7
Food	139.0	142.5		1.7	15.4
Industrials					
All	192.6	198.3		8.3	4.5
Non-food agriculturals	172.2	166.1		1.6	27.3
Metals	198.7	207.9		10.0	0.3
Sterling Index					
All items	187.4	194.0		5.1	10.7
Euro Index					
All items	163.0	168.6		5.8	17.3
Gold	\$ per oz	1,815.7	1,847.3	2.1	-0.3
Brent	\$ per barrel	87.6	88.3	16.2	57.7

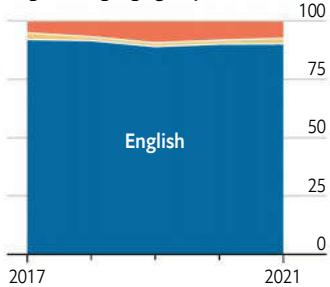
Sources: Bloomberg; CME Group; Cotlook; Refinitiv Datastream; Fastmarkets; FT; ICCO; IGO; ISO; Live Rice Index; LME; NZ Wool Services; Thompson Lloyd & Ewart; Urner Barry; WSJ. \*Provisional.

For more countries and additional data, visit [Economist.com/indicators](http://Economist.com/indicators)

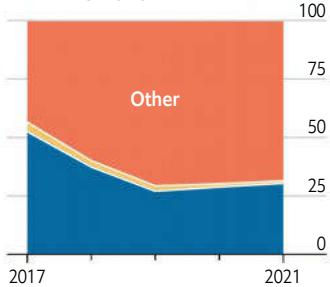
→ Our analysis of global music habits finds three broad clusters of countries. Popular English songs lost ground in all

Song language, % of total  
Among weekly top 100 songs\*

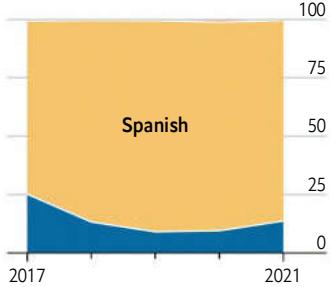
### English-language group



### Local-language group



### Spanish-language group

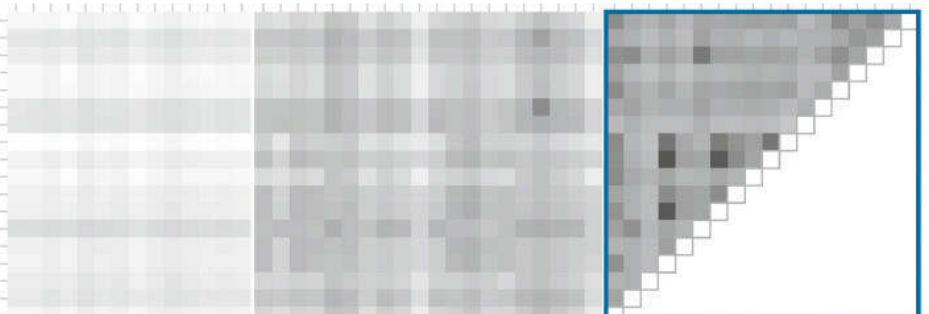


### Similarity of music streamed on Spotify†

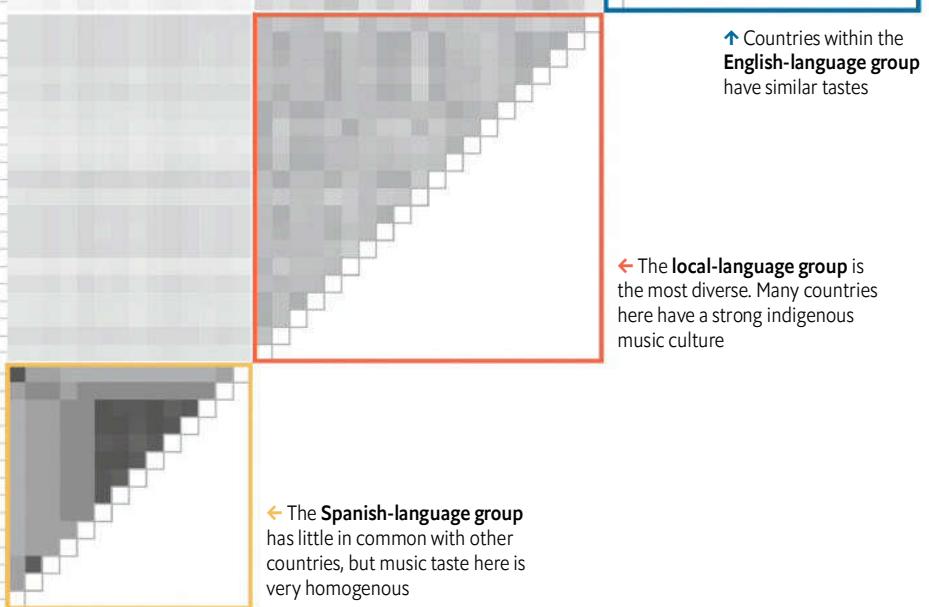
Least similar      Most similar



↑ Countries within the English-language group have similar tastes



← The local-language group is the most diverse. Many countries here have a strong indigenous music culture



← The Spanish-language group has little in common with other countries, but music taste here is very homogenous

\*To November 12th 2021 †From a model comparing top artists, genres, languages and tracks in 2021\*  
Sources: Genius; Google Translate; Musixmatch; Popnable; Soundcharts; Spotify; The Economist

## Singing in tongues

### The English language's domination of streamed music is fading worldwide

**B**AD BUNNY may not be a household name in the English-speaking world. Yet the Puerto Rican rapper, whose verses are usually in Spanish (and, on one occasion, Japanese), was the most played artist in 2020 and 2021 for listeners on Spotify, the world's largest music-streaming platform. Such success might have been harder to achieve 30 years ago when English was dominant. In the new digital era, it is becoming ever more common.

To investigate the evolution of music tastes across the world, *The Economist* trawled through the top 100 tracks in 70

countries according to Spotify. Examining 13,000 hits in 70 languages along with other data like genre, lyrical language and nationality of artist, we sought to group countries according to musical similarity.

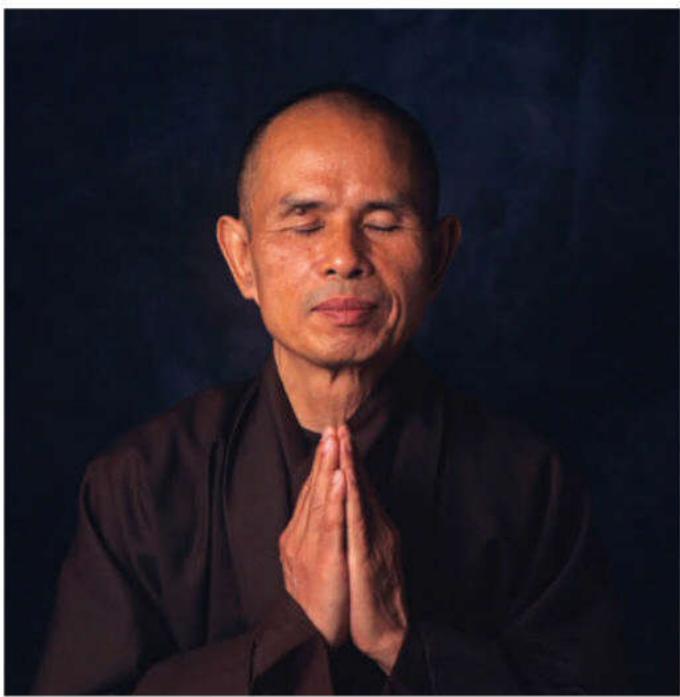
On these 320,000 records, we employed a principal-components analysis to assess the degree of musical kinship between countries, and then a clustering algorithm (known as k-means) to group them. Three broad clusters emerged: a contingent in which English is dominant; a Spanish-language ecosystem; and a third group that mostly enjoys local songs in various tongues. Across all, one trend emerged: the hegemony of English is in decline.

The drop over the past five years is mostly concentrated outside the English sphere. Within the Spanish cluster, English quickly lost ground—from 25% of hits to 14%—as native artists like Bad Bunny and Rauw Alejandro became internationally ascendant. Among the local-language

cluster, in countries with strong, indigenous music cultures—like Brazil, France and Japan—English declined even more precipitously, dropping from 52% of hit songs to just 30%. Only in the English cluster did the language remain unfazed, dropping only slightly from 92% to 90%.

There is no doubt that, despite its decline, English is still king. Of the 50 most-streamed tracks on Spotify over the past five years, 47 were in English. And the genres it incubated are being widely adopted elsewhere. There is now excellent rap available in Arabic, Russian and, of course, Spanish. A sign of the momentum in global-music tastes comes from a collaboration in 2018 between two superstars—Bad Bunny and Drake, the self-proclaimed king of rap in English. On that occasion, Drake delivered the chorus in Spanish. ■

Explore the songs in our interactive at [economist.com/global-music](http://economist.com/global-music)



## The time is now

**Thich Nhat Hanh, Buddhist monk and “father of mindfulness”, died on January 22nd, aged 95**

**I**N THE WEST's imagination a Buddhist monk is a model of other-worldliness. He sits silently in his temple, or under a tree in a manicured garden, lost in the inner vastness of contemplation. A small bowl of water and a bowl of rice are all that sustain him. His day is marked out by gentle gongs and bells, and he causes no more disturbance to the earth than a falling leaf or passing clouds.

Thich Nhat Hanh was a Buddhist monk, drawn to his calling in childhood by a picture of the smiling Buddha and a cold, astonishing draught of water from a natural well. He, too, often prayed. But there the similarity ended. As a novice he abandoned his Buddhist training college for Saigon University, where he could study world literature, philosophy and science. He was one of the first monks in Vietnam to ride a bicycle, hitching up his robes. He went to Princeton, taught Buddhism at Columbia and, at the height of the Vietnam war, confronted Robert McNamara, then secretary of defence, with his pleas for peace. Photos from that time showed him, tiny among towering Americans, with his jaw set, his arms folded and his gaze firmly determined.

His “engaged Buddhism”, as he called it, went out in the world solving problems. In the Indochinese war, when French soldiers shot up his monastery in Hue and killed monks in cold blood, he knew that the heart of spirituality survived; but Buddhism could not be a simple spiritual refuge in a country as ferociously fought over, for so long, as Vietnam was. Instead he founded his own institute, edited a journal that called for Buddhist action and set up a corps of lay and monastic workers to restore the country as fast as it was wrecked. Eventually 10,000 volunteers went out to rebuild villages, set up schools and rescue victims of disasters. He saw Buddhism as a raft that could lift the whole country and save it.

He and his followers took no sides. His aim was peace and his motivation was compassion, a wish to understand and lighten the suffering of others. This “interbeing”, as he called it, was a sense of

connectedness with the whole fabric of life. As he once told a UN session on disarmament, unfolding a crumpled poem from his pocket, he was both the 12-year-old girl raped by a pirate and that pirate, forced perhaps by poverty into a life of pillage. He was both the festering prisoner and his gaoler, the blithe frog and the snake that slyly ate it. He was not a separate entity, had no separate self; everything he did affected the suffering of the world.

Suffering meant feelings of anger, fear, intolerance and false hope, as well as bodily pain. These were man's enemies, rather than other people. But just as such suffering was inevitable, so too it could be ended: by right action, right thinking, right understanding, and by mindfulness, or full self-awareness. Human beings had to embrace the present moment, looking neither forward nor past, and deal with things as they were. His books showed how. In everyday life he matched his walking to his breathing, as if every step was an awakening to peace and his feet were kissing the earth; he saw an orange as a miracle, slowly colouring and forming for him under sun and rain; as he cleaned a pot he did so tenderly, as if bathing a holy child. His daily practice became by the 21st century the most active Buddhist movement in the West.

The West had also become, by default, his main teaching ground. After his peace trip to Washington in 1966, when he persuaded Martin Luther King to speak against the Vietnam war, he was declared a traitor and barred from returning home for almost 40 years. He used his exile to write dozens of books, go on lecture tours and turn an old farmhouse in south-west France into a centre for mindfulness, Plum Village, which grew into more than 1,000 practising communities worldwide.

He was revered now as “Thay”, or teacher, by ardent backpackers and middle-class seekers alike. But there were plenty of sceptics and mockers, too. To them mindfulness seemed ludicrous, an exercise in self-absorption. To him it was the reverse, a clearing away of the hindrances of “self” in order to love others. The best practical example was his operation, in 1978, to rescue the Vietnamese boat-people who were being turned away from Singapore to drown or starve at sea. He worked with fishermen to send food, medicine and bigger boats, and smuggled the refugees into the compound of the French embassy. Everything was done secretly, mostly at night, and everything was underpinned by meditations in which he calmly discerned what was possible. He spent those hours mentally in the lives of both the politicians and the police, while floating also with the terrified refugees in the South China Sea. With mindful diplomacy, thousands were saved.

More modern sorts of suffering caught his eye, too: the profit motive, the race to the top, the moment-by-moment distraction of devices, carelessness towards the planet. As his fame grew he found himself invited to the World Bank and the Google campus, where he told his listeners that voracious consumption was just a way of papering over unhappiness. They did not need to be number one; their inventions should actively bring healing; and they should practise “aimlessness”, the art of stopping, looking into their lives and asking what they were running from.

How far those teachings sank in, he did not know. The future would tell. But every little helped, as it also helped to be at the Paris peace talks in 1969, or to lead a walking meditation round the grounds of Stormont in 2012, bringing Northern Ireland's factions together. For a while, they all trod the same earth and were conscious of doing it. They embraced the present moment as all there was: no future, no past. This was it. He dreamed of marketing a watch in which each number was replaced by the word “now”.

In 2014 a severe stroke felled him. Four years later, since he was no longer a general gadfly, offending governments both Catholic and Communist as well as conservative Buddhists, he was allowed to live again in Vietnam. He spent his days sitting silently in his temple at Hue, the city in which he had been born and died: though there was no birth or death, only transformation, moment by moment, like the passing clouds. ■

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