

# The Economist

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Will America escape recession?

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The science of heatwaves

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Dismantling democracy: a case study

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Barbie v Oppenheimer

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JULY 22ND–28TH 2023

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# MAKING BABYMAKING BETTER

A SPECIAL REPORT ON THE FUTURE OF FERTILITY





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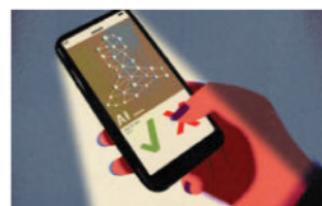
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The  
Economist

Volume 448 Number 9356

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

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Thailand's parliament again voted to prevent Pita Limjaroenrat from becoming prime minister. Coupled with a court ruling that suspended the opposition leader from the legislature, Mr Pita now has no chance of getting the job. Although his pro-democracy Move Forward party claimed the most seats in a general election in May, Mr Pita has been blocked by the upper house, which is stacked with parties aligned with Thailand's conservative military elite. The Constitutional Court is even considering a complaint against Move Forward over its aim of reforming the country's draconian *lèse-majesté* laws.

A senior leader in Malaysia's opposition alliance of parties, Perikatan Nasional, was charged with sedition. Muhammad Sanusi Md Nor is the chief co-ordinator of PN's campaign ahead of forthcoming state elections. He was indicted under colonial-era laws for questioning decisions made by the king.

In India 26 opposition parties formed an alliance to co-ordinate their political strategy when they compete against the ruling Bharatiya Janata Party at next year's general election. The Indian National Developmental Inclusive Alliance (INDIA) includes the Congress party, whose leader, Rahul Gandhi, has been convicted of defamation and barred from Parliament.

India launched its Chandrayaan-3 spacecraft on a mission to explore the Moon's South Pole. If all goes well Chandrayaan-3 is expected to reach its destination on August 23rd or 24th.

An American soldier was detained in North Korea after he crossed the border from South Korea. Travis King had been in jail for two months on assault charges and was due to be flown back to America when he absconded.

Rumours swirled around China's foreign minister, Qin Gang, who has not been seen in public since June 25th. "Health reasons" were cited when the diplomat did not attend a summit earlier this month. Now, though, the foreign ministry says it has "no information" on his status.

The Kerch bridge that connects Russia with occupied Crimea was attacked again, this time by water drones. The bridge carries Russian supplies into contested areas of Ukraine. It will not be fully operational again until mid-September. Last October a fuel bomb on the bridge caused extensive damage. Ukrainian officials say the latest attack will disrupt Russian logistics.

Russia carried out missile strikes on Odessa and other Ukrainian ports. Russia earlier pulled out of a deal that had permitted the safe passage of grain exports from those ports across the Black Sea. As wheat prices rose, the UN, which helped broker the agreement a year ago, warned that it would be people in poor countries who pay the price.

### Afraid of a little competition

An American who had been selected to be the European Commission's senior economist on competition issues declined the job following a political storm. Opposition to the appointment of Fiona Scott Morton was led by Emmanuel Macron. The French president said he wanted a "great European" in the position, though he didn't name one.

Vladimir Putin pulled out of an economic summit in South Africa in August, avoiding the possibility of being arrested by his host on a warrant issued by

the International Criminal Court, which South Africa is obliged to enforce. President Cyril Ramaphosa said in a court filing that Russia had made clear the arrest "would be a declaration of war".

Emmerson Mnangagwa, Zimbabwe's president, signed legislation into law that could impose the death penalty for the vague offence of "injuring the sovereignty and national interest of Zimbabwe".



Isaac Herzog, the Israeli president, visited Joe Biden at the White House. He also gave a speech to Congress, where he said that criticising Israeli policy should not cross a line into concluding that Israel does not have the right to exist. Mr Biden also issued an invitation to Binyamin Netanyahu, Israel's prime minister, to visit, and urged caution on the legal reforms that have provoked huge protests in Israel.

Iran's morality police will resume patrols to enforce a dress code which says women must cover their hair. The decision comes ten months after large demonstrations were held following the death in custody of Mahsa Amini, who was arrested for not wearing a "proper" headscarf.

Tunisia signed a deal with the European Union to manage "irregular" migration. Tunisia has become the main point of departure for migrants crossing the Mediterranean to reach Europe. Under the agreement the EU will give Tunisia €105m (\$118m) for equipment and training to prevent migrants from embarking. Another €150m was also pledged for a variety of other things.

A controversial Illegal Migration Bill was approved by the British Parliament. The government says the bill is essential to stop small boats carrying migrants across the English Channel. Opponents had hoped that a series of amendments would ditch bits of the legislation that they claimed would contravene human rights, but these were all eventually defeated.

England's court of appeal reduced the sentence of a woman who was found guilty of taking abortion pills outside legal limits to a 14-month suspended sentence. The original prison conviction had been widely condemned when it was imposed in June.

### A flair for troublemaking

At a summit of Latin American and European leaders, Luiz Inácio Lula da Silva, Brazil's president, said that the world was "tired" of the war in Ukraine. Lula, who has refused to admonish Vladimir Putin, also criticised Gabriel Boric, Chile's president, for condemning Russia.

Tens of thousands of people took to the streets of Peru to protest against the president, Dina Boluarte, who came to power only in December. She denounced the demonstrators as a threat to democracy.

A former president of Panama, Ricardo Martinelli, was sentenced to ten years in prison for money-laundering, which he denies. He had been considered the front-runner in a presidential election.

Scores of people were killed during severe flooding in South Korea. Many had become trapped in their cars in a tunnel in the city of Cheongju. It was one of many extreme weather events. Heat records were broken across Asia, North America and southern Europe. The temperature in California's Death Valley hit 53.3°C (128°F), though that was still short of the 56.67°C registered in 1913.

Britain's annual rate of **inflation** stood at 7.9% in June, down from 8.7% in May, a bigger drop than had been expected. Transport costs fell in the consumer-price index, mostly because of cheaper fuel. Food inflation eased to 17.3%. Core inflation, which strips out energy and food prices, was 6.9%, down slightly from the previous month's rate. The news was welcomed by the government. The Bank of England is still expected to raise interest rates when it next meets, but markets are now expecting a smaller rise of a quarter of a percentage point.

#### A tale of two banks

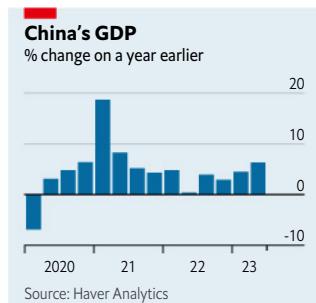
**Goldman Sachs** reported net income of \$1.1bn for the April to June period, its lowest quarterly profit in three years. The bank booked charges related to its property investments and retreat from retail banking. Like some other big banks it also saw a slowdown in revenues from trading. Higher interest rates are helping to make up for that shortfall in revenue and boosting profit at other banks. At **JPMorgan Chase** profit surged by 67%, year on year, to \$14.5bn.

**Tesla** reported a strong net profit of \$2.7bn for the second quarter, driven by a big increase in car sales during its price-slashing campaign. Tesla said that it was still on track to deliver 1.8m vehicles this year, though production would dip a bit this quarter.

America's Federal Trade Commission has reportedly opened an investigation into OpenAI, the **artificial-intelligence** startup behind ChatGPT, for potentially violating consumer-protection laws. The regulator wants OpenAI to explain its policy on data privacy and how it trains the large language models behind its generative AI.

**Sony** signed a deal with **Microsoft** that will continue to make "Call of Duty" available on Sony's PlayStation once Microsoft takes over Activision

Blizzard, which owns the video-game series. Sony had been the most vocal opponent of Microsoft's acquisition, which a court in America recently gave the green light to.



**China's GDP** grew by just 0.8% in the second quarter compared with the previous three months. It expanded by 6.3% over the same quarter last year, when lockdowns were in force, falling short of economists' estimates for a stronger rebound. China's property sector is proving to be one drag on the economy; investment has plunged and house prices have flatlined. This week **Evergrande**, a property developer which sparked a crisis in the market when it defaulted on its debt, said it lost \$81bn in 2021 and 2022.

As much of Europe sweltered under heat domes, the International Energy Agency

warned that "a cold winter, together with a full halt of Russian piped **gas supplies** to the European Union" could cause natural-gas prices to rise again. Prices have fallen sharply this year because a mild winter left gas stocks in good shape. The IEA thinks that "fierce competition for gas supplies could also emerge if north-east Asia experiences colder-than-usual weather."

Eli Lilly presented the full findings of the phase-three clinical study of its new drug to treat **Alzheimer's**, which showed a significant slowdown in the progression of the disease in its early stages. Some patients did suffer side-effects, however, such as swelling and bleeding of the brain. Eli Lilly hopes that its drug, called donanemab, will be approved by America's Food and Drug Administration by the end of the year.

A crackdown on users sharing passwords paid off at **Netflix**, which saw its subscriber base increase by 8% in the second quarter, year on year, a faster rate of growth than in recent quarters. A year earlier it had lost 1m customers. Netflix now has 238m paid members, far more than the around 160m at Disney+, its closest direct rival.

#### Quiet on the set

**Hollywood** stars (well, Susan Sarandon) joined the picket lines, after the union that represents film and television actors called a strike, joining screen writers who downed their pens in May. The actors and writers want the studios to limit the use of artificial intelligence in moviemaking, such as when it replicates an actor's image or generates a story, and a bigger cut of the proceeds from streaming. The studios say the unions are being unrealistic. Film and TV production has now virtually ground to a halt.

**Pret a Manger** turned an annual profit last year for the first time since 2018, according to newly released figures from its owner, JAB Holding. The purveyor of sandwiches, salads and coffee is on track to operate 700 shops worldwide by the end of the year, most of them in Britain, and most of those in London. Pret has become so synonymous with office workers that Britain's national statistics agency keeps a data set of transactions in its stores, indexed to January 2020, the start of covid-19, to track footfall. The index has risen faster in the suburbs than it has in the city.



# Making babymaking better

**IVF is failing most women today. New research holds out hope for the future**

After Louise Brown was born in Manchester in July 1978, her parents' neighbours were surprised to see that the world's first "test-tube baby" was "normal": two eyes, ten fingers, ten toes. In the 45 years since, in vitro fertilisation has become the main treatment for infertility around the world. At least 12m people have been conceived in glassware. An IVF baby takes its first gulp of air roughly every 45 seconds. IVF babies are just as healthy and unremarkable as any others. Yet to their parents, most of whom struggle with infertility for months or years, they are nothing short of miraculous.

In a world where one person in six suffers from infertility, such successes are rightly celebrated. Less discussed are the problems of IVF. Most courses of treatment fail. That subjects women and couples to cycles of dreaming and dejection—and gives the fertility industry an incentive to sell false hope. The obstacle is a lack of progress in understanding the basic mechanisms that determine fertility. At last, however, the science is making headway, holding out more promise and less heartache for generations of parents to come.

Over the years IVF has become better at making babies and safer for the women who bear the brunt of the treatment. The rate of twin and triplet deliveries has plummeted, reducing the number of risky pregnancies. Hormone treatments are safer. Combined with egg and sperm freezing, donation and surrogacy, IVF has given many, including same-sex couples and singletons, a path to parenthood where they had none.

Yet the process remains gruelling and costly. It is physically painful for women, and emotionally draining for both sexes. For many, fertility treatment is an unaffordable luxury; in America, for instance, a cycle can cost \$20,000. Some countries ration treatment according to a conservative moral code. Until 2021 French law permitted IVF only for married heterosexual couples. Many countries including China forbid egg freezing, which extends reproductive years.

All too often, the pain and the cost come to nothing. The 770,000 IVF babies born in 2018 required some 3m cycles. Many women go through round after round of hormone injections, sometimes moving from one clinic to the next. In America and Britain roughly half go home with a baby in their arms, even after several years and as many as eight cycles of treatment.

This has fostered a fertility industry selling to repeat customers desperate to conceive. When a cycle fails, many clinics offer poorly regulated menus of "add-ons" that do not demonstrably raise the chances of success, and may even reduce them. They can charge hundreds to thousands of dollars for a treatment.

These problems all share a fundamental cause. Although reproduction is one of the most basic aspects of human biology, scientists have an astonishingly poor grasp of how a new life comes about. The essentials are obvious: a sperm and an egg must meet. But many of the cellular, molecular and genetic underpinnings of babymaking remain a mystery.

Little is known about how a woman's stock of eggs is set before she is even born; or why they fade in number and quality

until menopause, which among mammals is known to occur only in humans and five species of whale. The intricacies of how an embryo buries into the womb and connects to the blood supply are also mysterious. Infertility is often classed as "women's health", yet male factors play at least some role in roughly half of heterosexual infertile couples—though how is often unclear.

In the face of all this, IVF is woefully inadequate. It was devised as a fix for the blocked Fallopian tubes that prevented Ms Brown's mother from conceiving. But today, when more couples try for children later in life, a woman's declining stock of eggs is increasingly likely to be the problem. Here, IVF works by giving people more rolls of the dice, by collecting more eggs and maximising the odds that they will be fertilised. That will work for the lucky few, but without an entirely new approach and new treatments, many aspiring parents will endure one disappointment after another.

As our Technology Quarterly reports, recent scientific work offers some hope. Researchers in Japan and America are exploiting stem cells, which have the ability to become any of the body's many specialised tissues, to make eggs from skin and blood cells, a process called in vitro gametogenesis (IVG). In Japan healthy mouse pups have been created from cells that originated on the tips of their mothers' tails. Earlier this year researchers

announced that they had delivered mouse pups that shared two genetic fathers. One had contributed sperm, the other skin, which was first turned into stem cells and then into eggs.

Some teams are working towards applying these techniques to humans. If cells safe enough to make healthy babies will ever be available, they are still far off. But the research is providing new insights into how sperm and eggs are made. IVG means that researchers may no longer need to rely for their studies on donated eggs, sperm and embryos, often generously provided by IVF patients. Other teams are using stem cells to build embryo models (dubbed "embryoids"). These will never see the inside of a womb but they can help show what happens to the real embryos that do.

In time, novel treatments may follow. Gay couples could have children that are as genetically related to them as those of straight ones. Trans people who are undergoing gender reassignment could possibly do so without sacrificing their fertility.

All this will take time—which is why IVF will remain important, and why it needs investment and regulation. A better understanding of fertility should help raise the success rate of IVF, bringing down its emotional and financial costs.

New treatments could eventually herald the biggest transformation in fertility technology since Ms Brown was born. Polling shows that in many countries people have fewer children than they would like, partly because they are putting off babymaking until later. Where the sexual revolution of the 1960s and '70s gave women the choice not to have babies if they did not wish to, emerging technology could usher in a new revolution, empowering women—and men—to have the babies they want, when they want them. ■



## Extreme temperatures

# Too darn hot

Cities need to respond rapidly and plan carefully to minimise the damage done by heatwaves

**T**HE BEST thing that has happened in Phoenix, Arizona, since the beginning of July is that the electricity grid has kept functioning. This has meant that during a record-breaking run of daily maximum temperatures above 43°C (110°F), still in progress as *The Economist* went to press, the houses, indoor workplaces and publicly accessible “cooling stations” in the city have been air-conditioned. There have been deaths from heat stroke and there will be more; there has been a lot of suffering; and there will have been real economic losses. But if Arizona’s grid had gone out, according to an academic quoted in “*The Heat Will Kill You First*”, a new book (see Culture section), America would have seen “the Hurricane Katrina of extreme heat”.

It is not just the United States, where 100m people are under heat-advisory notices, that is suffering. There is currently a spate of such heatwaves around the world. Much of the Mediterranean is in similar straits, with temperatures exceeding 40°C (104°F) from Madrid to Cairo (which is suffering power cuts). In Beijing July 18th saw a 23-year-old record broken by a 27th consecutive day with a maximum temperature above 35°C. By increasing the odds of a wide range of extreme events, global warming also increases the chances that they will come in waves (see Science & technology section).

Unbearable heat does damage in various ways, including killing crops and livestock, but the immediate challenge it poses to human health is greatest in cities. Less vegetation, more sunlight-absorbing tarmac and more waste heat produce what is called the urban-heat-island effect, exacerbating temperatures. Cities also often have poor air quality, particularly in the places where the poorest people live; extreme heat on top of dirty air can stretch already hard-pressed lungs and hearts too far.

There are things to do as soon as the mercury rises. Get home-



less people to cooling stations; encourage people to look in on elderly neighbours and relatives (the old, especially women over 80, dominate the excess deaths associated with heatwaves); make it possible for those who must work outside to do so very early in the morning; put hospitals on an emergency footing. The appointment of chief heat officers empowered to co-ordinate such things in American cities, and farther afield, is a welcome trend (see United States section).

There are also things to be done in advance. It is crucial to work out where the people at greatest risk live. One thing that can help is deciding where to plant trees, which both provide shade and, as water evaporates through their leaves, cool the air.

(It is probably best to work out how to keep them green using wastewater, too, especially if, like the people of Phoenix, you live in a desert.) There are smart choices to be made about the built environment, from the best sort of pavement and courtyards designed for passive cooling to the prevalence of white roofs; there are building codes to update so as to make those choices easier, as well as regulations to change

so that workers are not endangered by midday heat.

All these measures are easier to take when a city has resources to devote to them. In the developing world, where a lack of air conditioning makes heat all the more deadly, such resources are scarce. All the more need for leaders to take the issue seriously and for local politicians to see cooling plans as a way to compete for votes. Unfortunately, such a strategy works best in places where voters have already felt the consequences of failing to act. That makes studies which reveal that many places are at increasing risk of vicious heatwaves but have yet to experience one particularly troubling. Phoenix at least knows what to expect—and what it will have to go on expecting for decades to come. ■

## The world economy

# Still in danger

Falling inflation is good news. But it is too early to hail a “soft landing”

**E**CONOMISTS ARE not known for their optimism, but today their good cheer is palpable. Not long ago it seemed that an American recession was inevitable, as the Federal Reserve kept raising interest rates to fight inflation. Other central banks were following suit, their inflation problems made worse by a surging dollar—a particular problem for the emerging markets that borrow and trade using America’s currency. Yet news that America’s headline rate of annual inflation fell to 3% in June has fed hopes that the Fed’s next rate rise, which is expected on July 26th, will be its last and that other central banks might relax, too. Stocks are up, bond yields are down and the greenback is at close to its weakest since the Fed began raising rates (see Buttonwood).

The surge of hope is all the more unusual because the world

economy is slowing down. On July 17th China reported that its economy grew by a mere 0.8% in the second quarter compared with the prior three months, even though many had expected a boom after the government abandoned its “zero-covid” policy in December (see Finance & economics section). Global manufacturing has suffered as consumers came out of lockdowns and began eating out more and buying less home-office equipment. And, although America grew strongly in the first half of the year, most forecasters expect the economy soon to slow.

Increasingly, however, they are not expecting it to shrink. And growth cooling just enough to bring down inflation without a recession is the best-case scenario for overheated economies like America’s (see Briefing). Even the disappointing reopening ►

► in China, which does not have an inflation problem of its own, has meant a feared surge in global commodities prices has not materialised. That has helped Europe, which has replaced piped Russian gas with shipments of the liquefied sort.

Yet it would be a mistake to assume that the world economy is now on track for a so-called soft landing, for three reasons. The first is that inflation, though lower, remains far above central banks' 2% targets. The fall in America's headline rate has been driven by a one-off decline in energy prices: exclude food and energy, and prices are 4.8% higher than a year ago. In the euro zone the figure is 5.5%, and in both economies wages are still growing far in excess of productivity growth.

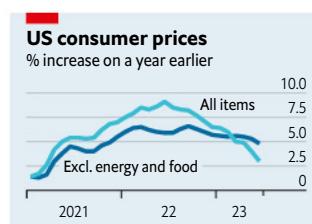
In other words, the rich world has some way to go before it is fully disinflated—and many economists expect the last mile to be the hardest. Though stubborn inflation of, say, 3-4% does not grab headlines as much as recent alarming price rises, it would still be a problem for central bankers. They might have to choose between more tightening than is currently expected and tacitly abandoning their 2% goals. Either would be disruptive for asset markets and potentially for the real economy, too.

The second risk is that, whereas the world is seeing the benefits of cooling off now, the costs may not be visible for a while. So far America's labour market has rebalanced fairly painlessly by reducing vacancies rather than jobs. Hiring is still strong and

lay-offs are rare. With job openings less plentiful, wage growth has fallen. Yet nobody knows for how long the jobs market can shed fat rather than muscle—and in recent months the fall in job openings has stalled ominously. Across the rich world there is evidence that firms, scarred by the memory of labour shortages, have been hoarding workers they don't need; in several countries average hours worked have been falling. Should companies decide that it is too costly to cling to workers who may or may not be needed in the future, then lay-offs could rise abruptly.

The third danger is that divergence among the world's big economies means that even as the pressure on the Fed lifts, policymakers elsewhere remain worried. Britain is celebrating a larger-than-expected fall in annual inflation in June, but with underlying price and wage growth of around 7% it remains a troubling outlier (see Britain section). Japan has barely started its monetary tightening; with inflation rising, the Bank of Japan may adjust its cap on long-term bond yields again at the end of July. China could be contending with a structural growth slowdown in which the economy is weighed down by bad debts, as Japan's was in the early 1990s, and in which inflation is persistently too low.

Wherever you look, in other words, there remains immense uncertainty about where inflation and interest rates will eventually settle. By all means celebrate good news. But the world economy has not yet escaped unscathed. ■



#### China and India

## A Himalayan thaw

**Western strategists are unprepared for a possible detente between the world's most populous countries**

THE HOPE that India might act as a pro-Western counterweight to China has become a cornerstone of American foreign policy. It is a bet on India's future capability and geopolitical posture that was clearly articulated after a visit to Delhi by Bill Clinton in 2000. Every subsequent president, two Democrats and two Republicans, has doubled down on it. Hence Narendra Modi's latest love-fest in Washington last month. Amid bilateral protestations of undying friendship, the Indian prime minister pocketed the sort of defence technology deals that America usually reserves for close allies.

But what if India, which does not enter into formal alliances, is on course to be a much less committed American partner than many in Washington assume? As we report this week in our International section, that is a distinct possibility. It is illustrated by a quiet yet striking recent improvement in India-China ties.

They deteriorated sharply after a bloody border brawl in 2020 that claimed the lives of 20 Indian troops and at least four Chinese ones. The violence, waged with rocks and iron bars along the Asian giants' frigid Himalayan frontier, helped spur the recent step-up in Indo-American defence co-operation. America rushed cold-weather and other gear to India's border forces, hatched plans for more joint military exercises between the two countries, and looked on approvingly as Mr Modi's government transferred some 70,000 troops in effect from India's western frontier with Pakistan to its northern one with China. India also banned over 300 Chinese apps, launched tax raids on Chinese

companies and introduced curbs on bilateral trade and investment. Yet much of that India-China iciness has now thawed.

The economic freeze was brief. In 2021 bilateral trade, recovering after the pandemic, grew by 43%. Last year it increased 8.6%. That put its total value at \$136bn—27 times greater than when Mr Clinton was in Delhi. Meanwhile, the countries' frontier remains largely contested and heavily militarised—but both seem keen to defuse their quarrel over it. After 18 rounds of negotiation between military commanders, they have withdrawn their troops from five potential flashpoints, in favour of "buffer zones" which neither side patrols. Only two major frontier hotspots have yet to be made safe in this way.

A world in which India and China set their territorial dispute aside, as they did previously for over three decades, following an accommodation to that end in 1988, could be very different from the one many American strategists envisage. India is already much less likely to provide support to American forces in the event of a conflict with China over Taiwan than many in Washington seem to imagine. A sustained India-China thaw would make that unimaginable. In such a world, India would also be even less of a friend to the West on thorny global issues such as climate change, trade and debt than it is currently.

A continued India-China detente would be in both countries' interests. India's momentary effort to reduce its economic dependence on China underlined how hard that would be. Two of Mr Modi's biggest priorities, infrastructure and manufacturing, ►

► are especially reliant on Chinese inputs. India's pharmaceutical industry, a big exporter, gets 70% of its active ingredients from China. And even if the prime minister could bear to curb such supplies (of which there is little sign) India's influential business lobbies would try hard to dissuade him. The brief hiatus also illustrated their strength of feeling and traction on the issue. This does not allay India's security concerns over China. They are long-standing and India will in any event continue to build up its defences because of them. India sees rapid economic growth as the essential condition for the build-up, among much else. And it rightly sees business with China as a necessary means to help it achieve that growth.

For its part, China has such an obvious interest in keeping India on-side that its recent pragmatic outreach is easier to understand than its former aggressiveness. China's former antagonism on the frontier appeared to achieve nothing except strengthening Indian security ties with America. At the same time, China's slowing economy has underlined the growing importance of India's vast domestic market to Chinese exporters. It may be that, at the time of the border clash, China was already

more respectful of India than the violence made it seem. Recent reporting from India suggests the frontier brawl, though most obviously instigated by China, was more down to poor local decision-making than strategy. Either way, China's strategic interests and recent outreach suggest a repeat has become less likely.

#### Awkward for America

A peaceful and fruitful Indo-Chinese relationship could be hugely beneficial to their massive populations and the world. It would also represent a challenge to Western thinking that American and other strategists need to weigh much more seriously. This does not weaken the case for close America-India ties. India will continue to want help protecting itself against China regardless of any improvement in the relationship; and those ties should yield manifold benefits beyond security. Yet to the extent that America's growing belligerence towards China is intensified by an assumption that India will, if necessary, help fight its battles, it should knock it off. To be a counterweight to China, India must be not merely weighty but also willing to counter. That cannot be taken for granted. ■

El Salvador

## A lawless crackdown

**The “world’s coolest dictator”, Nayib Bukele, shows how to gut democracy and be applauded for it**

IT IS A recipe to make strongmen salivate. Nayib Bukele, El Salvador's president, has worked out how to chop away democratic restraints while keeping an approval rating of 80-90% (see Americas section). One ingredient is his mastery of social media. The main one is locking up huge numbers of young men.

Since March last year, when Mr Bukele imposed a state of emergency, he has arrested more than 71,000 people, equivalent to 7% of male Salvadoreans aged 14-29. Anyone suspected of ties to a criminal gang can be thrown into a crowded jail—indefinitely. Little evidence is required: a suspicious tattoo or an anonymous accusation will suffice. Those detained will eventually have proper trials, the government insists, but so far they have had only cursory hearings, sometimes with hundreds of suspects appearing simultaneously before a judge. Mr Bukele glories in brutality, tweeting photos of suspects cuffed, half-naked and packed tighter than battery hens.

Outraged liberals must admit that his crackdown has brought benefits. Most touted is a plunge in the homicide rate, which fell from 51 per 100,000 the year before Mr Bukele took office in 2019 to 18 in 2021 (before the state of emergency began) and just eight last year. Analysts dispute how much credit to give Mr Bukele, but he can surely claim some.

More important, he has changed the balance of fear in El Salvador's extortion-plagued neighbourhoods. Before, if a gangster demanded protection money, civilians paid up or braved a bullet. Few called the police, since gangsters were seldom convicted without testimony that hardly anyone was brave enough to offer. Now, it is the gangsters who are scared. Knowing that an anonymous tip-off can put them behind bars indefinitely, those still at large are in hiding. Their absence has improved countless lives. A study in 2016 found that the annual cost of gang violence

in El Salvador was 16% of GDP. Today neighbourhoods are calm and businessfolk have mustered the optimism to open new shops. Hence Mr Bukele's rock-star popularity.

Yet his scrapping of due process carries costs that will outweigh these benefits. First, untold numbers of innocents have been locked away. Their families cluster outside prisons, desperate for news of their loved ones. (The government has released 6,000 so far, but seems in no hurry to admit its mistakes.)

More insidiously, Mr Bukele has amassed powers to pave the way for his crackdown and then used it as an excuse to grab even more. He has kept the country in a state of emergency for over a year. He has purged judges who resist him. He is shrinking parliament and tweaking election rules to entrench his party's majority. He intimidates the press: a new law prescribes jail terms of 10-15 years for journalists who repeat messages from gangs and spread “anxiety”. That could mean anyone who reports critically on crime policy. Next, Mr Bukele vows to crack down on corruption. If he applies the same rules of evidence to white-collar crimes as he does to consorting with gangsters, he will have a mighty tool for locking up opponents. El Salvador increasingly feels like a police state.

Some critics call his crackdown unsustainable. Previous attempts to crush crime with brute force have failed in El Salvador and elsewhere. Gang bonds will strengthen behind bars, so the prisoners will cause mayhem when they are eventually released.

But what if they are not released? Mr Bukele's crackdown is unlike previous ones. He has locked up far more people, and apparently plans to hold them until they are old men. This will be costly, but he scrimps on prisoners' food and urges their families to chip in. He is wagering that voters care more about safe streets than abstract notions like the rule of law. If his political ►



► opponents chide him for trampling over his people's human rights, his next electoral slogan writes itself: vote for me or the gangsters will be freed.

Mr Bukele is nearing the end of his first term as president; his party says he will run again in February. The constitution bars him from consecutive terms, but he has cooked up a Putinesque workaround: he will install a placeholder president for a few months and then return. The constitution clearly forbids a third term, but that may not stop him either. An official close to Mr Bukele told *The Economist* that there was no way for him to run for a third term—"so far".

The reputation of the self-styled "world's coolest dictator" is spreading. Sticklers for the rule of law decry him; others study his formula. Honduras has declared a state of emergency to bat-

tle crime. The establishment candidate for Guatemala's presidential election next month vows to build a huge prison. A combat-jacket-wearing presidential candidate in Ecuador, which also votes next month, praises Mr Bukele. So do some Republicans in the United States. His methods are ripe for copying anywhere with high crime and weak institutions, from South Africa to Papua New Guinea. They could tip such places into autocracy.

Democratic politicians everywhere should pay heed. When they fail to grapple with crime lawfully, with properly funded police and clean, efficient courts, they invite demagogues to do so lawlessly. As for Salvadoreans, if they re-elect Mr Bukele in February, as seems likely, he will have five more years to tear down their country's democratic guardrails. And if one day they tire of him, they may struggle to get rid of him. ■

## Reparations

# Should Ukraine get Russia's frozen assets?

### How to make Russia pay for the war while upholding international law

EVER SINCE the attack on Ukraine in February 2022 Western governments have made a show of clamping down on private Russian assets held abroad, from seizing oligarchs' yachts to forcing the sale of Russian-owned football clubs. But there remains a huge question mark over the really big money. Some \$30bn of Russian central-bank assets are frozen in Western accounts as a result of sanctions. Given the horrors that Russia has inflicted on its neighbour, the idea of tapping this pot to help compensate and rebuild Ukraine has naturally arisen.

The moral case to make Russia pay is obvious. It has waged war without provocation, without regard to civilian lives and in frequent violation of international law. The damage to Ukraine has been vast: the cost of reconstruction has hit \$41bn, according to the latest estimates from the World Bank, which were compiled before the destruction of the Kakhovka dam. These sums are far beyond the capacity of Ukraine, which now has a GDP of about \$150bn. Western taxpayers should not have to foot all the bill.

Yet it is vital that any measures the West takes comply with international law. For Ukrainians and their backers, the war is not just about defending one country against an aggressor but also about upholding the post-1945 global order, which underpins the world's economy and security. Whatever the West does with Russia's frozen assets will set a precedent that will shape global behaviour for decades to come.

State assets are protected from seizure under international law, and typically under domestic law, too (see Europe section). There are exceptions to this doctrine of sovereign immunity, but lawyers have advised America and the European Union that they may not apply in Russia's case. A vote in the UN Security Council could provide a clear legal basis for seizing the assets, but Russia has a veto there. Reparations can be part of a peace deal, but that requires the agreement of both sides.

What to do? The best approach involves three steps. The first is to seize the income that the Russian assets generate and hand it over to Ukraine. Euroclear, a Belgian clearing house and depository that holds almost \$225bn of frozen Russian assets,

makes profits from investing them. Taxing those at a 100% rate could generate over \$3bn per year, and is legal. At a minimum Ukraine could be assured of a recurring stream of income worth 2% of its present GDP. As a one-off this is peanuts; received each year in perpetuity it is well worth having.

The second step is to make the payment of reparations by Russia a condition of any eventual release of its reserves (or easing of sanctions). The two must go in lockstep. Estimates of Russia's capacity to pay should take account of its frozen reserves: think of them as a bit like collateral being held against a future claim. The G7, a group of rich countries, has recently adopted this position. The more countries that do so, the better.

Finally, patient, relentless work is needed to expand the legal case against Russia. It is still possible that a watertight case for immediate seizure can be built. Further votes at the UN General

Assembly in favour of this would help: although the assembly can only make recommendations, this can sometimes be deemed a stand-in for the Security Council if the latter fails to exercise its primary responsibility to maintain international peace and security.

At the same time, laying the groundwork for a future reparations process is vital. The arbiter of Ukraine's claims could be the International Court of Justice (ICJ) or a UN compensation commission like the one set up by the Security Council after Iraq's invasion of Kuwait in 1990. To try to justify its invasion, Russia has claimed that Ukraine was committing genocide against Russian-speakers in the east of the country. Ukraine wisely asked the ICJ to rule on this, and the verdict was clear: there was no such genocide, so Russia's pretext is bunk. The West should continue to support the meticulous recording of war crimes and damage to ensure this evidence is available for any eventual financial showdown.

It would, of course, be simpler just to grab all Russia's frozen assets; but that is what dictatorships do. Far better to take the legal path, which guarantees Ukraine a stream of income, secures priority for its claim on Russia's reserves and enhances its already strong case for reparations. It is possible to help Ukraine, make Russia pay—and uphold international law. ■



**Protecting the sea floor**

You support deep-sea mining as a means of easing the shortage of battery metals ("Give nodules the nod", July 8th). Deep-sea mining would see industrial extraction on a far greater scale than anything on land. Modelling suggests that this could affect up to 1.5m square kilometres of the Pacific Ocean's Clarion Clipperton Zone alone, the first area targeted for mining. It would cause irreversible biodiversity loss on the sea floor where the metal nodules support over 50% of life in the ecosystem. The hydraulic suction process would obliterate the sea floor and substrate and create sediment plumes that could travel at least a thousand kilometres.

The green transition does not require minerals from the deep sea. A 2022 report by SINTEF, a Norwegian research organisation, finds that demand for critical minerals can be reduced by 58% between 2022 and 2050 through a combination of new technology, circular-economy strategies and recycling. And nickel and cobalt are not needed for electric cars. A recent World Bank study concluded that with the rapid evolution in the battery sector, forecasting which technology will be the most used from now until 2050 is nearly impossible. Lithium iron phosphate batteries are already well-established, leaping from 10% of the global EV market share in 2018 to 34% in 2022.

We do not need, and cannot afford, to mine our way out of the climate crisis.

SIAN OWEN  
Director  
Deep Sea Conservation  
Coalition  
Amsterdam

Society faces uncomfortable decisions over how and from where we source metals for the energy transition. *The Economist* should be commended for its bravery in coming out in support of collecting deep-sea metal nodules. The seemingly ironic logic of tapping the oceans to protect them has left

some people anxious. Commitments to delivering a circular economy have resonated the world over, but we must be honest with ourselves that this cannot be achieved without using more metals to close the loop. You cannot recycle what you don't have.

Climate change is the greatest threat to our oceans and by saying no to nodules we tacitly accept the alternative: more mines on land. That means more deforestation and more toxicity flooding our oceans, rivers and communities. We also should not ignore the human impact of the mining status quo, which is displacing indigenous peoples and using child slave labour to extract the very same metals that lie unattached on the sea floor and require no drilling, blasting or sacrificing of human lives to collect.

There is a better way and the answer is clear. For the energy transition to succeed with the least impact on the environment and human lives, we need to source metals from where there is the least life, not the most.

GERARD BARRON  
Executive chairman and CEO  
The Metals Company  
Vancouver

**Ofwat responds**

Your article on water privatisation in Britain makes a series of assertions that do not accurately reflect how the sector works ("Circling the drain", July 8th). You claim that Thames Water's financial issues are exacerbated by high inflation. This, you say, is because customer bills rise in line with the consumer price index adjusted for housing costs, whereas some of Thames Water's debt is linked to the (higher) retail price index. As only part of the debt is indexed to inflation, higher inflation increases the value of equity and reduces gearing, easing financing issues, the reverse of what you claim.

You then attributed the widespread concern about sewage discharges to Ofwat, Britain's water-services reg-

ulator, blocking investment. In fact, investment in reducing sewage discharges by English water companies is determined by the Environment Agency's water-industry national environment programme, rather than Ofwat. Capital investment in the industry since privatisation in the late 1980s has been over £190bn (\$249bn), leading to an increase in the sector's asset base from £9bn at privatisation to £94bn in 2023. Progress on reducing sewage discharges had been impeded by the lack of accurate measure of their use. Now this has been addressed, improved operational performance will drive down future sewage discharges.

We agree that in some cases companies have been overly reliant on debt rather than raising equity. Ofwat has identified issues with weak financial resilience in several companies, including Thames Water. We have taken targeted action with these companies and secured over £3bn of new equity since 2020.

Finally, although customer bills have risen by around 40% in real terms since privatisation, there has been little or no increase in the past decade for most customers. This has been due to falling returns to investors rather than reduced investment.

DAVID BLACK  
Chief executive  
Ofwat  
London

**Italian paceniks**

"Putin's useful idiots" (July 8th), a guided tour of European opposition to the war in Ukraine, didn't say anything about the left in Italy. The Democratic Party, heir to the former Communist Party, is engaged in splitting hairs over supporting Ukraine. The Five Star Movement, Italy's shrillest populists, who have perfected the art of pretending to solve problems by marching in the streets, is against the arming of Ukraine. An assortment of radical leftists and greens oppose the war in the name of abstract pacifist principles.

Left-leaning Catholics oppose it on the ground of moral principle. Luckily Giorgia Meloni, the conservative prime minister, is a steadfast supporter of Ukraine's cause.  
BRUNO GEDDO  
Milan

**Changing lifestyles**

Working from home was bolstered by the first wave of studies indicating it was more efficient. Now that the evidence is shifting in the opposite direction (Free exchange, July 1st), it is worth considering why employees regard remote working as so valuable. As well as a commute-free life, it relates to how employees measure their own well-being, specifically to how they understand their personal identities. Few of us see ourselves as just workers, but define our lives through a constellation of roles; mothers, fathers, care-providers, citizens and so on. Since these identities are more closely associated with how we regard our lives than our ability to excel at our jobs, the new culture of working from home may prove hard to change.

DR MATTHEW DENNIS  
Assistant professor in the  
ethics of technology  
Eindhoven University  
of Technology  
Eindhoven, Netherlands

On the same day I read your article I took my children to visit Isaac Newton's family home in Woolsthorpe, Lincolnshire. I was reminded that it was during a plague-induced lockdown that Newton returned home and came up with the theory of gravity while sitting under the famous apple tree. This would appear to be evidence that significant accomplishments can occur while working from home.

JONATHAN RAMSDEN  
Columbus, Ohio

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## Turning a corner

WASHINGTON, DC

### Can America escape the long-predicted recession?

AS COVID-19 SPREAD throughout the world three years ago, many pored over the history of a previous pandemic, the Spanish flu of 1918-19, for clues about how the disaster would unfold. Now that the plague has abated, history may also provide a few lessons for the aftermath. As the first world war and the Spanish flu receded, interest rates were low and government spending high. Inflation surged. In order to bring prices back under control, America's central bankers cranked rates up, triggering a severe recession. The Federal Reserve described its actions in 1921 as "painful but...unavoidable" following "an unprecedented orgy of extravagance".

These days Fed officials tend to avoid the word *orgy*, but they are wrestling with similar circumstances. They have been raising rates at the fastest pace since the early 1980s. Hawkish economists argue that, to quell inflation, the Fed will have to raise them yet higher, even though that would certainly raise unemployment and

probably induce a recession. Doves counter that the Fed has already gone too far and that further economic pain is unnecessary. A third possibility, that the Fed is getting things just right, and that the economy will slow and inflation dissipate without a recession (a "soft landing" in the jargon), was until recently seen as nigh on impossible.

#### An orgy of tightening

The odds are still stacked against it. Since March 2022 the Fed has lifted short-term interest rates from 0% to 5%. Such rapid jumps tend to go hand-in-hand with recessions. As higher rates raise the cost of borrowing, they drag down both spending by consumers and investment by companies. As a general rule, the bigger the increase in rates, the bigger the drag. Thus, for much of the past year, the dominant view on Wall Street and in corporate boardrooms has been that America's economy would end up in a funk. As of June, the median forecast of economists surveyed by Bloomberg

pegged the probability of a recession in the next 12 months at about 65%. The Conference Board, a business group, put the probability at 99% in February. Stanley Druckenmiller, Silicon Valley's favourite macroeconomic prognosticator, recently said that he expects a "hard landing", involving a slump in corporate profits and a big rise in unemployment.

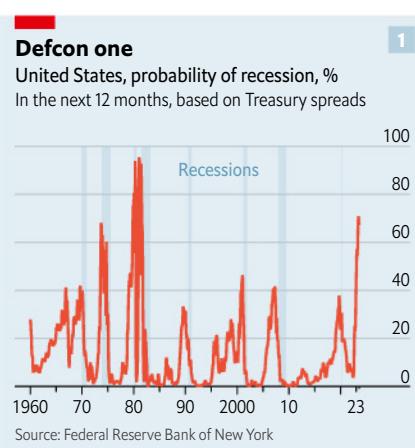
The gloomiest portent has been an extreme inversion of yield curves. Normally, rates on long-term bonds are higher than on those with short terms because investors expect extra compensation for the risk of holding securities that mature well into the future. When short-term yields are higher, the implication is that investors expect the central bank to cut rates, typically because they think growth is set to weaken. Inversions have a nearly perfect record in foreshadowing recessions in America over the past half-century, and they have been screaming trouble for some time now. Yield curves inverted for the first time in this economic cycle in October 2022, and are now deeply upside-down. The lag from the onset of inversion to the dawn of recession averages about 350 days, which would put the start of a potential recession in September. The Fed's New York branch calculates the probability of a recession based on the yield curve. In May it put the odds of one at more than 70%, the highest since 1982 (see chart 1 on next page). ➤

Other indicators confirm this bleak outlook. Consumer sentiment, as measured by a closely watched survey from the University of Michigan, plunged to an all-time low last year. The collapse of Silicon Valley Bank and a couple of other financial institutions in March provided evidence that the rapid rate hikes are harming vulnerable firms, and the ensuing financial instability added to economic headwinds. Banks have made their lending standards much stricter, another sign of a looming recession. Smaller businesses—the lifeblood of America's economy—remain extremely pessimistic. Manufacturing is already contracting, with output down since late in 2022. The debate among economists has been less about whether a recession is coming and more about whether it will be long or short, deep or shallow.

In the past couple of weeks, though, the mood has shifted. Despite the many ill omens, the most important indicator of the economy's health—the labour market—has remained amazingly resilient. The unemployment rate sits at just 3.6%, a smidgen above a five-decade low. A brief rise in claims for unemployment insurance during the spring has pattered out. America has added new jobs for 30 consecutive months, lifting total employment to about its pre-pandemic level.

At the same time, inflation is receding. In the year to June 2022 consumer prices leapt by 9.1%. In the year to this June they rose by just 3%, the smallest increase in more than two years. Core inflation, which excludes energy and food, is higher, but after a few months of stasis is moving in the right direction again. As post-pandemic supply-chain snarls untangle, the cost of most goods is rising only slowly, and in some cases falling. Rents, hitherto a big element of inflation, are falling according to private indices, and are likely to start declining soon in the official data, too. Labour costs are still rising, but the rate of increase has slowed, which bodes well for the prices of restaurant meals, car repairs, tax accounting and more.

To say that the combination of ebbing inflation and a robust labour market is unexpected is an understatement: many economists had assumed it was impossible. They had believed that there was a short-term trade-off between jobs and prices: that, all else being equal, a low unemployment rate is associated with a rising inflation rate, a relationship known as the Phillips curve. In the decade before the pandemic the Phillips curve had come into question, because inflation remained quiescent even though the jobless rate plunged. But the resurgence of inflation last year brought the Phillips curve back into fashion, in part because the labour market appeared to have become less efficient after the pandemic. Debate focused



not on whether unemployment would need to go up for inflation to come down, but rather on just how many people would need to lose their jobs before prices were brought under control. In one much-discussed speech last year, Larry Summers, a former Treasury secretary, said the jobless rate might need to climb as high as 10%.

#### A bacchanal of employment

America does have an ultra-tight labour market: too many companies competing to hire too few workers. That would normally lead to sharply rising wages and thus higher inflation. The obvious way to curb that inflation, in turn, would be to inflict enough pain on companies through higher interest rates that they resort to widespread lay-offs. But another way to bring the labour market into balance is to increase the supply of workers. That has happened to a certain extent: fully 84% of those aged 25-54 have jobs or are looking for work, the highest share since 2002. It also helps that immigrants—a vital, if politically contentious, part of the American labour force—have returned: more than 1m arrived last year, the highest figure since 2017. Since February 2020 the economy has added nearly 4m jobs, much faster growth than the long-term trend.

Employers, meanwhile, have been hesi-

tant to fire workers. Some may well be hoarding them, having found it very difficult to recruit enough over the past couple of years. Instead of firing staff, they are cutting back on hiring. The net result of more workers and fewer help-wanted ads is a slightly calmer labour market, despite the lack of lay-offs. Goldman Sachs calculates that there are roughly 3.2m more jobs than workers in America at the moment. That is still above 2m, which it considers the maximum for a not-too-tight, not-too-loose jobs market, but the overshoot is well down from its peak of 5.7m early in 2022. As the number of vacancies has declined, the relentless upward march of wages has eased somewhat (see chart 2). Economists at the doveish end of the spectrum are beginning to trumpet these achievements, if not quite declare victory. "The economy is defying predictions that inflation would not fall absent significant job destruction," Lael Brainard, head of the National Economic Council, said on July 12th.

Two additional things help explain America's run of good fortune. First, the looming problems were probably overstated because of pandemic oddities. Economists' models of the probability of a recession have for months been flashing red. But there is reason to think the models may be giving unreliable signals. They are designed to predict trouble whenever there are abrupt shifts in the data. Recently, though, such shifts have reflected a return to normal after the pandemic, rather than incipient economic weakness. People are buying markedly fewer laptops and exercise bikes than they did in 2020, for instance, not because they are cutting back sharply on spending but because they are not working from home as much. It may be, therefore, that manufacturing's weak spell is less a harbinger than a hangover.

The yield-curve inversion could also be misleading. Long-term rates may have fallen below short-term ones not because a recession is imminent, but for a far more pleasant reason: that as inflation melts away, the Fed will be able to lower rates. Provided it can make those cuts before growth gives out, it will have a good chance of guiding America to a soft landing.

The second factor relates to the economy's underlying strength. Monetary policy may be tight, but there are countervailing forces. One is government spending. America is running a budget deficit worth over 5% of GDP—unheard of outside recessions and wars. That is putting money in people's pockets. There are plenty of reasons to worry about the sustainability of such fiscal largesse, but, for now, it is a cushion for the economy.

Several big pieces of legislation from the first two years of the presidency of Joe Biden, enacted before Democrats lost control of the House of Representatives, are



also starting to affect the economy. Spending on highways, ports, power plants and more, enabled by an infrastructure law passed in 2021, is worth about 0.25% of GDP a year. Subsidies for electric vehicles, renewable energy and semiconductors appear to have catalysed a surge in private-sector investment: spending on manufacturing facilities is up 70% this year in real terms compared with pre-pandemic levels, hitting a record high.

Another countervailing force is households, whose spending accounts for about two-thirds of GDP. They entered the era of high inflation and rising rates well prepared. During the pandemic they had accumulated "excess savings" worth about \$2tn, a consequence both of having fewer opportunities to spend their money and of receiving three rounds of stimulus cheques as well as other forms of government support. Many people have drawn down these savings as the cost of living has risen. Nevertheless, researchers with the Fed's branch in San Francisco estimate that there is still a residual amount of extra savings—\$500bn or so—enough to last for most of this year. In any case, these savings matter less than they used to: for the first time in a few years nominal wage growth is eclipsing the rate of inflation, meaning that most Americans now have rising incomes in real terms.

What could go wrong? Policy lags are a known unknown that could yet trip up the economy. Lags refer to the length of time needed for changes in monetary policy to start affecting business activity. Economists used to think that it could take more than two years for a rise in interest rates to ripple through the economy. Stricter credit standards have yet to make their impact fully felt: for instance, interest rates on credit cards have just started to shoot up, and it may be another few months before delinquencies follow them higher.

But cutting against that is evidence that, in some respects, there is much less of a lag than there used to be, thanks to twitchy financial markets. For example,

mortgage rates rose sharply in early 2022 prompted solely by the expectation that the Fed would soon begin raising rates, as indeed it did. The housing industry, arguably the most rate-sensitive part of the economy, is now in the throes of a mini-rebound, with both sales and construction beginning to rise (see chart 3). A new financial-conditions index developed by the Fed suggests that, on balance, the drag on growth arising from higher interest rates has actually diminished in the past few months, in part because investors in American stocks have anticipated an end to the cycle of rising rates.

#### A debauched degree of listlessness

It is crucial to note that a soft landing does not equate to roaring growth. Far from it. What is needed to help bring inflation to heel is a period—potentially a long one—of subdued growth, which would lower the economic temperature. Such an interlude may, in fact, be well under way. Although GDP growth has held up well over the past few quarters, its close relative, gross domestic income (GDI), has been anaemic. In theory the two ought to be aligned. GDP tracks all final expenditures in the economy, summing up consumption, investment, government spending and net exports over a specific period. GDI tracks the earnings associated with that expenditure, summing up wages, profits and any other income. In reality the two never match perfectly, since they are derived from different sources. Recently the gaps have been unusually large—perhaps another consequence of distortions related to the pandemic. Whereas GDP increased by 2% on an annualised basis in the first quarter of this year, GDI fell by 1.8%. It is not clear which number is more accurate, but one common approach to reconciling the two is to split the difference. That would imply that growth is already very low which, in turn, may further sap inflation.

There are big risks to this rosy outlook. Inflation could prove stubborn again, as it has for the past two years. Much of the recent optimism has been tied to a better-than-expected inflation reading in June. Drawing sweeping conclusions from a single datum is never a good idea, not least when underlying trends are so volatile.

Even if inflation falls again in July and August, there are also questions about how low it will go if the number of vacant jobs continues to outstrip the number of available workers to such a large extent. Olivier Blanchard, a former chief economist of the International Monetary Fund, and Ben Bernanke, a former chairman of the Fed, estimated in a paper in May that, at the current level of tightness in the labour market, the unemployment rate would need to rise above 4.3% for some time to bring inflation down to the Fed's target. That would

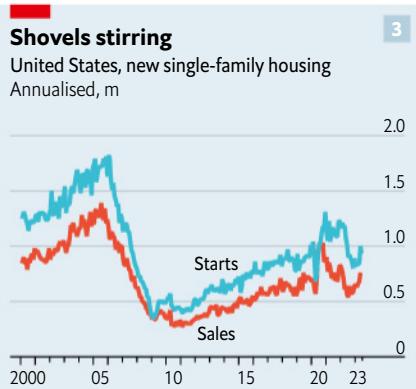
imply that roughly 1m people would have to lose their jobs—no small dislocation.

The resilience of the economy is, in this respect, disconcerting. If the rebound in housing gains steam, it could easily spur an increase in rents and goods prices (all those new homes need sofas, fridges, carpets and more). If wages continue to grow at about 5% annually, they, too, will put a floor under prices in the service sector. Expectations of inflation, although declining, do not suggest the Fed has everything under control (see chart 4). A feedback loop between a strong economy and sticky inflation would pose a stiff challenge for the Fed, leaving it with little choice but to raise rates to new heights—at which point fears of a tightening-induced recession might well come true.

The absence of a downturn to date has allowed the Fed to avoid confronting any serious trade-off in its tightening. Jerome Powell, the Fed's chairman, and his peers deserve high marks for raising rates as quickly, albeit belatedly, as they have. But it has been easy for them to be resolute given the health of the jobs market. Were conditions to deteriorate, their resolve would be sorely tested. Richard Clarida, a former vice-chairman of the Fed, says the central bank may ratchet down rates next year with inflation headed to a "two-point-something destination", instead of actually back to its target of 2%. That might help to avoid a recession. But it would also represent a shifting of the goalposts, with the Fed tolerating a higher rate of inflation because it does not want to inflict wrenching economic pain. That, in itself, would make it harder to fight inflation in the future.

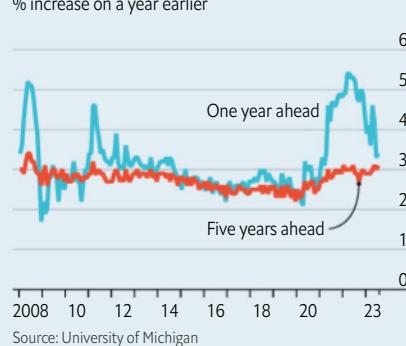
All these risks notwithstanding, it remains remarkable that America has so far avoided a hard landing. The economy is winding its way down a treacherous road from the highest peak in inflation in 40 years. Defying conventional wisdom, it has managed to add millions of jobs during the hair-raising ride. Its descent is far from over. But a soft landing, once a faint hope, is now among the plausible outcomes. ■

**Shovels stirring**  
United States, new single-family housing  
Annualised, m



Sources: Census Bureau; Department of Housing and Urban Development

**Down but not docile**  
United States, consumers' expectations of inflation  
% increase on a year earlier



Source: University of Michigan

**Hot cities**

## The sizzling Sunbelt

PHOENIX

### Americans are moving to places besieged by extreme heat

AMY SCHWABENLENDER has a front-row seat to suffering. From the windows of her office in downtown Phoenix, she can see rows and rows of tents. Their inhabitants keep inside, hiding from the heat that is scorching the desert city. On July 18th Phoenix experienced its 19th straight day with temperatures of at least 43°C (110°F), breaking an 18-day record set in 1974. Ms Schwabenlender runs Phoenix's Human Services Campus, a consortium of groups that serve almost 2,000 people who are homeless. "There's people with burns on various body parts" from the hot pavement, she says. "Maybe they fall asleep, maybe they're just laying there waiting for the next day." Her voice gets quiet, almost to a whisper. "I don't know how more people don't die," she adds.

Roughly a third of Americans live in areas where the government has issued warnings about extreme heat in the past week (see map). These hot cities are in the Sunbelt, or the southern part of the country, ranging from Los Angeles to Miami. Tourists flocked sweatily to Death Valley,

California, the hottest place on Earth, to see if it would get warmer than the previous record of 56.7°C (it didn't). Researchers in Florida worry that hot ocean temperatures will bleach coral reefs and worsen hurricane season.

The North American monsoon, which drenches parts of Arizona and New Mexico over the summer, has come late this year. Michael Crimmins, a climatologist at the University of Arizona, reckons that the arrival of El Niño, a warming ocean pattern that affects global weather, may have delayed the cooling rains. It is too early to know how much more severe the heatwave

was made by climate change. But, explains Mr Crimmins, global warming "pushes all of the normal local weather extremes just a little bit higher." Countries elsewhere can relate. Simultaneous heatwaves have some academics wondering whether the rate at which the world is warming is speeding up (see Science & technology).

Yet extreme heat in the Sunbelt is not convincing Americans to up sticks. Census figures suggest that 12 of the 15 fastest-growing cities in America are in the region. A recent study from Redfin, a property platform, finds that the 50 counties with the highest share of homes exposed to extreme-heat risk grew by an average of 4.7% between 2016 and 2020. The five hot counties that experienced the most growth were in Arizona, Florida and Texas. Williamson County, Texas, which includes Austin, grew by a whopping 16.3%. Counties with lots of homes vulnerable to drought, fire and floods also grew, though less rapidly. Places with relatively low climate risk experienced population declines. Rather than migrating away from the areas most affected by climate change, Americans are moving towards them, lured by the promise of lower taxes and house prices than in costly coastal metros.

Phoenix residents expect their summers to be sweaty. Their city sprawls across the Sonoran Desert. Saguaro cacti stand nobly atop mountain ridges like spiked sentries. Scorpions and rattlesnakes scuttle in the brush. Most people can abide the ➤

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► desert heat in air-conditioned homes and offices. But keeping cool is a luxury not everyone can afford.

Heatwaves kill more Americans than any other weather-related disaster. The number of deaths associated with heat in Maricopa County, which includes Phoenix, has risen each year since 2014. And at least 42% of the 425 people who died from heat in 2022 were homeless. More than half of the county's heat-related deaths last year involved methamphetamine, a stimulant that can increase body temperature. In Phoenix, heat, homelessness and drug use have become a lethal combination.

David Hondula, who runs Phoenix's new Office of Heat Response and Mitigation, reckons that a hotter city does not have to be more dangerous. Hot cities around the world—including Los Angeles, Miami and Athens—are appointing chief heat officers. These officials have two main jobs: to co-ordinate emergency response to heatwaves, such as opening cooling centres and distributing water; and to plan how to adapt to a hotter future, largely by diminishing the urban heat-island effect. City centres can be up to 10–15°C hotter than surrounding rural areas because buildings and roads absorb and trap heat.

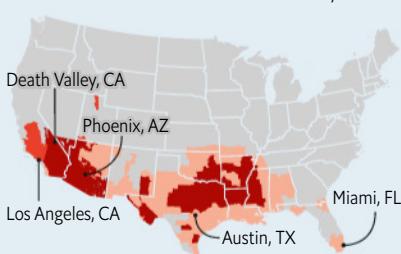
There are several strategies cities can use to cool down. Some are technical, such as painting asphalt with a reflective coating to repel, rather than absorb, sunlight, or using different building materials. Others are environmental, such as planting more trees for shade. Phoenix likes them all. Some streets around the city shimmer with their new reflective coatings. Downtown's municipal code requires new developments to provide shade. "There's no reason we can't have a Phoenix of the future that's more comfortable than the one we have today," says Mr Hondula.

Officials will face hard choices. Places reckoning with water scarcity must weigh planting trees for shade against the water needed to irrigate those trees. Reflective pavement reduces the surface temperatures of streets, but the coatings seem to

## Hotter than July

United States, July 19th 2023

- Excessive heat warning
- Excessive heat watch
- Heat advisory



Source: National Oceanic and Atmospheric Administration

increase radiant heat. Sunlight that would have been absorbed into the asphalt may instead be cast onto nearby people.

Growth and sustainability are sometimes at odds. In June, Arizona's governor, Katie Hobbs, decided to limit construction in parts of Phoenix that depend on limited groundwater supplies. Rising home insurance rates in Florida and California will make it more expensive to live in areas prone to floods or fires. Unchecked growth in places prone to extreme heat will increase heat-related deaths, argues Vivek Shandas, who studies climate adaptation at Portland State University. "We're going to see two trains heading on different tracks right at each other."

Mr Shandas's trains may already be in motion. As your correspondent drove through Buckeye, Arizona, she spotted two billboards representative of the Sunbelt's perverse climate-migration paradigm. Along the highway, one sign warned drivers that it was 11:33am and already 106°F (41°C). On the next stretch of road was a sign advertising brand new homes. ■

## Reproductive politics

# Pill pushers

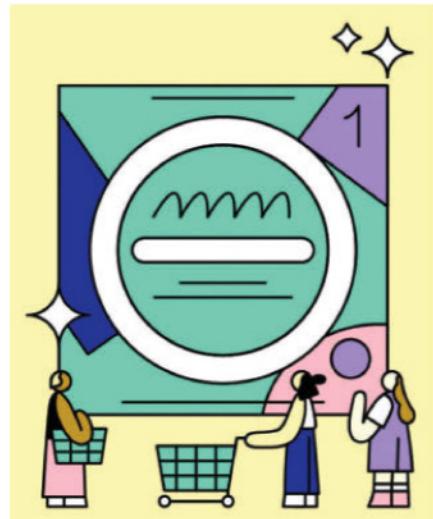
NEW ORLEANS AND WASHINGTON, DC

## The FDA approves the first-ever non-prescription birth-control pill

**I**F THE DECISION was sobering, the concurring opinion was chilling. When the Supreme Court overturned *Roe v Wade*, making states the new arbiters of abortion policy, Justice Clarence Thomas laid out a blueprint for what could come next. Harnessing the same legal logic that the court used to topple *Roe*, he called on his colleagues to do away with a trio of other precedents. Among them was *Griswold v Connecticut*, a 1965 case that established a married couple's right to buy contraceptives without government restriction. Wide-eyed progressives braced for abortion battles to morph into a war over birth control.

Pro-lifers have been mulling going after the contraceptive pill, but an organised offensive to purge pharmacies of it has yet to materialise. Doing so will soon become harder. On July 13th the Food and Drug Administration (FDA) approved Opill, the first-ever non-prescription birth-control pill. Come early 2024, women will be able to order Opill online or pick it up from drug stores without a doctor's sign-off.

Liberals see this as an antidote to abortion restrictions. Making contraceptive pills more readily available should result in fewer unplanned pregnancies. But for this to be a practical option for women,



Opill needs to be affordable. Perrigo, the company that makes it, has yet to disclose its price and private health insurers are not required to cover it (though an executive order issued in June suggests that President Joe Biden may try to change that).

At the right price, non-prescription pills could increase liberty. Claudia Goldin of Harvard University found that when contraceptives became widely available in the 1960s, women stayed in school longer, boosting the economy. Today, 12% of sexually-active women, and 14% of poor ones, do not want to get pregnant but do not use contraceptives. Though the impact will be smaller now, it could still be significant.

Kristan Hawkins, the boss of Students for Life, an anti-abortion outfit, thinks the pill will give women a false sense of security, leading to more, not fewer, abortions. She points to a 2014 analysis by the Guttmacher Institute, a pro-choice research group, that found that 51% of abortion patients used birth control in the month they got pregnant, as evidence that women misuse contraceptives. Yet to get FDA approval, Perrigo proved that consumers use Opill safely and effectively without doctors' instruction. Still, Ms Hawkins says the proliferation of the pill will empower rapists to slip it into their victims' drinks to cover up their crimes and will lead to higher rates of sexually transmitted infections and depression among girls. (There is some evidence for the latter two claims.)

The impact of Opill will be dulled if women are wary of it. In places where abortion is taboo, conspiracies are particularly potent. The nurse practitioner at Woman's New Life Clinic in New Orleans warns patients that the pill is linked to cancer and says condoms disrupt vaginal pH-levels. More than three-quarters of American women of reproductive age favour making birth control available over the counter. But those who need it most may be least likely to bring it to the till. ■

## The Republican primary

# Big-donor populism

Ron DeSantis is relying on big donors and his super PAC

**F**OR RON DESANTIS, whose presidential campaign began in earnest eight weeks ago on a glitchy Twitter live-stream, even good news seems to be bad news. Newly released data from the Federal Election Commission (FEC) show the Florida governor outraised Donald Trump during the second quarter and raised some 43% more than his competitors Nikki Haley, Tim Scott, Chris Christie and Mike Pence combined. But these splashy fundraising numbers disguise a looming problem for Mr DeSantis: an overreliance on big-dollar donors.

From May through June Mr DeSantis raised \$20.1m and spent \$7.9m, a burn rate of 39%. Compared with the same period during the 2020 election cycle, this seems modest. During the second quarter of 2019, Mr Trump's campaign had a burn rate of 40%, and then-front-runners of the Democratic primaries Bernie Sanders and Joe Biden both slightly exceeded 50%.

But those fundraising juggernauts, unlike Mr DeSantis, relied heavily on small-dollar donors—individuals who pledge less than \$200 to a campaign. These contributions matter not only because they help line campaign coffers, but because smaller donations from more people suggest greater enthusiasm for the candidate. During the second quarter of 2019, 70% of Mr Sanders's fundraising came from small-dollar donors compared with Mr DeSantis's 14% during the same period this year.

A reliance on big-dollar donors can be hard to sustain. Fewer people have lots of money to give and campaign-finance law caps individual contributions at \$3,300 per candidate per election. Nearly 70% of donors to the DeSantis campaign have alrea-

dy reached this limit for the primaries. Mr DeSantis can use future donations from these individuals (up to an extra \$3,300) only on his general-election campaign, should he make it that far. But some of his big-dollar donors have already hit both caps: \$3m of his remaining \$12.2m funds are reserved for the general election.

Under his campaign's current weekly spending rate (\$1.5m) Mr DeSantis will need to raise around \$33m during the remainder of 2023 if he hopes to reach the Iowa caucus with cash in hand. His campaign has already laid off some staffers in order to rein in spending.

The next few weeks could bring the DeSantis campaign worse news still. Though Mr Trump's FEC filings report fundraising of \$17.7m, the former president claims he has raised \$35m in the second quarter, 75%

more than Mr DeSantis. Because Mr Trump relies on a fundraising committee with different reporting deadlines the true number won't be revealed until the end of July.

The DeSantis campaign's financial state will become clearer then, too. Super PACs—which can take unlimited donations from undisclosed donors on behalf of campaigns so long as they do not co-ordinate with them—have the same July 31st filing deadline. "Never Back Down", a DeSantis-aligned super PAC, is allegedly flush with cash. But without co-ordination between the campaign and super PACs, efficient use of these funds is tricky. And come January, it will be the individual donors, not the super PACs, who shuffle into ballot boxes to decide their 2024 Republican nominee. Mr DeSantis would do well to woo them even if their wallets are slimmer. ■

## Bicycle hire

# Slow puncture

CHICAGO

Urban transport meets the venture-capital cycle

**O**VER THE past decade not many cities in America have won as many plaudits for investing in bike infrastructure as Minneapolis. Thanks to its extensive network of bike lanes, in 2015 it became the first (and so far only) place in America to win a place on the Copenhagenize Index, a list of the world's 20 most bicycle-friendly cities. Yet that was not enough to save the city's 13-year-old docked bike-share system. In March Lyft, the taxi firm which operated the scheme, known as Nice Ride, announced that because a sponsor had dropped out, it would close, and that they would begin removing the equipment.

Cycling is booming across America. Bike-share schemes, too, have been thriving. According to the Bureau of Transportation Statistics, usage of six of the largest docked systems nationwide increased by 42% from March 2020 to March 2023. Last year New Yorkers took just under 30m rides on the Citi Bike scheme there; in Chicago, the Divvy scheme had 6.3m riders, up nearly 40% on 2021. And yet many schemes, like that in Minneapolis, are closing. In 2019, 109 cities were served by a docked-bicycle-hire scheme; that has now fallen to 56. What is going wrong?

The basic problem, says David Spielbogel, the chief business officer of Lime, which operates dockless bikes and scooters, is that the boom, funded by venture capital, is deflating like a punctured tyre, and too many operators "haven't figured out how to run a profitable business". Dockless-bike firms (Lime aside) were



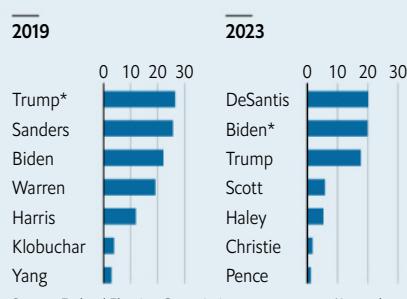
Tour de Williamsburg

the first to go. But docked schemes are now suffering too, especially outside the biggest cities. In Minneapolis, the fact that the bikes did not function during winter may have contributed to the system's demise. Lime, which is profitable, is one of the firms filling the void.

Schemes like New York's or Chicago's are not at risk of closure. But bike advocates accuse Lyft, which runs those two systems, of not maintaining non-electrified bikes in order to push riders onto pricier e-bikes. For non-members, hiring an e-bike can rival the cost of a taxi (members who pay an annual fee get cheaper rides). While demand stays high, that might sustain networks. But it will hardly accelerate the boom.

## Raise and tell

United States, presidential campaign funds raised, April-June, \$m



A new Mexican-American war

## How Mexico has become the “enemy”

WASHINGTON, DC

### Many Republicans want to use military force against drug cartels

MORE THAN once, as president, Donald Trump mused about firing missiles at the drug labs of Mexican cartels. “No one would know it was us,” he declared, before being talked out of the idea. Mark Esper, the then defence secretary, recounted the incident in his memoirs published last year, astonished that bombing a neighbour could be seriously thought of.

Now the extraordinary is becoming more commonplace as Republicans argue that greater use of military force, or the threat of it, can help control America’s southern border and curb the smuggling of fentanyl, a synthetic opioid that is produced illegally in Mexico.

One congressman, Michael McCaul of Texas, has introduced a bill to classify fentanyl as a “chemical weapon”. Lindsey Graham, a senator from South Carolina, is pushing one to designate Mexican cartels as “foreign terrorist organisations”. Dan Crenshaw and Mike Waltz, congressmen from Texas and Florida respectively, have proposed another that would authorise “all necessary and appropriate force” against foreign states, organisations or people linked to trafficking fentanyl.

Republican presidential candidates, too, are talking tough. Ron DeSantis, the governor of Florida, has suggested a naval blockade of Mexico-bound shipping to halt the import of fentanyl precursor chemicals from China. Nikki Haley, a former ambassador to the UN, has proposed sending in special forces with a warning to Mexico: “Either you do it or we do it.” Tim Scott, the other senator from South Carolina, declared in May, “I will allow the world’s greatest military to fight these terrorists.”

Tucker Carlson, a former Fox News host beloved by America’s hard right, goes further, regarding Mexico as an outright foe. On July 14th, while interrogating Republican presidential hopefuls (minus Mr Trump) at the Family Leadership Summit, a gathering of religious conservatives in Iowa, he grilled Mr Scott about his support for Ukraine: “No Americans killed by Russia. Hundreds of thousands killed by Mexico. But Mexico is our ally and Russia is our enemy—how does that work?” Mr Scott did not demur from the idea that Mexico was an enemy, but said America could deal with Russia and Mexico simultaneously.

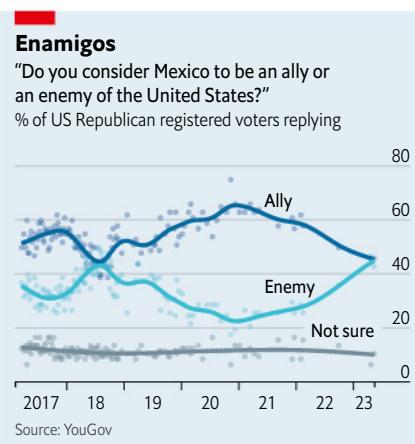
Many Mexicans feel they are again the piñata of America’s election season, freely beaten by any politician. Earlier this year

proposition (see chart). Democrats are largely unchanged, with about 70% regarding their southern neighbour as an ally. The Republican disenchantment has grown in the past year.

At least three factors may be at play. The first is frustration over fentanyl-related deaths, which rose sharply in 2020 and 2021. The drug has become the biggest killer of Americans aged 18-45, responsible for most of the 70,000 deaths from overdoses of synthetic opioids in 2021. Second, suggests Mark Jones of Rice University, the defeat of Mr Trump “unshackled” Republicans, freeing them to denounce President Joe Biden for his handling of the border. “There is no better issue for Republicans,” he says. “It mobilises their base. And it splits Democrats: whatever Joe Biden does will seem too fascist by the left and too permissive by centrists.”

A third factor, adds David Frum, a writer and former speechwriter for President George W. Bush, is the war in Ukraine. Given the MAGA movement’s hostility to Ukraine and sympathy for Russia—a position that runs against many voters’ views—denouncing Mexico allows them to cast themselves as “guardians of the country”.

Such policies are gaining an intellectual underpinning through a network of Trump-leaning think-tanks preparing for a future administration. A paper by the Centre for Renewing America, entitled “It’s time to wage war on transnational drug cartels”, is reported to have caught the attention of Mr Trump, among others. Its author, Ken Cuccinelli, argues that America should be free to take military action in Mexico given that its government does not fully control its territory. Never mind that it would stir deep anti-Americanism, or that treating Mexico like a failed state might turn it into one. “Mexico is not a friend. It is complicit in the drug cartels,” says Mr Cuccinelli. “It’s time to acknowledge that the relationship has changed.” ■



Mexico’s president, Andrés Manuel López Obrador, a left-wing populist who got on with Mr Trump, took issue with the militarist talk, saying: “In addition to being irresponsible, it is an offence to the people of Mexico, a lack of respect for our sovereignty.” He warned that he might urge Mexican and Hispanic voters not to cast their ballots for Republicans.

The anti-Mexican mood on America’s right is hardening, moving beyond Mr Trump’s cheap shots against migrants in 2015, when he said “they are bringing drugs, they’re bringing crime, they’re rapists.” According to tracking polls by YouGov, Republican voters are fast turning against Mexico. Roughly as many think Mexico is now an “enemy” as consider it an “ally”, with about 45% supporting each



Not high enough, apparently

## Lexington | Manchin in the muddle

*The real justification for Joe Manchin's third-party flirtation is actuarial and pragmatic, not idealistic*



**N**OTHING IN American politics is more quixotic than a third-party presidential campaign. Thus, to political insiders, nothing is also more pathetic or else more cynical: in the best case, the campaign is detached from reality, and in the worst (and, to insiders, the more probable case, since this is politics for God's sake) it is serving some hidden motive, some interest in the shadows.

Yet, because nothing is more quixotic than a third-party campaign, might it not actually be the most idealistic expression of American politics? Americans may have elected only one candidate to the presidency from a third party, but he was Abraham Lincoln. And good third-party politicians always seem so pure. They know the odds are stacked against them, but they also know Americans yearn for something different, for big ideas and hard truths. It sounds good to anyone who is in fact yearning for something different, which is pretty much everyone who is not an insider.

Enter Senator Joe Manchin, Democrat of West Virginia, one of the more cynical American politicians or possibly one of the more principled, weighing a third-party bid in the latest twist of a presidential melodrama no strike-breaking screenwriter could pitch with a straight face. Whatever further criminal indictments, mislaid cocaine, unacknowledged grandchildren, unvaccinated Kenedys, old-age pratfalls or attempted Russian coups may yet await, Mr Manchin's eventual choice could prove decisive.

Craggy and folksy, Mr Manchin has won in a state Donald Trump carried twice by about 40 points, but by casting votes that made progressives despise him. What Mr Manchin has seen as wise positions for an old-school blue-collar Democrat from coal country, they have seen as evidence of racism, truckling to special interests and egomania. As the spotlight of presidential speculation shines upon him, Mr Manchin is doing nothing to dispel that last suspicion. A fellow Senate Democrat, Dick Durbin of Illinois, recently called him "America's biggest political tease".

If Mr Manchin runs for president, he would do so as the candidate of No Labels, a centre-left organisation that argues Americans are dissatisfied with their emerging choice, between President Joe Biden and Mr Trump. The group intends to raise tens of millions of dollars and petition its way onto the ballot in every state. On July 17th, in the early primary state of New Hampshire, Mr Manchin ap-

peared at a town-hall meeting organised by No Labels alongside a Republican, Jon Huntsman, a former governor of Utah, ex-ambassador to Moscow and Beijing, and past presidential candidate.

"I truly believe that all 435 people elected to Washington want to do good," Mr Manchin said when asked about a radical House member. But the "business model" of both parties leads politicians to motivate supporters by creating or exaggerating division rather than compromising. Through No Labels, he said, "We can talk about the real problems. We don't have to villainise the other side just because they might think different than I do."

All of this is driving some Democrats crazy. The more sensible a No Labels candidate sounds, they fear, the more he will undercut Mr Biden's advantage among sensible people. They argue that polling shows more Republicans identify with their party's extreme than Democrats do with theirs, meaning a centrist candidate will take fewer votes from Mr Trump.

No Labels insists its polling shows it would hurt Mr Trump at least as much. It says it will field a candidate only if, after the Super Tuesday primaries next spring, the choice does come down to Mr Trump and Mr Biden, and only if the No Labels candidate has a clear shot at winning. "Those are deeply subjective judgments," warns Matt Bennett of Third Way, a centrist Democratic group organising against No Labels, "and so far at least we have no faith they are making those judgments correctly." The day Mr Manchin turned up in New Hampshire, some political luminaries opposed to Mr Trump launched Citizens to Save Our Republic, a super PAC dedicated to fighting No Labels. The Arizona Democratic Party is suing to keep No Labels off the ballot there.

Unfortunately for those opposed to No Labels, such machinations are classic grist for the third-party idealism mill. In New Hampshire Mr Huntsman remarked that he had previously heard only Russian and Chinese officials discourage more political participation. Mr Manchin argued that fear of No Labels would force the Democratic Party to embrace more centrist positions. "Why are they scared that they may be threatened to do the right thing?" he asked. "Why are they scared to say, 'Hey, you're too far to the left and it doesn't make any sense'?"

### Better angles

Yet No Labels is also playing games. As a non-profit organisation, it is not obliged to disclose its donors and it does not. Struggling to defend that practice, Mr Manchin fell back on saying that Republicans and Democrats also benefited from "dark money" and that he would vote, if given the chance, to do away with it.

There is no reason to doubt the sincerity of Mr Manchin or No Labels in seeking more public debate about the national debt, the need for national service or the decline of patriotism. But after the attack on the Capitol, only cynical political calculation could pinpoint the sensible centre of American life as equidistant from both parties. A party in thrall to Donald Trump is dangerous in ways a party resigned to Joe Biden is not.

In fact, some of his Democratic colleagues acknowledge, Mr Manchin deserves credit for blocking Mr Biden from moving farther left in the heady years when Democrats had majorities in both chambers, and for helping achieve landmark bipartisan legislation. Partly thanks to Mr Manchin, Mr Biden can justly claim to be the centrist's alternative to Mr Trump. Only should Mr Biden's health fail might Americans be lucky to have No Labels on the ballot (though Mr Manchin is 75). That is the only real argument for this third party, and it is the most cold-blooded one imaginable. ■

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### El Salvador's would-be dictator

## How to dismantle a democracy

SONSONATE

**Power-hungry leaders in other countries will learn from Nayib Bukele**

**T**O UNDERSTAND why El Salvador's president is so popular—and why aspiring autocrats elsewhere are likely to copy his ostentatiously brutal methods—it helps to visit one of the neighbourhoods he has made safer. Until recently, criminal gangs controlled huge portions of this small Central American country of 6.3m, terrorising locals. A study by the central bank and the UN Development Programme in 2016 estimated that extortion payments added up to 3% of GDP, and the total annual cost of gang violence, including the lost income of people deterred from working or investing, was a staggering 16% of GDP.

In 2019 Salvadoreans elected a then 37-year-old president, Nayib Bukele. Like most candidates, he promised to crack down on gangsters. Unlike his predecessors, he has done so on such a scale that most are either locked up or in hiding. He hopes to parlay that success into a constitutionally dubious second term. On July 9th his party, New Ideas, announced that he would be their candidate at elections in

February 2024. His critics fear he is building a dictatorship—a notion he does not exactly dispel when he dubs himself “The World’s Coolest Dictator”.

The gang crackdown began in earnest in March 2022, after 87 people were murdered in a single weekend, apparently after a deal between gangs and the government broke down. Mr Bukele declared a “state of exception” (ie, emergency). He let the police arrest anyone they suspected of gang ties, even if the only evidence was a tattoo or an anonymous tip-off. More than 71,000 people—a number equivalent to around 7% of male Salvadoreans aged 14–29—have been rounded up and tossed into overcrowded jails. Human-rights groups are outraged, but most Salvadoreans are delighted.

“Before, this neighbourhood was ruled by a gang, and you couldn’t leave it [with-

out their permission],” says Miguel, a shop owner in Sonsonate, a small town 65km (40 miles) from the capital, San Salvador. Violence was routine. Three gangsters murdered Miguel’s sister because she broke off a relationship with one of them. Since Mr Bukele locked up the thugs, life has grown easier, he says. His murdered sister’s daughter, whom he adopted, can walk around without worrying.

The state of exception was supposed to last 30 days, but has been extended 15 times. Prisoners will eventually have trials, the government says, but so far they have had only pre-trial hearings, where dozens or even hundreds appear simultaneously before a judge, sometimes by video link. Whole batches are charged with “illicit association”. This need not mean belonging to a gang. It could mean knowingly receiving a “direct or indirect benefit” by having relations “of any nature” with one. Mr Bukele has raised the maximum sentence for “supporting” a gang from nine years to 45. El Salvador now locks up a higher share of its people than any other country.

Of those arrested so far, 6,000 have been released, says Gustavo Villatoro, the security minister. Asked if any more of the detainees might be innocent, he says the police and prosecutors are working hard “every day” to gather the necessary evidence to determine who is guilty. Trials (which have not yet started) will be concluded within two years, he says. He adds ➤

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26 What Latin America thinks

► that the crackdown will continue until every last gang member is locked up: there are, he reckons, perhaps 15,000 more to catch, many of whom have fled from the country.

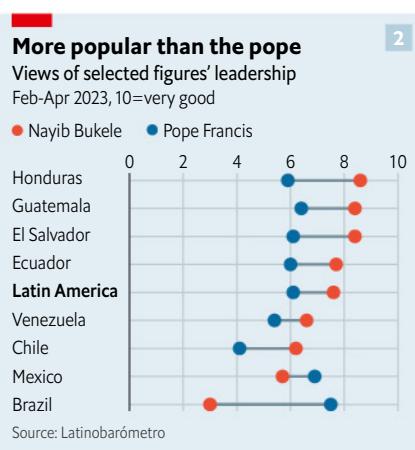
Tossing aside due process is an essential part of Mr Bukele's strategy. Previously, when a gangster swaggered into a shop and demanded protection money, the owner knew that to refuse was to court death. He could call the police, but if he testified he would be murdered and if no one testified there would not be enough evidence to lock the gangster up.

Now, if a gangster swaggers down the street, anyone can get him locked up with an anonymous phone call. This completely changes the balance of power in previously gang-dominated neighbourhoods. "Before, the good people were afraid. Now, the bad people are," says Miguel. (However, he asks that *The Economist* use a pseudonym.)

El Salvador's homicide rate was already falling: from 106 per 100,000 people in 2015 to 51 in 2018 (the year before Mr Bukele was elected) and 18 in 2021 (before the state of exception began). Nonetheless, it is almost certain that the crackdown contributed to a further halving (see chart 1). El Salvador had eight murders per 100,000 people in 2022, a rate only slightly worse than in the United States.

This is such an improvement that, in a new survey from Latinobarómetro, a pollster, the share of Salvadoreans who think crime is the country's biggest problem is just 2% (see next story). This helps explain why most polls put Mr Bukele's approval rating above 80% and some put it around 90%. No other leader in Latin America comes close. Some of those polled in other countries like him even more than Salvadoreans do. He even beats the pope in much of the region (see chart 2).

Yet his war on gangs has three enormous downsides. First, many innocent people have been incarcerated. Second, it has given him an excuse to accumulate immense powers, and he is not finished yet. Finally, he has created a formula that political opportunists in other crime-ridden



countries with weak institutions could copy. Call it: how to dismantle a democracy while remaining popular.

Start with the innocents. Not far from Miguel's neighbourhood, on a road to a prison, makeshift stores have popped up selling items for care packages. Families can buy underwear, soap and other basics to send to loved ones behind bars. Those captured under the crackdown receive 1,800 calories per day in prison, the government says—less than the 2,100 doled out to other prisoners. It suggests that families send \$150 worth of supplies every two weeks. But many cannot afford it. Prisoners are rarely middle-class. Over half the population earns less than \$328 a month.

"Maria", the mother of a young man who was arrested along with his wife last year, insists that both were blameless. "Someone denounced him. I don't know who," she says. Cops grabbed the couple, roughed them up and accused them of associating with MS-13, one of the country's two main gangs. Maria learned about it when relatives showed her a picture of the pair uploaded to Facebook by the police.

She says her son was given two hearings as part of a large group, but nothing resembling a proper trial. So far, he has been locked up for more than a year, and she has been given "no information at all" about his case. Maria's husband makes \$12 a day as a driver; she makes about the same amount, but only some days, working in a shop. At first they sent him care packages, but now they can no longer afford to do so.

As she talks, a truck rolls by, packed with young men in white t-shirts and handcuffs. A few minutes later, another truck passes with a similar load. Then another. From time to time, ambulances hasten in the other direction. Weeping, Maria says she has seen her son eight times since his arrest: usually no more than a glimpse as he is taken to a hearing or some other destination—she doesn't know where. Once she visited him in hospital, but was not allowed to talk to him. He appeared malnourished, and with injuries that sug-

gested he had been beaten.

Ingrid Escobar, a lawyer who works to release detainees, describes prison conditions as "inhumane". Mr Bukele does not try hard to rebut such allegations. On the contrary, he has posted pictures on social media of nearly naked inmates packed together like tattooed sardines. For the families of the disappeared, this adds insult to trauma. But many other voters are happy to see their former tormentors suffer.

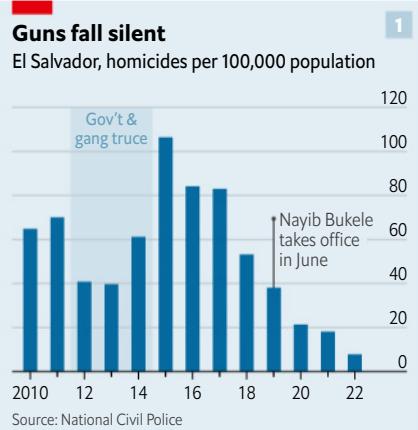
Mr Bukele is a talented showman. His father was a celebrity imam; his family owns an advertising business. He grew up steeped in the art of lively, emotive persuasion, not necessarily tethered to facts. On Twitter, Facebook, TikTok and YouTube he curates his image as the "CEO of El Salvador" and the "Philosopher King". Shunning suits, he turns up to meetings in jeans and a baseball cap. He boasts of sharing a birthday with Simón Bolívar, the liberator of much of South America from Spanish rule.

### Hard cell

When critics accuse Mr Bukele of flouting norms, he revels in his transgressions. For example, his government invests in cryptocurrency. The only public guide to how much it has bought is the president's tweets. Sticklers for transparency complain. Mr Bukele boasts that he buys Bitcoin (with public money) on his phone, while in the toilet. He announces new policies via social media. State outlets amplify his message; paid trolls deride his critics, according to an investigation by Reuters. Amparo Marroquín of the University of Central America in San Salvador reckons that the president needs just 12 hours to have everyone talking about a topic. By contrast it takes the opposition 500 hours.

While dazzling voters with his charm, Mr Bukele has steadily removed checks on his own power. He won over the army and police with lavish benefits. Then he methodically asserted control over all three branches of government, wagering that the public wouldn't mind ceding new powers to a man waging war on crime. In 2020 Congress refused to approve the hefty sums he wanted for his security plan, so he marched into the chamber with soldiers and accused lawmakers of thwarting the people's desire for public safety. In 2021 his party won a super-majority. In June it passed a law to reduce the number of seats in the legislature from 84 to 60 and turn the country's 262 municipalities into 44 districts. Critics say he has tweaked rules to benefit his own party.

When El Salvador's courts tried to restrain Mr Bukele, he first ignored and then gutted them. In 2020 the constitutional court ruled that emergency powers he assumed during the pandemic were illegal. He wielded them anyway. Once he had a majority in Congress, he pushed aside the ►



judges of the constitutional court and the attorney-general, who was investigating Mr Bukele's ministers for embezzling funds, replacing them with yes-men. He forcibly retired a third of the country's judges and replaced them with yes-men, too. The way he did so was unconstitutional, says Antonio Durán, a judge.

Mr Villatoro says the old legal system gave too much weight to criminals' rights, and not enough to those of honest people. Another senior official observes that Mr Bukele's crackdown would not have been possible without "many conditions". Had he not got "rid of these judges...from the constitutional [court] in the past, all this state of exception would have been declared unconstitutional".

### Go straight to jail

The war on gangs offers a handy excuse to intimidate journalists, too. A law passed in 2022 allows ten- to 15-year jail terms for those who transmit or reproduce messages "created or allegedly created" by gangs that could foster "anxiety and panic". Independent media fear this could be used to lock away anyone whose reports annoy the government. Mr Bukele has suggested that certain reporters want his crackdown to fail. Those he singles out for criticism have received torrents of threats. Several reporters have fled from the country.

The next crackdown, Mr Bukele promised in June, will be on corruption. So far, not much has happened, besides the confiscation of an allegedly corrupt former president's property. But the implication is plain. If people can be arrested for white-collar crimes as easily as they can be arrested for gang ties, the middle and upper classes had better watch out. Defying the government, or even refusing to pay bribes demanded by corrupt officials, could become dangerous. "There is no rule of law," says a businessman. "They can take you for anything." He says he wants to leave the country, "even if it means washing plates".

Celia Medrano, a human-rights activist who plans to run on an opposition ticket for the elections in February, frets that Mr Bukele is removing restraints on his power far more quickly than, say, the dictator of nearby Nicaragua did. "What took 20 years [there] is happening here in two years," she laments. "He wants a one-party state," says Ms Escobar. He also appears to be cultivating a family firm. Three of his younger brothers are his closest advisers.

Some critics, from Crisis Group, a think-tank, to Colombia's left-wing president, Gustavo Petro, say Mr Bukele's crackdown is unsustainable. Previous *mano dura* (iron fist) campaigns in Latin America have ultimately failed because they neglected to address the root causes of criminality. Gangsters grow hardened behind bars and cause mayhem when freed.

This is true, but Mr Bukele's crackdown is different. He has locked up much larger numbers of people, on flimsier evidence, and apparently plans to keep them locked up until they are old men. Mr Bukele has built a prison designed to hold more inmates than any other in the world, on 23 hectares of a 140-hectare site in the east of the country. Keeping that many people behind bars costs a lot—perhaps \$1.5bn per year, according to Mr Villatoro. But Mr Bukele is saving money for the state by leaning on families to pay for inmates' upkeep. And in the new mega-prison, inmates will have to grow their own food.

It is possible that Mr Bukele's erratic economic management might derail his project. El Salvador's government debts are an eye-watering 76% of GDP. The president often splashes out on popular things, such as a big pension rise and a hospital for pets. Measures touted as shoring up public finances have sometimes involved sleight of hand. The government blocked the IMF from publishing its most recent staff report on El Salvador, making foreign lenders nervous. But José Luis Magaña, a local economist, says Mr Bukele has such untrammelled control of the public finances that he can keep funding his priorities well beyond the next election.

No country has yet adopted the Bukele formula in its entirety, but several have borrowed parts of it. In November Honduras declared a state of emergency to tackle gangs, and plans to build a prison on an island off the coast. Jamaica also declared one to crush gangs in its capital. In Guatemala a minor presidential candidate, Amílcar Rivera, copied Mr Bukele's backwards baseball cap; a major one, Sandra Torres, vowed to build two mega-prisons.

Backed by the Guatemalan establishment, she faces a run-off against a liberal opponent on August 20th—and the elite may yet block him from running.

The Bukele formula is especially appealing to political insurgents. In Ecuador, which holds a snap presidential election on August 20th, one wildcard candidate is Jan Topic, a self-described former Foreign Legion sniper who rose from obscurity by promising to get tough on gangs. He tours the country in a helicopter to the soundtrack of "Top Gun", wearing a camouflage jacket. Flying over a notoriously violent prison, he told inmates: "The party is over."

He praises Mr Bukele. Asked about allegations of human-rights violations in El Salvador, he responded: "It is possibly true, but I don't know for sure. What I do know is that since Bukele came to power, the number of homicides per 100,000 inhabitants has dropped from 36 to zero." Despite Mr Topic's hyperbole, this is a message many Ecuadoreans want to hear. Polls suggest their biggest worry is crime. The homicide rate more than quadrupled between 2018 and 2022, to 26 per 100,000.

### Security without liberty

In Haiti Ariel Henry, the prime minister, signed an agreement in June for El Salvador to open an office in Port-au-Prince to help the Caribbean country tackle its gang crisis. One government prosecutor has been filmed shooting a gang suspect; he is touted as a potential next president.

A few foreign fans have reconsidered. One young Colombian who moved to El Salvador because he liked the sound of Mr Bukele was arrested on his first day in the country, with a friend who had been there a couple of months, after police found their tattoos suspicious. Their heads were shaved and they were crammed in a cell with 500 other men. Only when the men's families kicked up a fuss in the Colombian press did the Salvadorean authorities let them go. Mr Bukele's media team took them to a restaurant and a nightclub, filming them dancing and then persuading them to tell the camera that they had been held for breaking work-visa rules and it was all fine. The young men waited till they were home before giving the true account.

It is hypothetically possible that Mr Bukele is amassing extraordinary powers only temporarily, and plans to relinquish them when he thinks the gangs have been crushed. But it is hard to think of a leader anywhere who has swept aside term limits to keep himself in office—and then given up power voluntarily.

Asked whether Mr Bukele might run for a (clearly unconstitutional) third term in 2029, a senior official says: "So far there is no way to have a third term." The "world's coolest dictator" may be planning to stick around. And he is only 41. ■





### Political attitudes

## What Latin America thinks

### Young Latin Americans are unusually open to autocrats

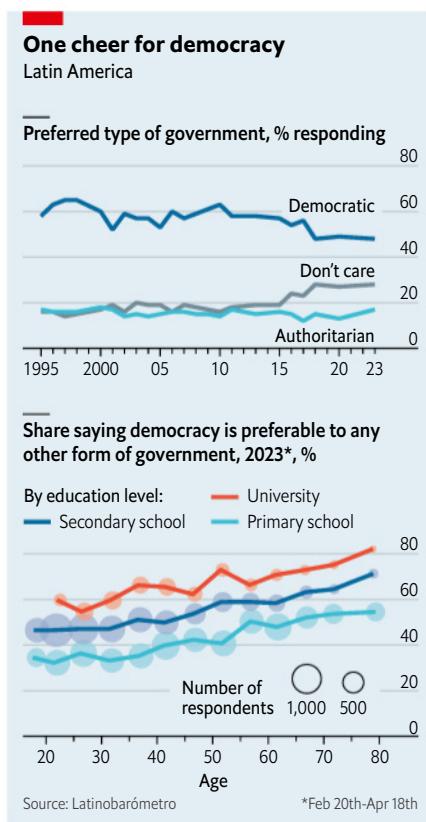
**I**N THE LATEST edition of Latinobarómetro, an international poll in Latin America, respondents were asked to rate their approval of 17 named leaders on a scale of one to ten. In 15 of the 17 countries surveyed, Nayib Bukele, El Salvador's populist, autocratic president, got the highest score—on a list that included Pope Francis and Volodymyr Zelensky, Ukraine's president. Such broad international appeal has raised concern about the durability of liberal democracy in the region. Are Latin Americans outside El Salvador yearning for their own version of Mr Bukele?

First conducted in 1995, Latinobarómetro is a leading source of region-wide data on Latin American public opinion. This year's poll, the first since 2020, was released on July 20th. Perhaps the most heartening result is that support for outright dictators remains scant. The two least-popular leaders in the survey were Nicolás Maduro of Venezuela and Daniel Ortega of Nicaragua, who have both banned political opponents and held power by force for more than a decade. And just 17% of the 19,000 respondents agreed with the statement that “an authoritarian government can sometimes be preferable to a democratic one”, a rate within the historical range of 12-19%.

However, such questions reveal little about elected autocrats like Mr Bukele, who maintain the trappings of democracy while hollowing out its substance. And although this slipperiness makes their political potential hard to gauge using polls, the overall pattern in the new data is that the

region is indeed becoming increasingly fertile territory for such figures.

Two questions in the survey addressed policies often implemented by illiberal leaders. Although 61% of respondents disagreed with the statement that “in case of



difficulties, it is good for the president to control the media”, the 36% who agreed marked a record high. In 2010 just 26% of participants did so. On the question of whether a “government with an iron fist”—a term that usually means heavy-handed security policies that lead to violations of human rights, such as Mr Bukele's mass-incarceration strategy—can “solve our problems”, the liberal side were in the majority by an even slimmer margin. Just 51% agreed with a statement that such a government could not solve problems, whereas 46% disagreed.

Another set of hypothetical questions suggested that the poor approval ratings for Mr Maduro and Mr Ortega might have more to do with their weak performance in areas like the economy and public safety than with their subversion of democracy. The share of respondents agreeing with the statement “I wouldn't mind if a non-democratic government took power, so long as it solved problems” has been rising steadily during the past 20 years, from 45% in 2003 to 51% in 2020. This year, it reached a new high of 54%. Another grim record was the 35% of participants agreeing that “I would support a military government replacing a democratic one if things got difficult.” The previous maximum, in 2020, was 31%.

These regional averages conceal variation between countries. Support for democracy and opposition to authoritarianism is highest in Argentina, Chile and Uruguay, all in southern South America. Conversely, it is lowest in Honduras and Guatemala, El Salvador's Central American neighbours. On a related topic, in Ecuador, Guatemala and Paraguay, outright majorities of respondents said they could support a military government. These three countries are also among the five where participants thought a coup was most likely to occur in the coming years, along with Venezuela, which is already under dictatorship, and Honduras.

Perhaps the most worrisome finding in the poll is the age breakdown of views on democracy. Younger Latin Americans, with no memory of the region's murderous military dictatorships of the 1970s, are the least likely to agree that “democracy is preferable to any other form of government”, whereas support is firmest among the old. Even when comparing people of the same sex and education level in the same country, the share of respondents committed to democracy is around 16 percentage points lower for 20-year-olds than for 75-year-olds. Unless the young of today change their minds as they age, average support for democracy will continue to decline as older generations die off. If Latin America's remaining liberal leaders fail to improve their citizens' lives, democratic backsliding is likely to metastasise into a grim regional trend. ■



Green supply chains

## Asia's battery battlefield

A China-free electric-vehicle boom may well turn out to be impossible

“I'D LIKE TO get all the gas emissions off the highways of the world,” said John Goodenough, one of the Nobel-prize winning scientists who developed the lithium-ion battery four decades ago, during an interview in 2018. Goodenough died on June 25th before his dream could become reality. But governments around the world are scrambling to make it so, with remarkable results. Global sales of electric cars quintupled between 2019 and 2022, surpassing 10m units last year.

Yet the speed of the transformation is running into supply constraints and geopolitical headwinds. The supply of the minerals required to make lithium-ion batteries must grow by a third every year this decade to meet the estimated global demand. Tens of millions of batteries will be needed in America alone to meet its ambition to ensure half of all American vehicle sales involve electric vehicles by 2030. And yet its great rival, China, is by far the biggest processor of battery metals, producer of battery cells and manufacturer of finished batteries.

Even where production is done overseas, Chinese firms dominate the process. American policymakers see that as a threat to the resilience of America's supply chains. All of this makes Goodenough's technology one of the most important industrial battlefields of the new cold war.

The outcome will be determined in Asia, where most battery supply chains are based. The first bottlenecks are in materials production and processing—including two of the most crucial battery materials, lithium and nickel. Capturing a consistent supply of both metals will be crucial for producers globally. Almost half of the lithium produced in 2022 came from Australia, 30% came from Chile and 15% from China. In the case of nickel, Indonesia's produc-

tion amounted to 48% of the global total last year, with the Philippines making up another 10% and Australia 5%.

So far America is pursuing narrow trade agreements with some of those countries in order to gain access to minerals and production capacity, and it is offering enormous subsidies to producers through its Inflation Reduction Act. To benefit from America's \$7,500 credits for new EVs, producers must meet tightening requirements on the share of minerals processed and batteries produced in America or in a country with which America has a free-trade agreement. China is meanwhile building a parallel battery supply chain.

Indonesia's dominance in nickel is itself a potential bottleneck. An estimate last year by PwC, a consultancy, suggests that 2.7m tonnes of the stuff will be needed annually for EVs by 2035. Indonesia currently produces only 1.6m tonnes, most of which is used for stainless steel. A huge amount of capacity to mine and process the metal is being planned, or under construction. The processing may be the most difficult segment of the supply chain to make China-free. By one estimate, China smelts and processes about three-quarters of the world's nickel. It also has about two-thirds of the capacity for lithium processing. Even those figures underestimate Chinese heft, because a lot of processing outside China involves Chinese companies.

The three operational plants in Indonesia use high-pressure acid leaching, an ad-►

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vanced process that extracts nickel from its ore without melting it. All are based on Chinese technology, operational prowess, or both. To secure supplies of nickel, Ford, an American carmaker, formed a venture with a Chinese mining company, Huayou Cobalt, to invest in an Indonesian nickel-processing plant. The Chinese firm hailed the partnership for its contribution to China's Belt and Road Initiative, a sentiment unlikely to have been popular in Washington. Ford is already facing political heat at home over a different venture with a Chinese firm: a new plant in Michigan, manufacturing both nickel-based and lithium-based batteries, for which it has joined forces with a Chinese battery giant, Contemporary Amperex Technology Co. Limited (CATL). The Chinese firm makes more than a third of the world's electric-vehicle batteries, measured by their total capacity.

The overwhelming presence of Chinese firms is not just a result of their impressive industrial expertise. It also reflects their ability to move quickly and take risks, according to mining executives and experts. The comparatively small number of Western companies working in mining and nickel processing spend more time conducting preparatory studies and work. Sumitomo Metal Mining, a Japanese minerals firm, withdrew from a nickel-processing project last year, citing disagreements with its partner, PT Vale Indonesia, another resources firm. The feasibility study into the project had been going on since 2012.

Chinese firms also dominate the production of battery parts. Among the components for battery cells, China accounts for at least half of production and more than 70% in some categories. The rest of the industry is concentrated in South Korea and Japan. Between them, the three East Asian countries make up between 92% and 100% of the mid-stream parts of the industry. Even if America secures enough processed minerals, meeting its goals will require a massive deployment of Korean and Japanese battery-manufacturing know-how into North America.

### Highly charged

Electric-car sales, m



LG Energy Solution, based in South Korea, is the second-largest battery manufacturer after CATL. The company is expanding in America, with joint ventures under way with Hyundai, Honda and General Motors. LG aims to produce 278 gigawatt-hours (Gwh) worth of storage capacity in North America by 2030, up from just 13Gwh in 2022. That may be too optimistic. Kim Myung Hwan, the company's chief procurement officer, notes that the rising cost of construction, shortages of skilled personnel and volatility in the price of the materials needed for batteries are all barriers to rapid growth.

Some Asian manufacturers worry that the cost of overseas production could be prohibitively high for years. "It's much more important to think of how we make the business profitable for 10, 15, 20 years," says Hideo Ouchi, director of w-Scope, a Japanese company that manufactures separators used in battery cells. Mr Ouchi estimates that to meet its goals on electric vehicles by 2030, America alone will need as much battery-separator material as was manufactured globally in 2021.

Government policy represents another uncertainty—especially as many Asian battery manufacturers are counting on decades' worth of financial support. Last month America's United Auto Workers union criticised the Biden administration for failing to attach strict labour-rights conditions to a loan of up to \$9.2bn to Ford and SK ON, a Korean battery-maker, for a new plant in Michigan. Future Republican administrations might reduce or simply scrap the current EV targets.

This amounts to a sobering picture. Expanding the battery supply chain to match the enormous global demand for electric vehicles represents one of the greatest industrial challenges ever attempted. Even the current order of bottlenecks in the industry will make it difficult. Pulling it off—for the good of the climate, human health and much else—without the country that, by most measures, dominates the battery industry may very well be impossible. ■

### Singapore and food security

## Bloodless revolution

SINGAPORE

### The home of cultivated meat

THE ISLAND-STATE's long history as a maritime trading hub, bringing together Chinese, European, Indian and Malay migrants, has given Singapore a rich culinary culture. It got even more diverse in December 2020 when the country became the first to grant regulatory approval for the commercial sale of meat produced in a lab from cultivated animal cells.

Concerns about food security underlie Singapore's push into alternative proteins. A country half the size of London, which makes only 1% of its land available for food production, Singapore imports over 90% of its food. To protect itself from a volatile food supply chain, disruption by unpredictable neighbours, inflation, pandemics and war, the government aims to produce 30% of the country's food by 2030.

It is encouraging experimentation with cultivated animal cells, meat, dairy and eggs made from plants, and food made from microbial or gas fermentation. Annual private funding for Singapore-based alternative-protein companies doubled to \$170m in 2022, according to the Good Food Institute APAC, an NGO that promotes alternatives to animal products.

A common challenge for alternative-protein startups is that they need to spend a lot of their initial investment on new equipment. This means they can struggle to become profitable without heavy capital outlays. The government has therefore invested in relevant infrastructure such as innovation centres that help startups develop their products and raise capital. Nuras, an alternative protein service provider backed by Temasek, a Singaporean sovereign wealth fund, helps startups minimise the risk of buying expensive equipment by renting out labs and kitchens that replicate a restaurant environment. This allows firms to test their product and business model before purchasing their own equipment, says Jolene Lum, its head of business development.

Singapore has also become the global launch-pad for foods made through precision fermentation, notes Mirte Gosker of the Good Food Institute APAC. Solar Foods is a Finnish startup that uses gas fermentation to feed microbes with hydrogen and carbon dioxide. It turns the resultant liquid into a powder, known as Solein, which is nutritionally similar to dried meat. In June the firm launched the world's first Solein chocolate gelato in Singapore. ►

► Very Dairy, an animal-free milk brand of a firm based in California, first launched in Singapore in 2022. The milk is biologically identical to conventional milk proteins but made from microbes instead of cows. That may be good for the climate, since farmed cattle produce a lot of methane, a powerful greenhouse gas (see Business section). Greenhouse-gas emissions from animal-based foods are estimated to account for around a fifth of man-made climate change.

Singapore has encouraged the industry by offering a clear regulatory framework and an efficient approval process. Solar Foods has been waiting for two years for regulatory approval in the European Union, says the company's CEO, Pasi Vainikka. The EU has yet to approve any cultivated meat products for sale. By contrast, Solein was granted approval in Singapore within a year. This fast and transparent process

means that many products appear in Singapore first, which is "a huge gift for the whole world because Singapore shows what is possible", says Mr Vainikka.

Whether those products can be taken to scale remains unclear. Even in Singapore the alternative-proteins industry faces high production costs and other burdens. The only cultivated-meat company to have received approval in Singapore is Good Meat, an American firm. It sells less than 2,300kg a year of its cultivated chicken. For context, global meat production is forecast to grow to over 360m tonnes this year. ■

Last month America became the second country to approve the production and sale of cultivated meat. Two companies, Good Meat and Upside Food, have already got the go-ahead to sell cell-cultivated chicken there. America's vast consumer market and cutting-edge technology could be about to threaten Singapore's early lead. ■

skimpy pretexts. Otto Warmbier, a college student from Ohio, was arrested in 2016 for allegedly stealing a propaganda poster. He was sentenced to 15 years in prison with hard labour, suffered a serious brain injury soon after, and died after he was permitted to return to America in 2017. Jeffrey Fowle, another Ohioan, was arrested in 2014 and convicted of proselytising (a crime in North Korea) after he deliberately left a Bible containing his contact details in a bar toilet. He was imprisoned for six months before being permitted to leave.

The handful of Americans who have deliberately defected have sometimes been treated better. Another ne'er-do-well soldier, James "Comrade Joe" Dresnok, was originally viewed with suspicion in the North after he fled there across a minefield in 1962, in order to dodge a court martial. Yet he ended up becoming a minor celebrity by playing evil American imperialists in propaganda films. He was popularly known as "Arthur" after one of his most famous characters—an American army officer called "Arthur Cockstud" in a TV series called "Unknown Heroes", about the struggles of a North Korean spy in Seoul.

More recent American defectors have fared less well, however. Matthew Miller, a 26-year-old Californian visitor to Pyongyang, was arrested in 2014 for espionage and sentenced to six years' hard labour after he tore up his tourist visa and declared he wanted to claim political asylum. He was released, eight months later, after James Clapper, then America's director of national intelligence, went to North Korea to spring him and another American.

Mr King's best hope may be the treatment meted out to Arturo Martinez, a mentally ill Texan, who allegedly entered North Korea from China by swimming the Yalu river in 2014. After declaring his desire to defect, Mr Martinez was unveiled by the North Koreans at a crowded press confer-

#### Americans in North Korea

## There's always one

SEOUL

**An American soldier has deserted to North Korea. He may already regret it**

THE PREVIOUS time someone crossed the border between the two Koreas at the Joint Security Area (jsa), an enclave along their heavily armed frontier, he did so through a hail of bullets. Oh Chong-song, a North Korean soldier, was shot and wounded five times by his comrades in 2017 as he sprinted into South Korea. A crossing this week was less dramatic but more surprising. On July 18th Travis King, an American soldier of the 1st Armoured Division, ran over to the North while on a group tour of the jsa.

Like many defectors to Kim Jong Un's prison-state, Mr King has a troubled past. He recently spent almost two months in a South Korean prison for assault. After his release, he was returned to America's armed forces in South Korea to be sent back to America to face possible additional punishment. He was escorted to Incheon airport, outside Seoul. He then went missing, appearing next at the jsa, 48km (30 miles) north of South Korea's capital.

Also known as Panmunjom, the enclave was carved out of the front line as part of the armistice that paused the Korean war in 1953—70 years ago next week. Consisting of a huddle of buildings, the jsa is the only direct point of contact between the two Koreas along their 240km frontier, and a popular tourist destination in the South. According to an American official who spoke to the *New York Times* and other reports, Mr

King was on a guided tour of the enclave when he gave a sudden hoot of laughter and ran at top speed towards the border. Tour guides chased after him in vain. He was last seen being taken into custody by North Korean soldiers.

America's defence secretary, Lloyd Austin, confirmed that Mr King had crossed into the North "wilfully and without authorisation". The soldier's reason for doing so is unclear, as are his prospects. North Korea loves detaining Americans, often on



The workers' paradise—Private King's whereabouts

ence in Pyongyang. After making some perfectly reasonable criticisms of the American justice system, he began spouting deranged conspiracy theories. He accused America of using UFOs and “weaponised satellite Octocopters” to carry out mass mind control and drug-running. Mr Martinez was quietly allowed to leave North Korea shortly afterwards.

Yet Mr King's status as a serving and apparently sane American soldier may make him a richer prize. When the North Koreans feel like talking to America, prisoner releases can help get them face time with

senior Americans. Jimmy Carter and Bill Clinton both flew to Pyongyang after their presidencies to secure the release of American hostages. Three more were released to Mike Pompeo, the then secretary of state, in 2018, as part of negotiations that led to a meeting between Donald Trump and Mr Kim later that year. Whether Mr King could be another bargaining chip will depend, however, on whether North Korea is interested in talking to America.

There is scant sign it is. On July 19th North Korea fired two ballistic missiles into the sea, apparently to protest against

the arrival in South Korea of an American submarine carrying ballistic missiles. Western officials also claim to have observed preparations for a possible North Korean nuclear test, its first since 2017.

On July 17th Mr Kim's sister, Kim Yo Jong, rejected America's oft-repeated offer of a “dialogue without preconditions” towards denuclearising the Korean peninsula. She compared American officials' parroting of the phrase to an “answering machine”. This is bad news for South Korea and the world. And perhaps also for the sprinting Mr King. ■

## Banyan Why are West Bengali politics so violent?

*The political stakes are even higher in the eastern state than elsewhere in India*

LAST MONTH police in the east Indian state of West Bengal took 11,000 people into “preventive detention”. They confiscated more than 20,000 licensed weapons, along with piles of ammunition and explosives. The election commission asked the central government in Delhi to deploy 80,000 paramilitary troops across India's fourth-biggest state, home to more than 100m people.

The purpose was not to fight an insurgency. It was to prepare for local elections in the sweltering Bengali countryside, which typically see eye-watering levels of violence. Despite the measures, bloodshed ensued. Some 50 people have been killed in clashes involving rival party activists since the announcement of the polls in June, with many killed on or after polling day. The violence was so disruptive the vote had to be re-run in some places. It eventually produced a landslide victory for the Trinamool Congress, a regional party led by West Bengal's charismatic chief minister, Mamata Banerjee, whose activists accounted for many of the dead.

Even by Indian democracy's rough-house standards, West Bengal stands out. According to the Armed Conflict Location and Event Data Project, an NGO based in America, the state recorded 3,338 incidents of political violence, including political murders, between 2016 and July 2023, the highest number of any state except militancy-riven Jammu and Kashmir. This is despite the fact that West Bengal's underlying crime rate is not especially high. It is much lower than in the vast and lawless nearby states of Bihar and Uttar Pradesh.

What explains such extreme political violence in one of India's most important and culturally rich states? Non-Bengali Indians might attribute it to Bengalis'

stereotypical penchant for politicking and quarrelling, a counterpart to their equally fabled love of intellectualising. (The region has produced many of India's greatest artists, including Rabindranath Tagore and Satyajit Ray.) “Two Bengalis is an argument, three is a political party, four is a riot,” goes an old joke. A look at next-door Bangladesh, whose mostly-Bengali population was joined to West Bengal's until 1947, suggests there might be something to this. It is a similar case. Hundreds of Bangladeshis are killed and thousands injured in political brawls each year.

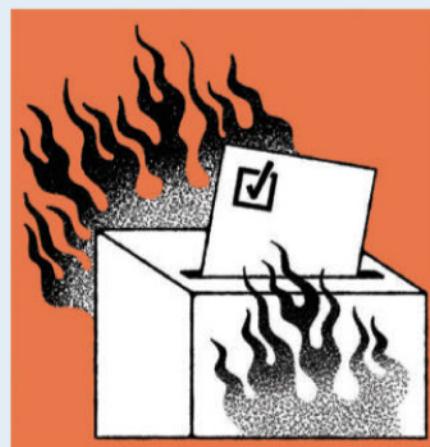
This points to a deep historical explanation for the bloodletting. Bengalis had a reputation for revolutionary agitation dating back at least to armed resistance against the British Empire, which had its capital in Kolkata (then known as Calcutta) until 1911. The violence then continued seamlessly into the post-independence era in the form of peasant uprisings and leftist insurrections. Yet even if Bengalis' history initiated their violent politics, it is being sustained by contemporary factors.

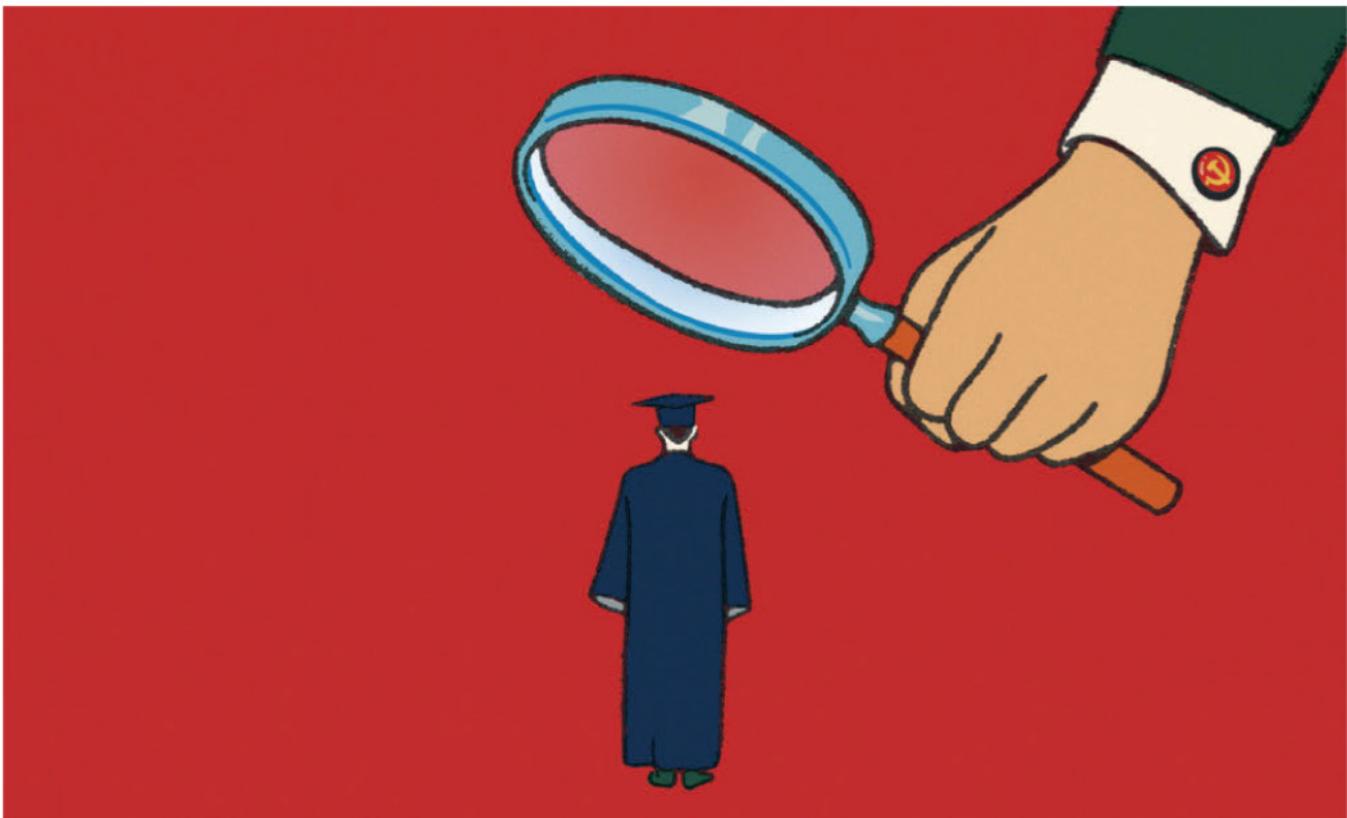
One is the importance of Bengali poli-

tics as a form of social organisation, says Dwaipayan Bhattacharyya of Jawaharlal Nehru University in Delhi. The entrenchment of communist rule in the state in the 1970s pushed alternative forms of sorting, including religion and Hindu caste, to the margins. The Bengali countryside became so politicised it was as hard to marry across the political divide there as it was to marry across caste lines elsewhere in India. In a patronage-based political system, zero-sum politics of this kind is played for high stakes—often the difference between poverty and relative prosperity. Local political leaders can thereby summon mobs of foot-soldiers to fight to the death against their rivals' goons. And they do.

This murderous system is further enforced by the way political and economic power is distributed in West Bengal. It is one of only two Indian states (the other is communist-run Kerala) to have devolved significant power to the village-level administrative units, or panchayats, that Bengalis voted in this month. Devolution is supposed to bring decision-making close to home. In West Bengal it also brought the violence close, creating local political economies in which access to government jobs and other local resources are contested both at the ballot and in the streets.

The violence is now starting to erode the democratic system that helped create it. Gangsterish local satraps increasingly defy their party leaders. Violence within parties is therefore becoming almost as common as violence between them. No wonder the bloodletting is impossible to police. Mitigating it would be hard even if the state's two main parties, Trinamool Congress and its communist rival, made a serious commitment to ending the violence. So far, neither has.





### Foreign universities in China

## A for effort, Xi for control

**Amid growing tension between China and the West, academic joint ventures still abound. Can they survive?**

FILING INTO a graduation ceremony to the strains of Edward Elgar's "Pomp and Circumstance March No. 1" is quintessentially American. As they did so in May, clad in violet-coloured gowns, students at the campus in Shanghai of New York University (NYU) may have reflected on the oddity of this cultural transplant: not just the music, but their whole experience as undergraduates. Relations between China and the West—especially America—are becoming increasingly tense. China is trying to purge its universities of liberal thinking. Yet here were nearly 400 students, about half of them Chinese, getting their bachelor's certificates from a Chinese outpost of American academe.

Since Xi Jinping took over as China's leader in 2012, he has tightened controls over university education. Several liberal scholars have been dismissed. Lecturers have been ordered to stop using imported textbooks that are deemed to promote Western values. Universities have been told to become "strongholds of the Com-

munist Party's leadership". Under Mr Xi, few students have dared to stage protests. But in November small demonstrations broke out in several cities, and on many campuses, over harsh covid-related lockdowns. Pro-government commentators accused "foreign forces" of stirring the unrest. It has surely made the party even more wary of Western influences.

But ventures such as NYU's in Shanghai seem a world apart. Some are even expanding. This year NYU's campus in the city's financial district, Pudong, moved to a glitzy new nine-storey building designed by Kohn Pedersen Fox, a New York-based firm that also drew the blueprints for Pudong's

most iconic skyscraper, the Shanghai World Financial Centre. It has twice as much classroom space as NYU Shanghai's previous location. In August Duke Kunshan University (DKU) in Kunshan, a city near Shanghai, is also due to move to new premises. The joint-venture campus—involving Duke University in North Carolina, Wuhan University and Kunshan's government—will cover more than 33 hectares, twice as large as the current one. In Suzhou, a nearby city, Xi'an Jiaotong-Liverpool University has 23,000 students, making it China's largest academic joint venture. Last year it opened an additional campus, with room for 10,000.

NYU Shanghai and DKU were founded around the start of Mr Xi's rule, and Liverpool's venture seven years earlier (following the pioneer in this field, the University of Nottingham, which launched a campus in the city of Ningbo in 2004). But even as Mr Xi grew increasingly anti-Western, more such ventures were introduced, albeit on a smaller scale. In all, well over half of China's more than 1,230 universities have co-operative projects with foreign or Hong Kong counterparts. Over the past decade, the number of such schemes—most of them involving universities from English-speaking countries—has increased by a third. They range from ten full-blown universities to a plethora of smaller ventures such as joint departments or institutes inside Chinese campuses.

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► One of China's aims is to boost the quality of its universities by helping them learn how foreigners run such institutions. Another is to help local governments fulfil their economic ambitions. It is no accident that several of the biggest ventures are located in Shanghai and cities nearby. Shanghai is the country's financial centre; its hinterland is a base of high-tech manufacturing. Officials hope that foreign universities will attract talent for such industries.

Compared with enrolment in the rest of China's university system, the number of students in foreign-run programmes is small: fewer than 600,000, according to state media, or less than 2% of the total number of students in China. But that does not stop the party from worrying. Even though most of the joint ventures' students focus on subjects such as science and business that are unlikely to touch on politically sensitive topics, officials are nervous that foreign professors and their textbooks might spread heretical views.

In 2017 the central authorities issued a classified directive on "party building" in foreign-run academic programmes. It said the venture's party chief (the Chinese partner always has one) should sit on the governing board. This was often the case already. At DKU, however, the party secretary did not have a voting right. Allowing her to vote could have changed the balance between the American and Chinese representatives, says Denis Simon, who was then DKU's executive vice-chancellor. It would have required rewriting the joint-venture agreement, he says. The Americans were not keen to do so. That issue "was never fully resolved".

But the party is getting twitchy. In 2020 Chongqing University of Education (which has numerous foreign partnerships) published its own guidelines for implementing the central government's directive. They clearly reflected the mood in Beijing. The university instructed that Chinese teachers and students in joint-venture arrangements should "consciously resist corrosion by all kinds of erroneous Western thoughts and decadent ideas". Social media such as WeChat should be used to help "manage" student party members during their periods of study abroad, it said. Party branches should "keep abreast of the thinking of students and teachers" and use "supervisors" to monitor classes.

There have been ominous remarks, too, by Chinese staff in joint ventures. In 2021 a party official at the University of Liverpool's wrote that party committees should make sure no one with "ideological problems" is appointed to faculty. They should "resolutely stop the spread of erroneous thinking". The party chief of Nottingham Ningbo, in an interview that year with state media, said: "If the school makes mistakes on important issues such as ideology, then

there is no value in the school's existence, and it needs to be closed." In 2018 Stephen Morgan, then a professor at Nottingham Ningbo (now retired), says he was pressed to step down from its board. He blames the party: he had written an online article critical of Mr Xi. "A lot of the party people would not even look at me or say hello to me for at least a year," he says.

The vice-chancellor of NYU Shanghai, Jeffrey Lehman, remains stoical. "Within our academic community, academic freedom has been fully honoured," he says. "Academic freedom was the clear understanding from the very beginning. And if the Chinese government is ever no longer comfortable with that, we can shut down." Responding to the party official's remarks, the University of Liverpool said it was "absolutely committed to academic independence" and the joint venture had "freedom of speech enshrined in its core values".

For all its fretting, China shows no sign of wanting to chase away prestigious university brands that have already established a high-profile presence. But Mr Morgan believes that no new ventures involving humanities or social sciences are likely to be approved. In March the government said that on Hainan, an island province, foreign universities specialising in such areas as engineering and medicine could set up campuses on their own—unlike existing ventures, which must have a Chinese partner. A party secretary, however, will still be required on their boards. ■

## China and Germany

# The wind of change

**Germany adopts a tougher strategy for dealings with China**

THREE YEARS ago, Angela Merkel, then Germany's chancellor, said it was important to have a "relationship of trust" with China. On July 13th the government that succeeded her published a long-awaited paper laying out how it plans to handle those ties. It did not echo Mrs Merkel's belief. "China has changed," it said, adding: "As a result of this and China's political decisions, we need to change our approach to China." Governments across Europe have long been saying much the same. But for Germany to set out a detailed case for China-scepticism was striking.

After Mrs Merkel handed over the chancellery to Olaf Scholz in December 2021, Germany's new ruling coalition promised a rethink of the country's China strategy. Drafting a document setting out the fresh approach—the first paper of its kind produced by Germany—was a tortuous effort. There were differences to reconcile between the views of Mr Scholz, whose instincts on China are redolent of Mrs Merkel's with their emphasis on business interests, and those of the foreign and eco-►

## The disappearing data



China, % of national population aged 65 and over, 2021



## A clue to China's true covid-19 death toll

On July 13th the authorities in Zhejiang, a rich coastal province, released what they probably thought was innocuous data about cremations in the first quarter of 2023. Around 171,000 took place during that time, up by 73% compared with the same period last year. The jump was undoubtedly caused by a wave of covid-19; the central government lifted all covid controls in December 2022. Just under 5% of China's population aged 65 or older lives in Zhejiang. If one assumes that its share of covid deaths is similar (the disease mainly kills the old), a simple extrapolation suggests that there were 1.6m excess deaths across China in the first quarter, which is roughly in line with our modelled estimate of the country's covid death toll. The central government, though, has acknowledged fewer than 84,000 deaths from covid on the mainland since early December. The data from Zhejiang was quickly removed from the internet.

nomic ministries, which are led by more hawkish members of his three-party coalition. There were also the views of the European Union and America, among others, to take into account.

During the drafting, many questions were raised about how much of a change was under way. Last October Mr Scholz pushed through the sale of a stake in one of Hamburg's port terminals to a Chinese state-owned firm: a smaller share than had been proposed, and with no voting rights for the Chinese side, but still controversial among the hawks. When Mr Scholz paid a visit to Beijing in November, the first by a Western leader since the start of the covid-19 pandemic, he took a big delegation of businesspeople, including 12 CEOs of German blue-chip firms. In June he rolled out the red carpet for Li Qiang, China's new prime minister, acquiescing to Chinese demands that there be no questions at a joint press conference.

But the strategy paper confirmed a shift. It did not talk of hope of "Wandel durch Handel" (change through trade), once a motto of the Merkel era. "De-risking is urgently needed," the document said, using the now standard language of EU and American officials when referring to the dangers of over-reliance on economic ties with China. It echoed the EU's labelling of China as a "systemic rival" and said China's friendly relations with Russia had "direct security implications for Germany". It warned that military escalation by China in the Taiwan Strait would "affect German and European interests". The paper promised that Germany would co-ordinate "more closely" with its partners in the EU on China matters. It did mention a relationship of trust: with America. Andrew Small of the German Marshall Fund of the United States, a research centre, calls the language "markedly different from where we were with Merkel and the way she was willing to frame things".

### Business decisions

Mr Small says that, though large German firms have expressed support for the strategy, "they haven't jumped in to embrace it". They have much at stake. According to the Rhodium Group, a research firm, Germany's three big carmakers—BMW, Daimler and Volkswagen—plus BASF, a chemicals giant, accounted for more than one-third of all European direct investment in China between 2018 and 2021. But the paper is softer than a version that was leaked in November: no more talk of "stress tests" of German companies that are heavily involved in China, or making them "specify and summarise relevant China-related developments". De-risking, it appears, will be up to businesses themselves. Some of them may not share the government's sense of urgency. ■



The media

## What would the party say?

BEIJING

### How China trains its journalists to report "correctly"

SOME YEARS ago China's leader, Xi Jinping, issued instructions to the reporters working for state-run newspapers and television stations. He demanded "critical reports with accurate facts and objective analysis". But he also told the journalists that they must "love and protect the Communist Party". He did not explain what they should do if one instruction conflicted with the other.

A new educational app for China's journalists, introduced on June 30th, makes it clear that the party comes first. One hour-long tutorial is titled "Ensure that the politicians run the papers, the magazines, the TV stations and the news websites". Another talks about how to "correctly guide public opinion". "It's like a drumbeat," says David Bandurski of the China Media Project, a research programme in America. "They want to remind them that the party is in control."

China locks up more journalists than any other country. But the training app is one of many softer forms of coercion. Since 2014 all reporters have had to pass an exam to get a press card. It tests knowledge of the trade—and of the party's ideology. One former journalist failed the exam on her first try because she forgot the meaning of "the four great things", one of Mr Xi's impenetrable nationalist slogans. She had read his speeches beforehand. "But he's made a lot! I just wrote four things at random," she says. (Two were right.)

Before Mr Xi took power in 2012, journalists were more probing. Some investigated corruption, pollution or

oppressed groups, such as migrant workers. In 2008 candid reports about a devastating earthquake in the south-western province of Sichuan laid bare the failings of local officials. Some of this spirit lives on in commercially run publications such as *Caijing*, a magazine that focuses on business and economics (less politically sensitive topics).

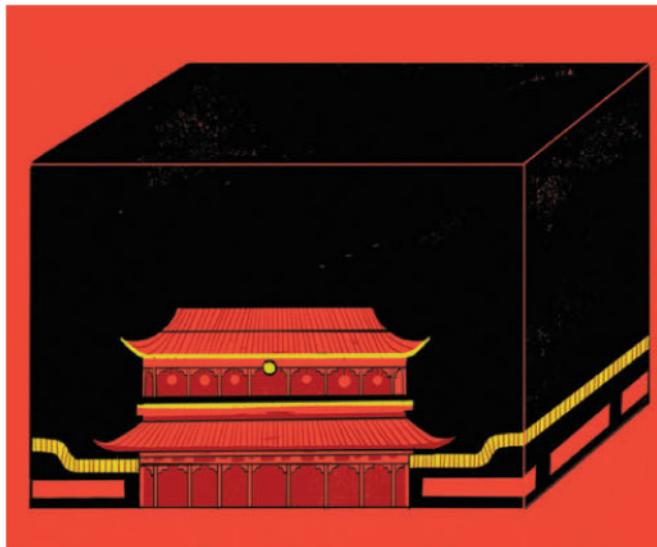
A journalist for state media insists that he and his colleagues are still "revealing the truth". He cites recent reports about a furore involving a college canteen in southern China that served rat head in a meal (the authorities had claimed it was duck neck). Also, among the winners of China's national journalism awards last year was an investigative piece on the illegal trade in rich black soil in northern China.

But when the All-China Journalists Association, which is overseen by the party, handed out that award, it noted that Mr Xi had once expressed great concern over protecting northern China's soil. Most of the other winners were puff pieces about the party. One was titled "Without the Communist Party there is no happy life for China's people".

A number of frustrated reporters have left their jobs. In late June a heated debate erupted on Chinese social media over whether it was still worth studying journalism at university. Many argued that it was not. Critics of the industry lamented state media's relentless pro-government positivity. Journalism degrees, said one commenter, "only teach you one thing: to be obedient."

# Chaguan | China's missing foreign minister

*Official silence about Qin Gang's whereabouts speaks volumes about Xi Jinping's China*



AT SOME POINT the ill-explained, weeks-long disappearance of China's foreign minister, Qin Gang, will come to an end. Quite possibly Mr Qin—a suavely confident diplomat of the iron-fist and velvet-glove type, rocket-propelled to high office by a spell as an aide to President Xi Jinping—will quietly resume his duties, just as suddenly as he stopped work after a day of meetings on June 25th. Perhaps he will explain the undefined health issues that remain the only official reason for his absence. Still, it cannot be excluded that Mr Qin's career path is about to take a grimmer turn. That would vindicate Beijing's elite gossip mill, which is currently seething with ever-wilder theories about Mr Qin, some of them worthy of a bad romantic novel or spy thriller.

However this episode ends, it is a reminder that China's capital, for all its Tesla showrooms and Apple stores and outward marks of globalised modernity, remains a tough place. It is a city of secrets and rumours. Grandees do sometimes vanish, before reappearing to face charges of corruption, immorality or dissent. In an age when other countries' leaders drop indiscretions on social media or in interviews, China's ruling classes heed codes of silence that would be familiar to Communist Party cadres of the 1950s. As Beijing is pounded by a heatwave, Chinese elites and foreign ambassadors huddle in embassy gardens and drawing rooms to exchange theories about Mr Qin. Diplomats compare notes about when the foreign minister's meetings first began to be cancelled, and how far ahead, looking for evidence of a sudden, severe health crisis. Analysts scour China's tightly policed internet for signs of censors deleting comments about Mr Qin, or about an alleged friend with a boastful, indiscreet presence on social media. According to the brutal rules of Chinese politics, it would be a bad sign if Mr Qin were becoming a non-person. But a lack of censorship might also signal that powerful allies are deserting him.

Even with the mystery unresolved, a few lessons may be drawn about how power is wielded in China. Some are simple. If Mr Qin really is unwell, a formal statement about his health would help calm the rumour mills. But physical infirmity is a political taboo. This goes beyond a preference for privacy. Leaders are expected to be vigorous. Any sign of frailty is risky: party gatherings are a sea of dyed black hair. While China's strict zero-covid rules were in

force, no senior official admitted to catching the virus.

Other lessons about Chinese power are less simple. Take Mr Qin's job as foreign minister. That is one reason why his disappearance matters, but not the most significant. Chinese job titles map poorly onto those used elsewhere. Foreign ministers are outranked by the head of the party's Foreign Affairs Commission: a post held by Wang Yi, who is China's top diplomat. More importantly, when Chinese insiders assess an office-holder's clout, they look at not just that one individual but all his or her patrons and allies and even family members, as if connections can be glimpsed like a spectral halo of influence. In Mr Qin's case, his absence is a big deal because he is seen as Mr Xi's protégé. Provoking envy as he rose, Mr Qin was fast-tracked to ministerial rank and into the party's central committee in 2022, not long after being made a vice-foreign minister and ambassador to Washington. In Beijing, that ascension is linked to Mr Qin's stint as head of diplomatic protocol from 2014 to 2017, which involved lots of contact with Mr Xi.

As a result, Mr Qin's rapid rise should offer clues about Mr Xi's worldview, or at least about the sort of diplomacy that he values. The foreign minister is sometimes called a "wolf warrior", but that is misleading. Some Chinese diplomats deserve that tag, which comes from a jingoistic Chinese action film. Truly wolfish envoys are often crudely anti-Western. They repeat conspiracy theories about alleged American misdeeds, harvested from shady corners of the internet or from Russian disinformation agencies.

## A West-scoring warrior, but not a wolf

Mr Qin is a more sophisticated warrior, capable of charm and pragmatism when the national interest calls. As the protocol chief charged with delivering a successful state visit by President Donald Trump to Beijing in November 2017, Mr Qin cleared away red tape and de-escalated crises, including, it is said, a brief physical altercation between the White House's then chief of staff, John Kelly, and a Chinese security official. Yet Mr Qin has a talent for menace, too. He showed it in March 2021, when the European Union's ambassador was called in for a midnight dressing-down over EU sanctions relating to repression in Xinjiang. When the EU envoy resisted that late-night summons to the foreign ministry, he was warned to think of the consequences for his delegation, and by implication for the safety of his Chinese staff, diplomats relate. During the meeting, Mr Qin harked back to China's last imperial dynasty and specifically 1900, when eight foreign powers invaded Beijing to crush an uprising by anti-foreign fanatics, the Boxers. His message was that today's China would not be bullied in the same way that a Qing dynasty diplomat, Li Hongzhang, was by foreign governments seeking reparations. I am not Li Hongzhang and you are not the eight powers, Mr Qin told the EU ambassador. More substantively, European governments blame Mr Qin for recommending sweeping, disproportionate counter-sanctions that continue to blight EU-China relations.

In encounters with foreigners, Mr Qin shows deep knowledge of the Western world, gained during several postings abroad. That familiarity appears to co-exist with disdain for a West seen as declining, arrogant and hypocritical. Indeed, some claim that Mr Qin reserves a special scorn for Western reporters, dating back to his first job out of university, as a government-supplied researcher for an American news agency in Beijing. Still, his absence is a source of regret on the capital's diplomatic circuit. In Mr Xi's China, the black box of elite politics is only getting more opaque. When clever, candid officials vanish, they are missed. ■



## Gas and renewables

# Africa's enormous energy opportunity

DAKAR AND WINDHOEK

**Gas finds and renewable potential mean the continent is poised to become a much big player on the global energy stage**

ENERGY MARKETS are being rocked by an unprecedented double whammy. Since Russia's invasion of Ukraine last year, Europe has cut energy imports from Russia, the world's second-largest producer of natural gas and third-largest oil producer. Prices of both shot up before falling back, but anxiety over energy security persists. Meanwhile climate change is prompting a deep but uncertain shift away from fossil fuels such as oil and eventually gas. Politicians and industrialists in Europe worry about keeping homes warm and factories humming in the face of these challenges.

Africa may be the answer to Europe's immediate gas problem and its longer-term carbon one. It has 13% of global gas reserves, only a touch less than the Middle East, and 7% of the world's oil, as well as vast green-energy potential. African energy could "become really central for the future for Europe—and not just for Europe", says Claudio Descalzi, the CEO of Eni, the Italian oil major. "They have a lot—a lot—of gas, they have sun, wind...[that is] perfect for our energy transition."

This talk is not hot air. International en-

ergy firms including Eni are dusting off or drawing up new plans to produce liquefied natural gas (LNG) across the continent. Among these are moves to restart two huge LNG projects that had been shelved, including a \$30bn-40bn one in Tanzania and another worth \$20bn in Mozambique.

This activity marks a sharp change in the prevailing mood over the past few decades, when Africa had dwindled in importance for energy markets. A continent that once provided a fifth of the world's internationally traded LNG now provides half that share. Its shares of global oil and coal production have also fallen as investors in oil, in particular, have been put off by deteriorating security in Nigeria, usually the continent's biggest producer.

Higher prices, increased European demand as the EU diversifies away from Russia and a switch from coal to gas, a cleaner

fuel, are driving the change. And the swing is swift. Mozambique shipped its first LNG in November and may soon export vastly more. TotalEnergies, a French oil major, could soon restart building a giant LNG project in Mozambique that it halted in 2021 because of a jihadist insurgency. Patrick Pouyanné, the CEO of TotalEnergies, tells *The Economist* that the project is almost back on track, so should be producing gas by 2028. Improved security could also boost the prospects of an even larger LNG project nearby that is proposed by ExxonMobil, the largest Western oil major, Eni and China National Petroleum Corporation. Across the nearby border in Tanzania, Shell and Equinor, two European energy companies, are resuscitating their proposed LNG project worth \$30bn-40bn.

Elsewhere an LNG project in Senegal and Mauritania is expected to start producing this year and the prospects of its second phase look promising. In Nigeria, Africa's biggest LNG exporter, production capacity should rise by about 35% by 2026.

In all, new gas projects in sub-Saharan Africa could add some 90 billion cubic metres (bcm) in annual LNG capacity by 2030, reckons Akos Losz of Columbia University. To be sure, only about a fifth of this capacity is already under construction or not on hold for security reasons, and some projects may yet fail.

Yet energy firms seem determined to press ahead. New projects in north Africa, where Eni has just signed an \$8bn deal to develop two Libyan fields, could supply an ➤

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► additional 30 bcm of gas by 2030, reckons Mr Losz. Rystad Energy, a research firm, sees similar potential (see chart on next page). If all go ahead, the 120 bcm added to Africa's current output would raise its share of global gas production to 8.5% from 6% today, even taking into account massive increases expected in Qatar. That much additional production in Africa alone would more than offset the 70 bcm fall in Russian gas exports to the EU between 2021 and 2022.

In the longer run Africa seems set to play an even bigger role in global energy markets. The Gas Exporting Countries Forum, a global club, expects Africa to add more gas capacity than any other region bar the Middle East. It reckons Africa will be producing almost 600 bcm a year by 2050, up from 249 bcm now.

### Counting rigs, not rigging counts

Other indicators seem to support these bullish views. The number of rigs operating in Africa, a leading indicator of exploration and production, is at its highest since 2019, according to Rystad. Spending on African exploration and development is expected to reach \$46bn this year, the highest since 2017. Meanwhile, Africa's share of global capital expenditure on gas has more than doubled since 2014, according to Wood Mackenzie, another energy-research firm.

Oil is also attracting investment. Total-Energies, the world's third-largest international oil and gas firm, will spend half of its global exploration budget this year in Namibia, where it appears there may be as much as 11bn barrels of oil and potentially gas too. That could make Namibia a huge producer. "We have no doubt that it's going to happen," says Namibia's energy minister, Tom Alweendo. Even modest hydrocarbon exports can have a big impact on poor countries. Take Niger, where a Chinese-built export pipeline is nearing completion. "Next year alone it will bring budget resources worth a quarter of our current budget," says Mohamed Bazoum, Niger's president. "The following years it will be even bigger."

Africa also has huge potential to be a big producer of green energy. Although it has sunny, spacious deserts, windy coasts and plains and gushing rivers, it has been a laggard. It has just 1% of the world's installed solar and wind capacity and only 4% of hydropower. This, too, is changing, though perhaps not quickly enough. Installed solar capacity in Africa has almost quadrupled since 2016.

Africa has punched below its weight mainly because it has been hard to export green energy. Investments were made mainly for local consumption of electricity (which is less than 3% of the world's total) and even privately owned power producers

have struggled to make money because they have been supplying small markets through inefficient state-owned utilities.

Now new technologies could allow renewable-energy producers to sidestep problems in domestic markets by exporting energy. With assured revenues from exports, green-energy firms can more easily secure the investment needed to build big and efficient plants. One spillover is that they should then also be able to provide power to local economies.

The first of these export opportunities is through producing so-called "green hydrogen", which is made by splitting water into oxygen and hydrogen using renewable electricity. Rich countries see green hydrogen as the best hope to keep their energy-intensive industry running while slashing carbon emissions. America recently introduced the largest subsidies in the world for low-carbon hydrogen (which includes that produced with gas and carbon capture). The EU's new energy programme, designed to make the bloc independent of Russian fossil fuels, has set a target for Europe to produce 10m tonnes of green hydrogen a year and to import another 10m tonnes by 2030. The International Energy Agency (IEA), an intergovernmental think-tank, reckons the world will need to produce 90m tonnes of low-carbon hydrogen a year by 2030 and 450m tonnes a year by 2050 if it is to reach its goal of net-zero emissions by mid-century.

Africa's strong solar and wind potential make it an attractive place to produce green hydrogen. A recent study by the European Investment Bank (EIB), the EU's development bank, argues that Africa could produce 50m tonnes of the stuff a year by 2035 from three sub-regions: Egypt; Mauritania and Morocco; and Namibia and South Africa. About half of this could be for export. "Namibia has the potential to be-

come one of the main renewable energy hubs on the African continent and worldwide," gushed Ursula von der Leyen, the president of the European Commission, in May. The bank reckons Mauritania and Morocco could be one of the world's most competitive producers, with costs including transport to Gibraltar of about \$1.60 per kg by 2035.

### Gas in the tank

Big hydrogen projects are starting to gather speed in Africa. One of the largest is in Mauritania, where last year the government and cwp Global, a green-energy company, signed an early agreement for a wind and solar project to produce 1.7m tonnes of green hydrogen a year. Another mega-project in Mauritania by Chariot, a British firm, and a subsidiary of TotalEnergies aims to produce 1.2m tonnes a year. "This is an extraordinary opportunity," says Abdelsalam Ould Mohamed Saleh, Mauritania's energy minister.

The excitement is similar in Namibia where the government recently finished negotiations with Hyphen Hydrogen Energy, a renewable-power firm, for the next phase of a \$10bn project. It aims to produce 2m tonnes a year of green ammonia (a product made from green hydrogen that is transported more easily) by 2030. It is backed by the EU. "They need the molecules. We need the jobs," says James Mnyupe, an adviser to Namibia's president.

Green hydrogen is not the only possibility for exporting renewable energy. Xlinks, a British firm, is planning a wind and solar plant in Morocco that would send electricity directly to Britain along 3,800 kilometres of deep-sea cables by 2030. The project could provide 8% of Britain's electricity at a much lower cost than alternatives such as a long-delayed nuclear power plant, says Xlinks. Though its \$18bn



Orange fizz for Mozambique's economy

► cost is a considerable hurdle, the project has attracted initial funding from Abu Dhabi's national energy company.

For Africa to realise its energy potential it will need to dodge a series of pitfalls. The first danger is sloth. On natural gas, competitors such as Qatar and America are moving quickly to expand their production. If Africa is tardy, its window of opportunity to supply Europe may close, particularly as demand shifts to greener sources of energy. The IEA reckons that by 2030 the EU may use 20% less gas than it did in 2021, based on current policies.

Africa's record on speed has been poor. Over the past two decades new gas projects in sub-Saharan Africa have taken almost five years longer than expected to go from discovery to production. On the other hand, African oil and gas producers are reasonably cost-competitive, meaning they would not be the first to struggle if falling demand were to push prices down. At a gas price of just \$3 per 1,000 cubic feet, two-thirds of African gas is still profitable. This includes much of the gas found in Algeria, Mauritania and Tanzania. Even in oil, which is dominated by low-cost Saudi production, Africa is still largely in the game at prices above \$30 a barrel.

Meanwhile demand for gas is expected to grow in Africa itself as the continent moves to produce electricity for the roughly 600m Africans who do not currently have it. Much of this new supply will probably come from renewable sources, but gas could also be an important part of a stable electricity mix and be needed to fuel the furnaces of heavy industry.

Firms and governments are also working to ensure that Africa's natural gas is extracted in the most climate-friendly ways possible. Eni claims that its development and operation of the Baleine oil and gas field in Ivory Coast will be the first in Africa to have net-zero emissions (though that does not count the emissions from whoever buys and burns the oil and gas).

The second major pitfall threatening Africa's energy boom is domestic security. Jihadists have already delayed the construction of Mozambique's massive gas projects by several years, prompting the government to ask other African countries such as Rwanda to send in troops to restore order. Meanwhile Nigeria partly missed out on the windfall of high gas prices last year, as a lack of security led to it shipping less LNG in 2022 than the year before.

The third hazard is disputes over how the rents from energy production are divided. The dollars big oil and gas projects earn could be grabbed by well-connected politicians and businesspeople, rather than benefiting populations as a whole.

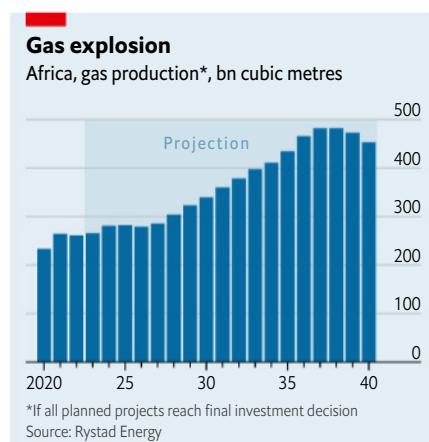
Alas, governments in the region do not always have a good record of investing revenues from natural resources into infra-

structure, schools and clinics. In Equatorial Guinea, for example, oil has propped up the world's longest-ruling dictator. His playboy son, who hopes to take over, is known for splashing cash on mansions and fast cars—and squandering the rest. Meanwhile the people of Equatorial Guinea suffer. The country ranks 145 out of 191 on the UN's Human Development Index, a measure of income, health and education.

Shakedowns of oil and gas companies and nationalisations of their assets are still worryingly common in Africa. In Ghana, usually one of Africa's better investment destinations, Tullow Oil is going to international arbitration after being given a retrospective tax bill of \$387m as the country scrambles for funds amid a public-debt crisis. Investors considering pumping in the billions of dollars needed to produce LNG or green hydrogen will not do so if they fear their assets will not be safe, or if the rules will be arbitrarily changed.

This is especially the case for green-hydrogen projects, which will need to attract formidable amounts of capital. Namibia's proposed project will cost about \$10bn; not much less than its current GDP of \$12bn. The estimated investment needed for the EIB's pan-African vision to produce 50m tonnes of green hydrogen a year by 2035, including everything from solar installations to export pipelines, is \$1.4trn. The biggest problem is whether companies and governments in the rich world, who want green hydrogen, will invest. "Will words become deeds that meet needs?" asks NJ Ayuk of the African Energy Chamber, an industry body.

After decades of declining relevance to global energy markets, Africa has a brief moment of enormous opportunity. To seize it, Africa's governments will have to learn from the mistakes made in previous commodity booms, when investors were frightened off and revenues were squandered. Adonis Pouroulis, the CEO of Chariot, believes that this time the continent will not waste its opportunity. "This century," he says, "is Africa's century." ■



Israel

## Just give me a reason

JERUSALEM

**Israel's constitutional chaos is far from over**

BY 1989 THE city of Jerusalem had been trying for nearly two decades to build a new football stadium. Powerful religious groups who saw matches on the Sabbath as a desecration of Jerusalem's sanctity had blocked the project, but at last ground could be broken. One obstacle remained. The acting interior minister, Arye Deri, an up-and-coming ultra-Orthodox politician, blocked the land-use change. Teddy Kollek, the city's mayor, took him to court. In January 1989 the Supreme Court ruled that Mr Deri had acted "in an unreasonable way". Two and a half years later the first match was played at Teddy Stadium.

Legal experts cite the case as one of the earliest examples of the court's nullifying a government decision on the grounds of "unreasonableness". That principle was introduced in a ruling in 1980 by Aharon Barak, then a new judge on the Supreme Court. It revolutionised Israeli jurisprudence and is a principal source of the constitutional chaos engulfing Israel today.

On July 23rd Benjamin Netanyahu's government is set to pass an amendment to one of Israel's quasi-constitutional "basic laws". It would give the government immunity from the reasonableness standard. Israelis have been taking to the streets since the start of this year in protest. Even Israel's closest ally is concerned. On July 17th, after meeting the Israeli president, Isaac Herzog, President Joe Biden applauded the vibrancy of Israel's democracy but urged Mr Netanyahu not to rush his reforms and to seek a consensus for them. ►

The reasonableness standard has affected decisions in almost every area of Israeli politics. It was used by the Supreme Court in 1989 to force the army to put on trial a colonel who ordered his soldiers to beat up Palestinian detainees. The following year the court invoked it to direct the attorney-general to charge bankers with share manipulation. In 1993 the court again took on Mr Deri, ruling that he could not remain interior minister after being indicted for corruption. He was forced to resign, convicted and sent to prison. He then returned to politics. In January 2023 the Supreme Court ruled once again he must resign from cabinet because of a conviction for tax fraud. Seven of the justices cited the reasonableness standard.

Mr Deri is no longer in the cabinet, but he still leads the second-largest party in Mr Netanyahu's coalition and is one of his closest allies. "They are trying to immunise the government and all the ministers from judicial review," says Menachem Mazuz, a former Supreme Court justice and attorney-general.

Mr Barak was not the first to invoke the reasonableness standard but he greatly extended its scope. He was admired by many who, like him, believed that in the absence of a written constitution and bill of rights, it was up to the Supreme Court to protect individual rights and the public interest. Others criticised him for extending the court's powers without authority. Reasonableness, argues Yoav Dotan, a law professor at the Hebrew University and a critic of the principle, is not a legal standard: it is "a linguistic construct invented by the court."

On March 27th Mr Netanyahu announced the suspension of his proposed legal reforms in favour of pursuing a broader consensus on constitutional change. But when talks with the opposition broke down in June, the government changed tack, focusing on limiting the reasonableness standard as a first step.

Many legal critics of the standard oppose this amendment. Mr Dotan has joined street protests against it. "I don't want to be anyone's useful idiot," he says. Like many, he fears that the government's reforms, even those he agrees with in principle, are a prelude to an erosion of democracy.

Mr Dotan and other legal experts have advocated a less sweeping amendment that would exclude only decisions made by the entire cabinet (as opposed to individual ministers) from the reasonableness standard. The opposition parties have agreed to this in principle in exchange for the suspension of the rest of the constitutional changes for the duration of this Knesset term. But the coalition is in no mood for compromises. As huge protests return and thousands of military reservists refuse to "serve a dictatorship", Israel is once again on the brink of civil unrest. ■

Tickling smuggled ivories

## Iran's bizarre contraband

BEIRUT

How well-connected Iranians import their pianos

**H**ASSAN IS AN unlikely smuggler. Affable and a bit nerdy, he looks better suited to his old job as an international public-relations adviser. Now he is one of the many shadowy operators who send contraband to Iran. Some reckon goods worth \$20bn-\$25bn evade Iranian border guards each year. His particular speciality is pianos.

Since Iran's customs authorities banned the import of musical instruments in 2021, the upright pianos that Hassan (not his real name) buys for less than \$900 in East Asia go for \$6,000 apiece in Tehran, Iran's capital. Musical instruments are outlawed, possibly for religious reasons; a member of the parliamentary economic committee said that those who want to tickle the ivories "must leave Iran".

The ban is also part of a strategy to deter imports of items officially deemed unnecessary, so as to tackle a balance-of-payments crisis that has been fuelled by Western sanctions on Iran. Foreign-made sunglasses, fancy smartphones and various fashionable items of clothing are prohibited, too. This has created a lively illicit market for traders who already benefit from the authorities' willingness to overlook their activities in order to help them to circumvent the American embargo.

On paper the customs authority runs an anti-smuggling programme whereby millions of dollars' worth of goods are seized every year. Yet at the same time an estimated 95% of smuggled goods enter Iran, not in pickup trucks crossing the border in the dead of night, but under the

noses of customs officers, often with their tacit approval. The scale of activity is so large that some politicians lament that smuggling has wiped out hundreds of thousands of jobs for Iranians in homegrown industries.

Hassan's pianos arrive in large container ships. The shipping company issues him with bank guarantees for any damage incurred on the short trip between a warehouse in the United Arab Emirates and the Iranian port of Bandar Abbas. The company greases palms at the port and the pianos are unloaded and recorded as parts of musical instruments rather than as single units, thus evading the ban. They are then put onto lorries and driven to Tehran.

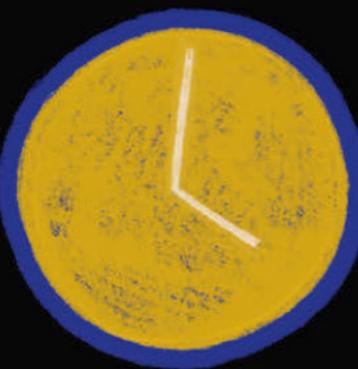
That 40 containers of illegal pianos can be regularly unloaded at Iran's biggest port, which is also the Iranian navy's main base, suggests that someone high up is taking a cut. The Iranian Revolutionary Guards Corps, the regime's praetorian body, has long been involved in smuggling networks. When he was the country's puritanical president, Mahmoud Ahmadinejad once castigated the corps as "our smuggler brothers", accusing it of making money at the expense of the national treasury.

Smuggling—and the bribes that sustain it—is one way that those who call the tune in Tehran continue to prosper, while ordinary Iranians suffer under an ailing economy. Annual inflation hit 43% at the last count, in June, yet those connected to the regime's rulers still flaunt sports cars and send their children abroad for private education.



# TQ

The Economist  
Technology Quarterly:  
**In vitro fertilisation**



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## The most personal technology

The double issue

# Twice the insight

Next week, enjoy the summer double issue of *The Economist*, which includes a supplement from *1843 magazine*, our digital publication of narrative journalism. There will be no print edition for the week of August 5th, but as a subscriber, you have full access to all our journalism published daily on our app and website.



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### In vitro fertilisation

## The most personal technology

Demand for, and expectations of, in vitro fertilisation are growing. The technology is struggling to keep up, write Catherine Brahic and Sacha Nauta

**W**ITH THE possible exception of Adam and Eve, all human beings born before 1978 were conceived inside a woman's body. Today the world contains at least 12m people who started off in laboratory glassware. On average, four more are born every three minutes. That is a worldwide rate of roughly one newborn in 175.

There are various ways in which technology can assist reproduction, for example with sperm donation, hormone treatments or turkey-basters. But no other approach has had as momentous an effect as in vitro fertilisation (ivf).

Every year over a million women go through the rigours of a hormonally heightened menstrual cycle that sees their ovaries produce several mature eggs, rather than the usual monthly singleton. Those eggs are collected with needles and either fertilised with sperm from a partner or donor, or frozen for later use. Any fertilised eggs will hopefully divide to form embryos; one or more are then transferred into the woman's womb or, again, frozen. The experience no longer carries the level of physical risk that once it did. It remains painful, draining and intrusive.

As ivf has become safer and more common, it has also become more effective, largely thanks to advances in the handling of embryos. In Britain, 25-30% of the embryos transferred to the wombs of women in their mid-30s now lead to live births. That is about four times better than in the early 1990s (see chart on next page). Trying again does not simply multiply the odds. The more ivf cycles a woman does, the lower her chances of success with each

new attempt: couples whose biology and personal circumstances mean they are more likely to conceive thanks to ivf will do so faster, leaving those with lower odds to try again. For those who do succeed, an ivf birth will be nothing short of miraculous—leading them finally to have the child they could only dream of.

As the technology improved and the practice gained acceptance, the eggs being fertilised started to come from a wider range of sources. Louise Brown, who in 1978 became the first baby to be born from ivf, was conceived the year before with the sperm and egg of a married couple. She was presented both as a miracle of scientific progress but also, to stave off worries of a "brave new world", as a baby like any other from a marriage like any other.

In 1985, though, two women gave birth to ivf babies conceived using their husbands' sperm and eggs donated by other women. That opened the way for women who were unable to conceive with their own eggs to nevertheless give birth. It also opened up the possibility of a woman carrying a child and giving birth on behalf of another couple; the first successful "gestational surrogacy" took place a year later.

Then came the first successful pregnancy to begin with a frozen egg. The development of vitrification, or flash-freezing, made possible "cryobanks" which store the potential for future babies—straws containing eggs, sperm and embryos—in liquid nitrogen.

Infertile heterosexual couples are not the only beneficiaries. Same-sex couples and single women can make use of ivf (and, in ➤)

► the case of men, surrogates) to have children that are every bit as longed for. The technology is also a boon for people at high risk of passing on a genetic disease. Since the 1990s it has been possible to remove cells from an embryo developing in a dish and inspect their DNA for a dangerous gene that one or both of the parents is known to carry. "It is, in some ways, the ultimate manifestation of preventative medicine," says Zev Williams, of Columbia University Fertility Centre: "Helping someone be born without the disease."

After early concerns about its unnaturalness, often but not always expressed in the name of religion, IVF has become broadly accepted. In some countries it has come to be seen as a tool against demographic change; in China over 1m IVF cycles happen every year, the highest number for any country. The process is seen as benign by most and as providential by its beneficiaries. There is, though, a side of the story less often discussed in public and instead endured in private. Most Petri-dish conceptions end not in magic but in heartache. Most of the embryos transferred back into patients do not implant in the womb, or, if they do, "fail" in some other way. These are not talked about. Indeed, the language for doing so hardly exists.

There is a word for the loss of a confirmed pregnancy—miscarriage—but no equivalent for the loss of an embryo that never dug into the lining of the woman's uterus and connected to her blood supply. There has never been need for such a word because, though it happens with embryos conceived inside a woman, just as for those conceived in glass, in her body the embryo is never seen, never even known about. In vitro it will have been peered at, monitored, photographed. A couple leaving a clinic after an embryo transfer know they are taking a potential life with(in) them; they will have to wait two agonising weeks to find out if it developed or decayed. The joy of the births IVF makes possible is much like the ancient joy of any birth, perhaps sweetened by the overcoming of adversity. The sadnesses it brings are new and strange.

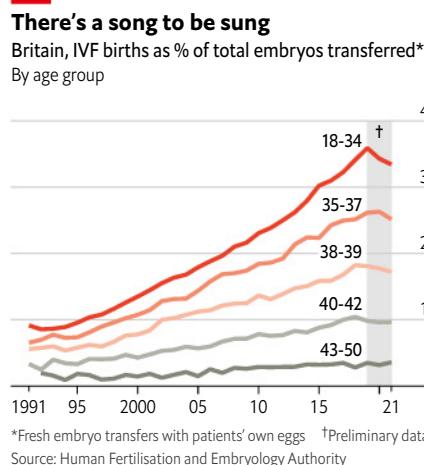
Records are kept of how many IVF cycles are undergone and how many births ensue: globally the ratio is about four to one. Little is done to track how many women go through cycle after cycle fruitlessly and how many couples end up, not with a child, but with an unusually lonely form of grief: the baffling experience of losing something that could have been but never was.

### Young dreams

The technology's failure rate shows how little is really known about how to make a human life, and how randomly the chance to have children easily is distributed. Its successes hide that lack of understanding. Indeed they may perpetuate it. By providing a reasonable rate of success IVF seems to obviate the need for better understanding. Fertility researchers interviewed for this report consistently reported that basic questions about human reproduction remain a surprisingly low research priority.

That said, one piece of basic understanding is clear. An increasingly common reason for IVF failing is age. The females of almost all other mammals can continue to bear young more or less until they die. Humans and five species of whale are the known exceptions; their fertility diminishes with the years.

In most developed countries and many developing ones women are postponing reproduction. In England and Wales the average age for a woman to have her first child (29) is more than five years older than it was 50 years ago. In Shanghai the mean age is one year higher. In America one in five women now has her first child over 35, which in medical terms sees her classed as "geriatric". In



Spain, where maternal age shot up in the aftermath of the financial crisis of 2008, 10% of births are to mothers over 40.

The later people try to conceive, the more they are likely to struggle to do so. If this is driving much of the increased demand for IVF, it is also responsible for a disproportionate share of its failures. In Britain, 40- to 42-year-olds see an embryo transfer lead to a baby only a third as often on average as under-35s.

It is the age of the ovary from which the egg is taken, rather than the womb that nurtures the embryo, which matters. That is why an increasing number of women in their late 20s and early 30s are having some of their eggs frozen. Should they need IVF in the future, perhaps because they have delayed trying for children, younger eggs will give them a better chance of success.

Like delayed fertility itself, this sort of "elective" freezing looks as if it could increase the size of the IVF market. Currently less than 1% of births, this could rise to as much as 10% in the places where it can be afforded. In a few it is already almost there.

Some observers see it going further. They imagine a time when it will be possible not just to fertilise eggs in the lab, but to make them there, too. Stem-cell science makes it possible to turn the descendants of one type of cell into another type. In mice, such techniques have been used to derive viable egg cells from skin cells.

### Sometimes never comes

The same has not yet been achieved for humans. If it were, new possibilities would open up. Older women who had not previously frozen eggs might be able to have new ones made. Gay men could combine sperm from one with an egg grown from the cells of the other to have children biologically related to both.

An egg grown in the lab could also, in principle, be an egg engineered in the lab. There are currently gene-editing therapies in clinical trials where cells are harvested from a sick child's bone marrow, edited to remove a harmful mutation, like that behind sickle-cell disease, and reintroduced into the body. It could be simpler and cheaper to edit the genome before conception. If eggs were easily mass-produced it might also, in principle, be possible to fertilise them in large numbers and let couples pick out embryos with particular genetic traits.

Attempts to gain control over human biology in such ways should set a whole peal of alarm bells ringing; the technical barriers are immense, those in the realm of ethics, public morality and safety probably larger still. They suggest a level of control over human life with which many will be very uncomfortable—and which might well be illusory. After all, IVF is commonly understood, and sold, as a way to take control of errant biology, and for many it proves anything but. Studies have consistently found that a majority of IVF patients drop out before completing all the cycles which their insurers or governments will cover. The main reason they cite is psychological strain. They are experiencing the opposite of the "empowerment" often advertised. They feel wildly out of control.

The authors of this report can empathise. We have, between us, undertaken 14 cycles of IVF, over 550 hormonal injections and countless scans and blood tests to collect around 120 eggs. Our partners have made 23 visits to awkward "sperm sample" rooms. Just 34 of the eggs that were fertilised made embryos that could be transferred into our wombs. Thirty did not implant. Three did but failed further down the road (one ectopic pregnancy and two miscarriages, one referred to by a doctor as "tripping before the finish line"). After five years each, only one of us is pregnant. ■

**The process**

# If at first you don't succeed...

## IVF remains largely a numbers game

MOST HEALTHY young couples seeking to get pregnant will try for a few months before they are successful. Those who are not will try for months more, or years, before concluding they need help and stepping into the waiting room of an IVF clinic. They often arrive in a state of acute emotional vulnerability, clutching at the hope that doctors will help.

For the woman, what follows is uncomfortable at best. There are internal ultrasounds, dozens of self-administered hormone injections into her increasingly bruised abdomen, the swelling of her ovaries until two clutches of hard grapes appear to be knocking about on either side of her pelvis. And unless she is in the lucky minority who get pregnant the first time, she will have to do it again. To take home a new life, most women and couples go through more than one cycle; sometimes, many more. Each brings with it physical discomfort and pain and intense loneliness, the emotional impact of being jacked-up on hormones and the fear of doing something that might impact her chances of having one more egg cell, one more viable embryo, one healthy pregnancy.

IVF helps overcome some of the challenges of making a baby in two ways: first, by increasing the number of mature eggs that a woman makes in one menstrual cycle by means of hormone injections; second, by ensuring that those eggs have the opportunity to be fertilised by sperm. This overcomes problems caused by ovaries that do not of themselves give up their eggs, by blocked Fallopian tubes which form a barrier between the egg and the sperm swimming to meet it and by sperm that aren't good swimmers. When sperm are truly lacklustre, fertilisation can be more or less guaranteed by squirting one straight into the egg: "intra-

cytoplasmic sperm injection", or ICSI (see diagram on next page).

In the case of, say, blocked tubes, the fertilised eggs produced by IVF may be the first of the woman's eggs ever to have met any sperm. But that is not enough to guarantee a pregnancy. Every time a sperm and an egg fuse, the sum of their parts is a unique genetic package. Much of whether or not the resulting embryo is viable and able to develop into a healthy neonate is down to dumb genetic luck. Not every fertilised egg naturally leads to a pregnancy. This makes IVF a numbers game.

Globally, between six and seven out of every ten IVF cycles will not result in pregnancies which go to term. As a result, many women will try more than once. In each cycle, a woman may have one or more embryo transfers. Each of these can take months, and recovery adds more time. With medical tests, life, jobs and mental downtime in between, IVF treatments can easily take a year—for many it will be longer, with no guarantee of success.

The older a woman gets, the steeper the odds. She has all the "oocytes" which will ever develop into eggs in her ovaries when she is born. After puberty every menstrual cycle will see a number of them activated, but normally only one of them matures in a way that leads to ovulation. So month by month her "ovarian reserve" gets smaller. At the same time the DNA in the oocytes which remain gradually fragments. By the time she is 45, her odds of a child will be less than 5% with every embryo.

## Try, try again

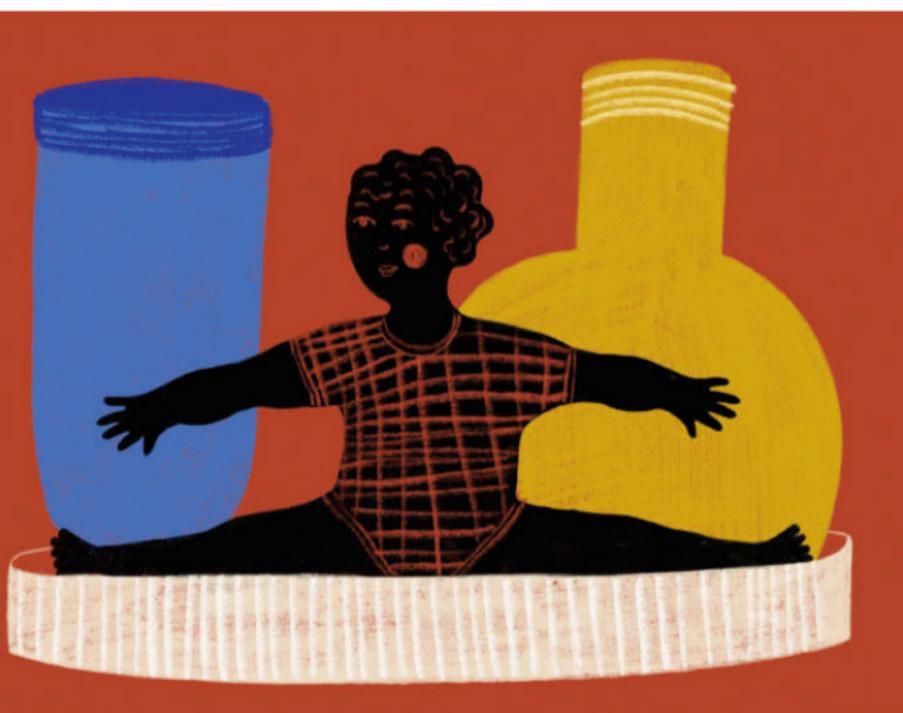
Doctors are used to thinking in terms of probabilities across the population. Patients are not. Patients know people who got pregnant on their first IVF attempt; patients have friends whose walking, talking toddler was once a "low-grade" embryo given tiny odds of leading to a full-term pregnancy. Above all, patients believe they can and will make a life through IVF, because not believing is inconceivable and hope is what gets them to the next appointment, the next throw of the dice. It is possible to sink years and tens of thousands of dollars into multiple rounds of unsuccessful IVF and still feel the next one will succeed.

When an IVF cycle fails, especially if it is not the first time, people naturally seek out ways to change their treatment. "Rather

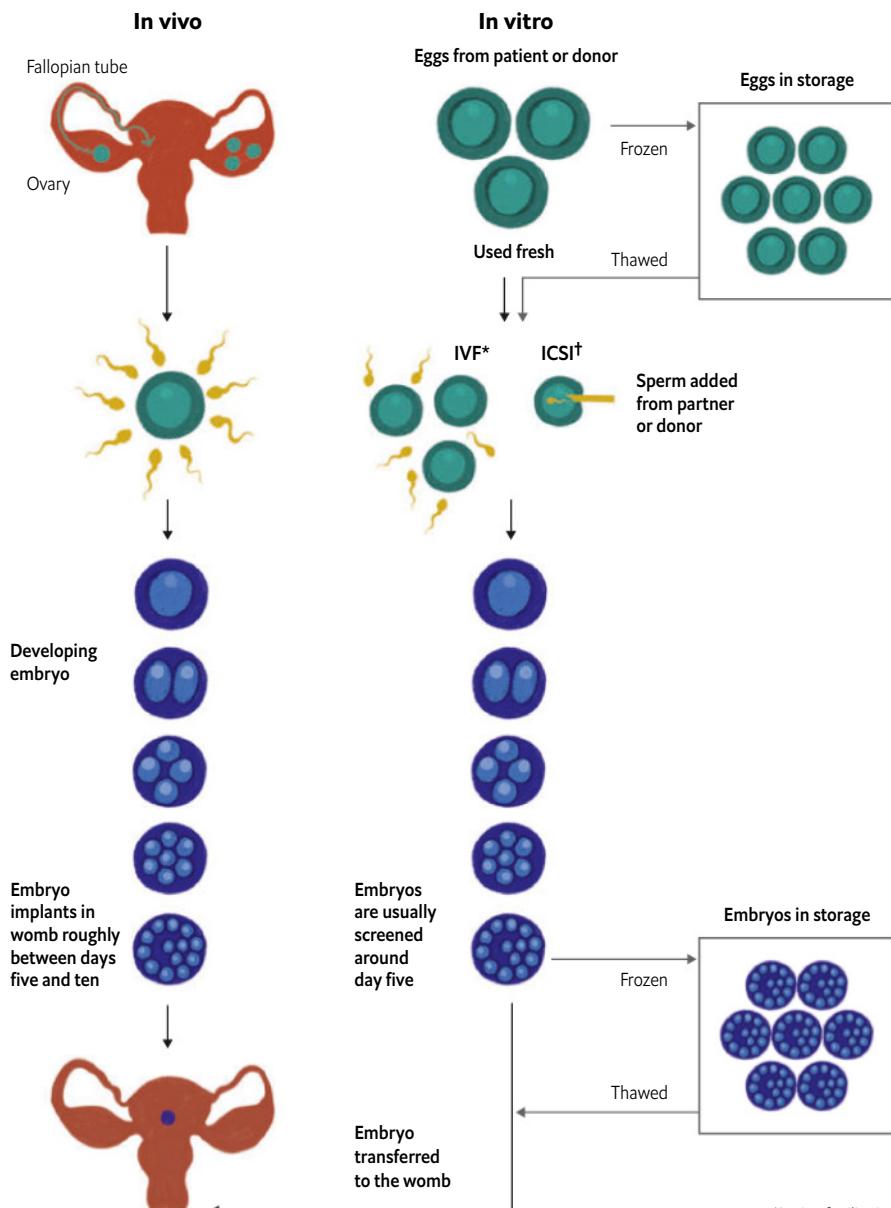
than thinking 'I have to keep rolling the dice' people think 'Something is wrong,'" says Sarah Lensen, a research fellow at the University of Melbourne in Australia. Right on cue, clinics—particularly private ones—step forward with a menu of "add-ons". Through the grief of yet another failure to conceive, these optional, and generally paid-for, treatments offer hope that the next attempt might just be different.

Price tags range from zero to thousands of dollars, depending on the treatment, clinic and country. Several can be combined into each round. It is basic human psychology to think that if you pay more you might get more. The business model of many clinics trades on such hope.

Unfortunately, the evidence base for these additions is underwhelming. The draft conclusions of a study of 35 of them by the European Society of Human Reproduction and Embryology found that there was sufficient evidence to recommend that just one of the add-ons—the use of hyaluronic acid to help embryos stick to the uterine wall—be added to IVF treatment as a matter of routine. Another—choosing the best sperm by running them through microscopic channels, a procedure held to ➤



### → Vivo vitro...vici?



► mimic some aspect of the environment they would encounter in vivo—did show some promising signs of increasing the overall chance of a birth, but those signs fell below the standards required for reliable evidence.

In some other cases there was a possibility that the add-on might, with further testing, be shown to help a specific subgroup; patients with an autoimmune disease, for example, might benefit from steroids. For the rest, though, there was not just an absence of evidence that they worked; there was sufficient evidence to be reasonably sure they did not. A meta-analysis that Dr Lensen led was similarly damning. None of the 12 add-ons it looked at was “supported by high-quality evidence that [it] is effective and safe”. Three treatments, including hyaluronic acid, seemed to provide a benefit, but the evidence was judged to be of poor quality.

One problem is that, given scant public funding for research in this area, randomised and blinded studies with large numbers of

patients are infrequent. This may come as a surprise; patients tend to assume that medical interventions are required to go through such tests before they are approved. Often, though, add-ons are IVF-specific applications of procedures already approved for other purposes. “Endometrial scratching”, which involves lightly scarring the lining of the uterus with the aim of stimulating growth factors is exactly the same as an endometrial biopsy, normally carried out to test for cancer. “It got renamed,” says Dr Lensen.

### Evening odds

Private clinics have little incentive to spend investors’ money on trials with thousands of patients, especially when there is a risk they will show add-ons that are already being sold to be ineffective. Both authors of this report were offered a trademarked test, costing roughly \$1,000, that supposedly determines when a woman’s uterus is most likely to welcome an embryo, by a clinic that later admitted it had not yet been correctly evaluated, and that subsequent trials showed it did not improve chances of success and “may even be harmful”.

In September 2022, after a ten-month investigation into mis-selling, Britain’s Competition and Markets Authority and Advertising Standards Authority together admonished the sector for the way it uses claims about success rates and add-ons.

Some add-ons have become almost standard, even when they are only beneficial to, at best, a subset of patients. In Australia and New Zealand ICSI, which can cost up to a few thousand dollars a pop, is performed in 56% of IVF cycles. In America the share is 60%. Yet it has been proved to help only couples whose infertility is due to low sperm quality—around 30%.

More controversially, pre-implantation genetic testing (PGT) is now being used in roughly half America’s IVF cycles. The most commonly used version of the test, PGT for aneuploidy (PGT-A), involves counting the chromosomes in a few embryonic cells that are taken from the part of the embryo destined to form the placenta. Cells are meant to have an even number of chromosomes and finding that to be the case is taken as a good sign.

Its defenders see PGT-A, which typically carries a price tag of about \$5,000, as a better way of telling which embryos will do best than peering down microscopes in order to assess shape and development, as is the historical norm. They argue that selection with PGT-A helps women who are over 35 to get pregnant faster and that it reduces miscarriage rates.

Detractors point out that randomised controlled trials have failed to demonstrate either of those benefits. And recent studies have shown that “mosaic” embryos, in which some cells have odd numbers of chromosomes, can lead to successful pregnancies even though PGT-A may rule them out. And if they are discarded there is a chance that the woman’s overall chance of getting pregnant may drop. ■

Baby-making as a business

## Selling hope

### The fertility sector is booming

**I**VF ACCOUNTS for around 9% of live births in Denmark, the highest proportion in any country. For average number of cycles undergone per woman, the winner is Israel. The fundamental reasons for the two countries' pre-eminence are distinct: Danes are strong supporters of women's and family rights and understand fertility as part of the package; Israel is, culturally and politically, much more pro-baby than other rich countries. The proximate reason, though, is more or less the same. In both countries the state makes IVF widely available and (nearly) free. Israel, in this respect the world's most generous country, will in most cases pay for as much IVF as it takes to have two "take-home babies".

In most of the world most couples cannot afford IVF. A recent study in lower-income countries found that a single cycle costs between 50% and 200% of people's average annual income. There is a sad irony in this. Among the forms of infertility for which IVF is particularly effective is a blockage in the Fallopian tubes, which often arises as a complication of infection. Those complications are most commonly suffered by poor women in poor countries. The population least likely to get access to IVF thus contains a disproportionate number of those it was originally designed to help.

Even in countries where IVF accounts for 1% or more of births, prices are high enough that, unless governments either mandate that they be offered by health insurers or provide the service themselves, most women cannot afford it. An American whose insurance, if she or he has any, does not cover IVF can expect to pay \$20,000 a cycle. Unsurprisingly this means a lot of people who need treatment do not get it. Eduardo Hariton of US Fertility, a network of clinics, reckons that for every patient who gets IVF in America as many as four more may go without.

Politicians are paying increasing attention. Five years ago, there were nine American states where insurers were required to cover some IVF treatment. Today there are 14. Employers are aware of the value placed on access to fertility treatments, too. Job packages which included fertility benefits such as IVF were once just a perk for Silicon Valley. Today, according to Mercer, a consulting firm, four in ten large employers include them. In online infertility forums, women exchange tips on where to get jobs with coverage. Walmart, America's largest employer, recently started offering fertility benefits through Kindbody, a chain of clinics. The chain last year built a clinic near to its new client's head office. It opened another one near Lockheed Martin in April.

Potential patients with financial worries increasingly look to travel abroad as a way to afford what they cannot at home. So do some patients looking for regulatory regimes more permissive than those they live under (see box on next page). The barriers that going abroad may circumvent include restrictions on who can try to conceive (several countries restrict IVF to married couples) and on how they can become parents (some countries ban surrogacy or the use of donated eggs). But many destinations, including the Czech Republic, Mexico and Thailand, are popular at least in part because they are cheaper.

The evidence of price sensitivity provided by such IVF "tourism" is backed up and quantified by formal research. An international



comparison published in 2014 found that for every percentage point of average disposable income that the price of IVF drops, demand increases by 3%. It all suggests that companies which can bring costs down so as to attract more clients could do very well out of it. And some are trying to do just that.

Five years ago Joshua Abram, a veteran tech entrepreneur, co-founded Conceivable Life Sciences, an IVF-automation company with headquarters in New York City. Neither he nor his business partner knew anything about reproductive technology at the time, but they could see a market gap. "Because we know that 10% of kids in a just world will be born through IVF, versus less than 1% today, solving this is one of the great medical and ethical opportunities of our lifetime," says Mr Abram. "And indeed a mammoth, mammoth business opportunity."

### Hope springs eternal

The sector is certainly soaking up capital. As the entrepreneurial doctors who set up the first generation of fertility clinics reach retirement, investors have been buying their businesses on the basis of opportunities for consolidation and strong growth prospects. "In the past decade, while the overall birth rate declined, the birth rate resulting from ART [assisted reproductive technology] grew around 6% annually," says Jennifer Gregoire from McKinsey, calling it "a market with strong tailwinds".

The investments are often from private equity (PE). Today about a third of IVF cycles in America are done through clinics affiliated with PE funds. In January KKR, a PE firm, paid €3bn (\$3.2bn), a very high multiple of earnings, for IVIRMA, a large Spanish chain of clinics. Such investment has driven a new level of consolidation. In Australia three networks now provide around two-thirds of all cycles. ►

About a third of IVF cycles in America are done through clinics affiliated with private-equity funds

For the most part, though, these large organisations are not particularly focused on increasing access. After all, patient numbers are going up even though prices are not coming down. Though they do not see it this way, the clinics' customers are buying hope as much as, or more than, they are buying healthy pregnancies, and it is easier to upsell hope than increase the number of pregnancies that go to term. "Bringing hope to life" is the headline for Columbia Fertility Associates' sales material. "The best way to predict your future is to create it," assures Liv Fertility in Mexico. "Every two hours an SGF baby is born," says Shady Grove Fertility.

Websites juxtapose pictures of smiling babies with figures purporting to provide a "success rate". Professional associations caution against choosing providers on the basis of such numbers. They can be inflated or massaged through a number of presentational tricks. It is often impossible to tell if one site's claimed rate is truly comparable to another's. Think of the range of metrics that fund managers use to claim "above-average" returns, and then remember that fund managers' claims are much more regulated than those of fertility clinics. But in the absence of other clear differentiators they will be the numbers to which most of the hope market's consumers latch on.

Other things being equal, buying more tends to bring people more hope and a greater sense of control. This offers a number of

ways to make already fairly fat margins fatter. Zealously catering to patients' desperation through "add-ons" to their IVF despite their lack of proven success (see previous article) is one. A recent study found that in America PGT-A, a controversial add-on, is significantly more likely to be part of IVF treatment in a PE-affiliated clinic than elsewhere.

### Profit pushes perpetual

The newest vendors in the hope market are a wave of "reprotoch" startups, some associated with starry names: TMRW, which has an automated system for freezing and storing sperm, eggs and embryos, boasts investors including Amy Schumer, a comedian, Peter Thiel, a venture capitalist, and Susan Wojcicki, the former CEO of YouTube. Legacy, which sells sperm tests, dietary supplements that claim to improve sperm quality and sperm-freezing services, is backed by Justin Bieber, a musician.

At the Reproductive Health Innovation Summit held in Boston, Massachusetts, in February, entrepreneurs from around the world pitched everything from AI that promises to select the best sperm to needles that make hormone injections easier. At times, the proceedings felt like a speed-dating event. The emphasis was largely, though not exclusively, on trying to improve the process and outcomes for existing patients rather than lowering prices to improve ➤

#### Reasons of state

## Our bodies, ourselves. Or not

#### Governments often have clear ideas about what sort of families they want to facilitate

THE CHARACTERISTICS that can disqualify people from being allowed to access IVF are, for the most part, relationship status, sexuality and age.

Restrictions on the use of assisted reproduction by same-sex couples and single women have been loosened across much of the West. But the liberalising trend is far from universal. A number of European countries, including the Czech Republic and Italy, still allow access only to heterosexual couples. A recent survey of changes to regulations concerning sexuality and IVF in 18 countries by the International Federation of Fertility Societies (IFFS) found that in 2018-21 five increased access for same-sex couples and six decreased it.

In Japan, where subsidies for IVF are being enacted as a response to demographic change, parliament is discussing a law that would determine who is eligible for treatment. The outcome could limit treatment to married couples, which would exclude gay couples: an interest in more children does not necessarily trump concerns about what sort of families there should be.

Such concerns are clearly seen when it comes to freezing eggs, something 35% of countries surveyed by the IFFS forbid.



In China, which is one of them, eggs are to be used now, in existing relationships. Ruling for a hospital that refused to freeze a single woman's eggs in a case last year, a Beijing judge cited the "psychological and societal problems" a large age gap between mother and child would bring.

The freezing of Chinese women's eggs is a growing business for many clinics elsewhere. Erika Wang, a 33-year-old from Zhejiang province, recently had her eggs frozen in California at her Singapore-based employer's expense. She has posted

about her decision on social media.

"Fertility technology is a great invention for feminism, especially Asian feminism," she says. "I wanted to show my friends and peers that this is possible."

Some countries allow only women with a medical reason for freezing their eggs to do so; others require that frozen eggs, like fresh eggs, be used only in the context of a heterosexual marriage, or only in the wombs of women below a certain age. Malaysia has banned freezing for single Muslim women while exempting those of other faiths or none, thus preserving the business of clinics serving patients from China.

Other areas of disagreement include donation and genetic testing. Two European countries allow neither egg donation nor sperm donation; three more allow sperm donation but not egg donation. Embryo donation is banned in 14. Eleven European countries do not allow pre-implantation genetic testing for any "non-medical" reasons; most of Europe strictly forbids its use for sex selection. In places where such selection is tolerated, which include America, Mexico, Northern Cyprus and Ukraine, this ability to choose constitutes something of a selling-point.

► access. "Almost all of this caters to the women who can already afford IVF and just digs deeper into their pockets," grumbled one veteran fertility doctor.

Some think that technology could do more. David Sable, a reproductive endocrinologist turned venture capitalist, reckons that the right investments could raise the worldwide number of IVF babies from 64,000 per month today to over a million a month. At Conceivable Life Sciences Mr Abram says he is confident of being able to reduce costs by as much as 70% in America and 50% in Britain. A large part of the company's plan rests on centralised labs with hyper-modern microscopes and lots of automation. They also think there are savings to be made by using local gynaecologists rather than higher-paid fertility doctors.

Such investments may pay off in time, especially if insurers get behind them. But for now the IVF part of the ART sector remains focused largely on selling more hope to the sort of people who are already in a position to buy it.

This will not stop the spread of IVF. But the current state of play makes it likely that investors and entrepreneurs will not be the driving force. Politicians will be—whether because they just think it is the right thing to do, as in much of Europe, or because they worry about ageing populations, as in a lot of Asia, or because their voters are increasingly insistent. ■

#### Donation and preservation

## Eggs from elsewhere

**Some women need eggs from other people, or from their younger selves**

"YOU WILL not have a child with your own eggs," were the hardest words to hear. They were delivered late last year to one of your authors and her partner, after five years of failed IVF, by a doctor who quickly moved on to the remaining options: adoption or seeking the help of an egg donor.

Coming to terms with the idea that you will not pass on your genes even if you do still bear a child is another of the strange new forms of loss that IVF has brought with it. It is possible to know that genes are not the essence of what it is to be part of a family—that step-children can be loved unconditionally, that people may bear scant, if any, resemblance to their genetic forebears—and still struggle to adjust to what can feel like a loss of parental identity.

The possibility of being an egg donor is also a historical novelty. That men might have children of whom they are unaware barely needs saying; that women can do so is new. It is also becoming increasingly frequent, partly because of growing demand from older would-be mothers. (The use of donated sperm is also rising in many places, but that is primarily because of demand from single women and same-sex couples.) Where it was once necessary for a donor to have her menstrual cycle synced with the recipient mother's, and her eggs collected just before use, efficient egg freezing now means donors can stick to their own schedules and their eggs can be stored until needed.

That hardly makes the process easy. Egg donation has all the hormonal helter-skeltering, internal monitoring and needles

through the cervix of egg collection for IVF. Yet a sense that it is a way to make the lives of strangers better still moves some women to donate. Niamh, from the English city of Nottingham, donated her eggs for the first time when she was 20 after hearing an ad on the radio. "I thought 'I'm not using my eggs, why not?'" she says, six years on. Learning that the first attempt to make a baby from them did not work triggered a feeling of disappointment. "I wanted it to work for someone." So four years later she donated again.

#### Affective altruism

One of her biggest complaints is poor information. Although she knows that her first donation did not make a baby, she does not know the outcome of her second donation. "That is something I have a fundamental problem with," she says.

By unbundling aspects of parenthood that used to be all of a piece, assisted reproduction brings new types of relationships into the world just as it brings new babies and new sadnesses. Some donors want to know at least something about the children they have made possible; some want complete two-way anonymity. Some children want to know about their donors, or about the other children who received some of their genes from the same donor—"dibblings", as they are sometimes called. Others do not.

Then there is the relationship, or at least the flow of information, between donors and parents. The amount parents may want to know about donors will differ from couple to couple, and sometimes between two partners. Different countries give the different players different rights in all these regards.

Comparing Britain and Spain brings some of the issues to the fore. IVF with egg donation is an order of magnitude more common in Spain than any other country except America, where half as many such cycles are done. "It's taken for granted that it's an option," says Sara Lafuente-Funes, a sociologist at Goethe University in Frankfurt who has studied egg donation in the country. She says the Spanish IVF sector has a particular focus on delayed reproduction, which economic uncertainty has made common in Spain: the average age of first-time mothers is 32. If delayed reproduction is the focus, donation is an obvious area in which to specialise.

Its status as a donation hot-spot leads many British couples to investigate the possibility of a Spanish donation. To do so, though, means trade-offs, both for themselves and for their children. Parents choosing a donor in Britain can search a database like one at the London Egg Bank by eye or hair colour, height or education. They can even read a handwritten letter from the donor, if she has supplied one. In Spain they learn nothing about any distinguishing characteristics: the clinic will attempt to match the mother's looks to the egg donor's, perhaps using biometrics, but will provide no information about her. That devotion to donor privacy

also means that, whereas a child conceived in the British system has the right to learn their donor's identity when they come of age, a child born through the Spanish process does not.

One thing that British and Spanish donors have in common is that the system in which they make their donations allows them to be compensated for doing so. In some countries, such as Italy, no money is allowed to change hands when eggs are donated. In most of the rest of the world the donor can be compensated for the travel, time off work, inconvenience and discomfort that donation involves. In Spain donors receive €800-1,300 (\$890-1,450) per donation cycle. Britain caps compensation at £750 (\$980) per cycle.

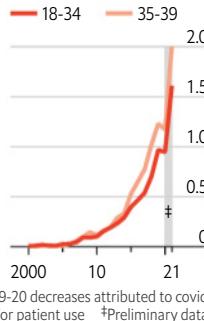
Though in principle such compensation is not meant as an inducement, in

#### The big give Britain

IVF cycles\*, by egg and sperm source, '000



Egg-freezing cycles†, by selected age group, '000



► practical terms it can serve as such, at least in part. Dr Lafuente-Funes says that compensation in Spain is set at a level that will enable clinics to recruit donors, young women who are normally less wealthy than the recipients. But that economic motive does not make donation simply a commercial transaction; the money "does not mean that the donors are not at the same time altruistic," she says.

In some regimes commerce has a much fuller role. In America, where compensation is not capped, online egg-banks can feel eerily like dating apps, but with far more information: tastes, hobbies, personality profiles, emotional-intelligence scores and baby pictures. Donor Nexus, an agency based in California, offers "premier" donors with "specific...desirable traits such as higher education, rare ethnicities, professional athletes, musicians or models".

The prices paid to donors—from a few thousand dollars to \$10,000 or even much more, according to Diane Tober, a researcher at the University of Alabama—vary by region, agency and donor profile. Some firms pay more to donors with higher SAT scores. Ads in university newspapers reflect the fact that students are well suited to the market's needs: typically young, presumably smart, relatively rich in free time and often conscious of the debt they are accruing. The fact that they can donate batches of eggs directly to the freezer makes the process inherently less personal.

This commodification upsets many ethicists. Its commercial logic may also expose donors to harm. If the eggs themselves are valued, rather than the act of donation, the incentives to produce more eggs are increased. Anecdotally, egg donors report that they are likely to be given levels of hormones that put them at greater risk of complications than is normal in IVF. Research by Dr Tober supports some of these concerns.

Increasingly, though, younger women have their eggs collected for another reason: to make them available to their older selves. Sophie, a 31-year-old British-born research fellow in Philadelphia, is a case in point. Many of her American friends were talking about

**Some demand for freezing may stem from a belief that the egg in the freezer might as well already be a baby**

having their eggs frozen; some had done so. So when a romantic relationship she was in ended abruptly she decided, "If I'm going to do it, I should do it now." She flew home, where freezing was cheaper and her mother could administer the daily jabs, and was lucky enough to have 31 eggs collected.

After collection, Sophie's eggs were prepared for storage, something which involves dehydrating the cells and adding a "cryoprotectant" to them. If this is not done, ice crystals can grow in the cell's watery cytoplasm and disrupt the cell's internal structure.

With ample cryoprotectant and the freezing done very quickly, the cytoplasm solidifies into a glass rather than an array of crystals. That preserves its structures far better.

Having been plunged into liquid nitrogen at -196°C (-320°F) Sophie's "vitrified" eggs are now safely tucked away in a freezer in Southampton. Studies suggest that, in a properly proficient lab, nine out of ten frozen eggs survive thawing. What is more, the length of time the egg remains frozen seems to have no impact on its future prospects.

#### The cold never bothered me anyway

Before vitrification, egg-freezing was rare. Efforts to preserve fertility tended to focus on the freezing of embryos, which was more reliable because their cells are smaller. That made it mainly an option for women who already had partners or who used donor sperm. Now, thanks both to the new technology and the campaigners who have raised awareness of it, in many places it is routine for women facing, say, chemotherapy, which might harm their eggs, to have some frozen.

Two other groups have taken an interest in becoming their own future donors. The first, who tend to be older, would like to have a child right away, but are not in a position to do so, often due to the lack of a partner. The second, mostly younger, do not wish to have a child yet but want to give themselves every possibility of success when they do. The first group was initially bigger, but several clinics report the average age has been coming down. FertilityIQ, which provides courses to people considering assisted reproduction, reports not just that egg freezing is one of the most popular ones, but that the average age of those taking it has dropped from 38 to 32 in just six years.



There are worries that some of the demand for elective freezing from younger women stems from a belief that it is fail-safe: that the egg in the freezer might as well already be a baby. @annelisejr, a Tik-Tok influencer, reflected what many may feel when, having frozen 13 eggs, she posted: "It's a relief knowing once I'm ready many years from now I will be able to have little Annelises." She may well have increased the possibilities, but little ones are never a sure thing. What freezing offers is a slowing down of the rate at which the odds lengthen against you, should you at some point need IVF.

In the largest American study so far 70% of a group of women who had started freezing their eggs before they were 38 and who thawed at least 20 eggs were able to have a baby. Good, but not perfect. Younger women may do better. That said, clinics without a track record piling into the grow-►

►ing market may make things worse. "If there's a potential black eye for the sector down the road," says Jake Anderson-Bialis of FertilityIQ, "egg freezing could be it."

Sophie, who says she has always wanted a number of children, knows that freezing does not guarantee that she will get them. But £5,000 and three weeks over the Christmas holiday have brought her "a huge amount of peace" along with a new romantic freedom. The control over their fertility offered by the pill let women enjoy sexual relationships without worrying about getting pregnant. Egg freezing allows them to explore relationships into their 30s without worries about a lover's suitability as a co-parent. "I just want to be able to date like a man," says Sophie.

Why would she not? Women are not delaying reproduction simply to concentrate on their careers. They are doing so because forming a relationship with someone with whom you want (and can afford) to raise children takes time, whether you are a woman or not. As Marcia Inhorn, an anthropologist at Yale, puts it in her recent book "Motherhood on Ice", vitrification will not fix the issues driving women to have their children later. But the technology does offer them the hope of a "reproductive suspension bridge".

What women like Sophie are choosing is a personalised version of what Dr Lafuente-Funes sees writ large in Spanish society: a transfer of reproductive capacity from younger to older women. Such transfers are often seen as a way to deal with a crisis in reproduction that does not address its root causes. But for some women the transfer is an unambiguously empowering expansion of her future options. And if, as is increasingly the case, women freezing their own eggs also donate some—perhaps immediately, to defray the costs, perhaps later when they have used those which they need—the benefits may be spread further. ■

#### In vitro gametogenesis

## Eggs from scratch

New ways of making babies are on the horizon, but they are not yet to hand

THE HUMAN genome can create cells with a remarkable range of capabilities and shapes. Looked at under the microscope, the enterocytes which line the gut bring to mind the ghosts from a Pac-Man video game. Neurons look like medieval morningstars, but with long hair. But none is more special than the big, round egg. It is not just the largest of the cells. It is also, once fertilised, the cell from which all other sorts of cell are descended.

The size of the egg allows it to carry the nutrients and chemical building blocks needed for the first days of an embryo's development. As those days tick by, the single large cell of the fertilised egg splits into two, then four, eight and onwards until they are countless. In the earliest stages, the divisions produce "stem cells", from which all sorts of others can be derived. As time passes, the cells specialise, expressing some genes more and some genes less, eventually producing all the intricacies of tissue and organ the newborn needs, right down to its toenails.

In nature, this differentiation is a one-way street. In the laboratory, not so much. In 2006 Yamanaka Shinya and Takahashi Kazutoshi of Kyoto University showed how cells which expressed the genes appropriate to being part of a mouse's skin could be stripped of their dermatological determination and reprogrammed to become something very like the stem cells which are found in embryos. These "induced pluripotent stem cells" (iPSCs) could, with the right cues, be turned into almost any other sort of cell. The next year they showed how to create human iPSCs.

In 2016, a team led by Hayashi Katsuhiko, then at Kyushu University, announced that it had turned iPSCs from a female mouse into egg cells, fertilised them and implanted the resultant embryos into the uteruses of other mice. This eventually produced eight healthy pups. In March this year a team which included several of the same researchers announced that, by using stem cells that had lost their Y chromosome, they had managed to do the same thing with eggs made from the skin of a male mouse.

These feats of reproductive wizardry have generated a palpable excitement about the new field of fertility research called "in vitro gametogenesis" (IVG). If it proves capable of producing healthy eggs where there were none before, it could herald the biggest change in reproductive technology since IVF itself. Henry Greely of Stanford University, a legal scholar who specialises in the ethics of new biotech, thinks IVG may within a few decades be widely used even by those who have no fertility problems. The reasoning is that, if IVG proves capable of producing viable eggs in copious amounts, it could allow the production of a large enough number of embryos to allow screening for a wide number of genetic traits, and that could be something many parents might want.

#### Of mice and semen

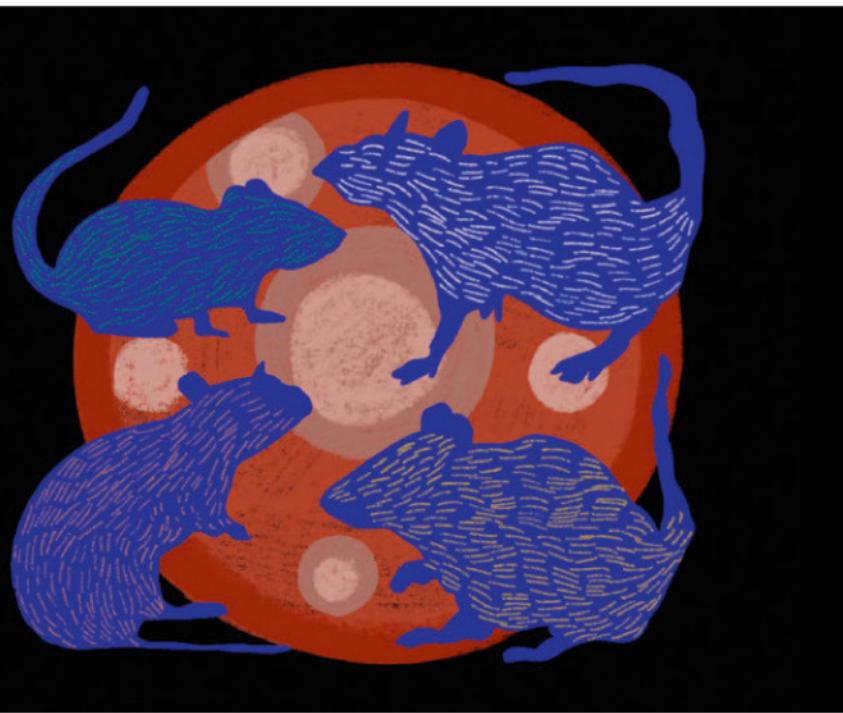
The biologists behind the breakthroughs are far more circumspect. Dr Hayashi, now at Osaka University, is wary of brash statements about IVG's prospects in humans. Amander Clark, a biologist at the University of California, Los Angeles (UCLA) who has been working on IVG since the early 2000s, reckons it is "at least a generation, if not two" away from "ever getting to the clinic". Nevertheless, patents are being filed, vc wallets are opening and eager entrepreneurs are poking around academic labs seeking skilled researchers to poach.

The most obvious beneficiaries of a future in which people can have new oocytes made from other cells will be women with low ovarian reserves, either because of age, because cancer treatment has meant their ovaries had to be removed, or for some other reason. The technique could also offer eggs, and thus genetic parenthood, to transgender women and gay male couples. But experts expect that translating what has worked in mice into something that works for people will be very hard.

To make eggs from mouse cells means coaxing iPSCs into becoming cells that look like "primordial germ cells", common ancestors to egg and sperm. Those cells then have to be convinced to produce primary oocytes which themselves must then be matured into egg cells that can be fertilised. Early experiments led by Saitou Mitinori of Kyoto University and Dr Hayashi got the germ cells to go egg by transplanting them into the ovaries of infertile mice. Signals from the tissue around them were clearly key, so the team set about reproducing them in vitro using cells from mouse ovaries (see diagram on following page).

The Japanese team also transplanted germ-cell-like cells into mouse testes, where they developed into cells that produced sperm. They have not done the same thing entirely in vitro; a claim to have done so by Zhou Qi at the Chinese Academy of Sciences and others has not been replicated elsewhere. To make sperm that way would be another step forward, but a less consequential one. Eggs are in much shorter supply than sperm. And in nature sperm production requires Y chromosomes. Without further innovation that would rule it out for a woman in a same-sex partnership, or a trans man, who wants to fertilise a partner's egg.

In humans, Dr Clark has got as far as making primordial-germ-cell-like cells from human skin. Dr Saitou has achieved the same thing using blood cells and, by incubating the products with reconstituted mouse ovaries, has nudged them one step further, to become "oogonia", a closer precursor to egg cells. Matt Krisiloff, the boss of a Californian startup called Conception, says his company is further along, and could conceivably produce the first "proof-of-concept" mature human oocyte "within a year or maybe ►



▶ two". In May he showed *The Economist* pictures of ipsc-derived cells which the company believes to be relatively advanced precursors to human oocytes.

When the same pictures were presented at a scientific meeting, though, some attendees were unconvinced. And even if Mr Krisiloff is right and ivg eggs are just a couple of years off, he does not expect them to be of the quality a clinic would require or a regulator insist on. "It's possible that the first egg cells could turn out to be totally normal," he says. "But I will be really surprised."

In the Japanese experiments, fewer than 5% of mouse eggs made from ipscs produced healthy pups (the success rate with eggs from the ovary is 60-70%). The longer eggs spend in glassware the more development is thought to be disrupted, and ipsc-derived eggs spend a lot of time in glassware. On top of that, ipscs tend to accumulate mutations and chromosomal abnormalities of the sort which, if seen in an embryo, would greatly increase the risk of miscarriage and birth defects.

Another advance in reproductive technology, mitochondrial replacement therapy, offers a cautionary tale. Mitochondria are cellular components that drive metabolism. Unlike all the other gubbins in animal cells, they have their own genomes, a handful of genes kept on their own little bits of DNA rather than on chromosomes in the nucleus with the main genome.

All the mitochondria a human has come from its mother; the egg's copious cytoplasm is full of them. So if a woman has a dangerously faulty mitochondrial gene this can be bad news for her children. One way round this is to fertilise such a mother's egg and a donor egg at the same time and then replace the nucleus in the fertilised donor egg with that from the mother's egg. The resulting embryo has a nuclear genome provided by the mother and father, as usual, and a mitochondrial genome from the donor. This mitochondrial replacement (sometimes misleadingly seen as producing "three-parent" children) is also practised, in some clinics, as a possible way to better the odds for an older woman's eggs.

**"First we have to understand the basic mechanism of how eggs get old, then we can try to find a way to stop it"**

Unfortunately, experience and experiments have revealed a problem. Small amounts of mitochondrial DNA from the mother can get into the embryo along with the nucleus and gradually push out the mitochondrial DNA from the donor, a process called "reversion". First identified as an issue in animal studies, reversion has now been seen in at least one human case, luckily not one where the mother was a carrier of mitochondrial disease. It is a sombre warning shot about experimental reproductive technologies.

Regulators are taking a cautious path with ivg. In Japan researchers are banned from fertilising any human eggs they produce using the technique. Elsewhere fertilisation is allowed for research purposes, but not for reproduction. In Britain the Human Fertilisation and Embryology Act specifies that only the products of genetically unaltered eggs and sperm extracted from a man or woman's reproductive organs may be placed inside a woman. In America, any human tissue that is more than "minimally manipulated" becomes a drug or device and this falls into the purview of the Food and Drug Administration.

The fda has taken a keen interest in mitochondrial-replacement therapy; if it thinks those manipulations are more than minimal it seems very likely to feel the same about those involved in ivg. "They would probably claim that the sperm and eggs were drugs," says Mr Greely, "and they certainly would claim the embryo was."

Regulators and the politicians to whom they answer will weigh questions beyond patient safety and welfare. As Lucy van de Wiel of King's College London, puts it, "There's a lot of controversy around people using technologies to have children later in life, particularly if those people are women." Adding trans women and gay couples to the mix will hardly defuse that controversy. The comparative ethical and technical simplicity of egg donation may see ivg's role limited to special cases.

#### Eggs of Eden

If controls were to be very strict, or even prohibitive, they might possibly be circumvented. Many suggested this would be the fate of the bans on human cloning enacted after Dolly, a sheep, was cloned in 1996. But there is no evidence that they have been. Cloning human embryos in the lab is possible; techniques similar to some of those used in mitochondrial replacement can place a new nucleus into an egg just after fertilisation. But despite a copious supply of the rich, the morally challenged and the megalomaniac, any incipient demand the world may have for mini-mes seems to have so far gone unfulfilled.

The market for ivg seems likely to be larger than that for cloning. But that hardly means it will spring up as an underground offering. As Dr Hayashi points out, ivf is popular because it is relatively safe, easily performed and uncontroversial. ivg is none of those things, at least not yet.

That is one reason why Dr Hayashi's current research focuses as much on eggs still in ovaries as on eggs created outside them. A girl hitting puberty typically has a few hundred thousand primary oocytes; they are the cells that can become mature eggs. Every month ➤

somewhere between a few and a couple of dozen of them will be activated and begin to mature. Only one or two will make it to full maturity and head out into the Fallopian tubes. The rest are, from then on, out of the equation. (The hormonal manipulation used in IVF cycles is designed to get round this winner-takes-all approach and let as many as possible of the activated eggs mature.)

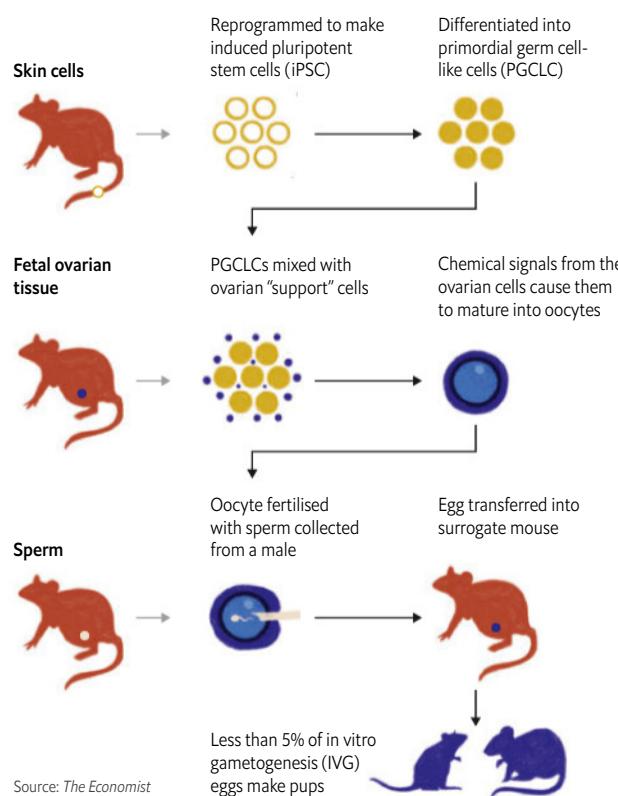
Some researchers believe control over the activation and maturation of the primary oocytes could help women who do not respond to hormonal stimulation. Dr Hayashi's team recently identified four of the genes involved. A better understanding of the process might make it interruptible. Today's contraceptive pill is designed to stop ovulation, but not to keep oocytes from maturing. A pill that stopped oocytes from being activated might work as a contraceptive while keeping a woman's stock of eggs from shrinking month by month.

Quality, though, is as important as quantity. A woman's oocytes accumulate chromosomal abnormalities as she ages. Older women who go through repeated rounds of IVF become painfully aware that they are not only producing fewer eggs, but also that a growing number of those eggs generate embryos with genetic defects that prevent them from progressing to full pregnancies.

Dr Hayashi wonders if this could be changed by identifying the specific processes that cause eggs to deteriorate. One insight which may help is that the quality of egg cells, and their ability to generate viable embryos, varies with their levels of cohesin, a protein which helps hold chromosomes together and is involved in the repair of DNA.

Do not look for a cohesin booster any time soon. "First we have to understand the basic mechanism of how [egg cells] get old," says Dr Hayashi. "Then we can try to find a way to stop it." But the new tools he and others are bringing to that understanding are cause for hope—and make a strong case for a new commitment to the basic science of fertility. ■

#### → Gamete, set and match



#### The work still needed

## Conception, reconceived

A dearth of basic research has hampered assisted reproduction. That may be changing

**O**N THE THIRD day after fertilisation a human embryo is made of six to 12 roughly identical cells; on day four its cells appear to fuse into a mostly uniform blob; and on day five it puffs out to reveal two completely new groups of cells—an outer layer that will go on to form the placenta, and an inner clump that will develop into the fetus. How this happens is a mystery. So is how things happen after day six—a particularly frustrating one, given that it overlaps with the crucial stage during which the embryo readies itself for implantation into the wall of the uterus and a pregnancy either begins or does not.

Many tens of millions of human embryos have been created in laboratories over the past half century. Yet how they achieve their remarkable development from a single cell to a human being remains, in substantial ways, opaque. The fundamental mechanics which govern how a new human life takes shape—the cellular, molecular and genetic underpinnings of human fertility and infertility—are, largely, a black box.

There are many reasons for a lack of research into the basic biology of baby-making. One is that health issues perceived as significant mostly to women have often been treated as low research priorities. Another is that such studies have, until now, relied on donations of tissue, eggs, sperm and embryos. Research which creates human embryos raises issues that some funders will not countenance. Since 1996 America's National Institutes of Health (NIH), the largest funder of biomedical research in the world, have been forbidden by law from spending money on research in which human embryos are created for research purposes only, or in which any embryos are destroyed. It is "difficult for scientists to even engage in new innovations in IVF and overcoming those really challenging cases of infertility" under such conditions, says Amander Clark of UCLA.

Then there is the nature of the problem being faced. Unlike cancer, which attracts a huge amount of research spending, infertility is not a life-threatening condition and often not really seen as a life-imparing one either—if it is seen as a medical condition at all. The American Medical Association did not recognise infertility as a disease until 2017. Nor are drug companies queuing up to take a crack at the problem. They make little money out of infertility treatment, and they allocate research money with the bottom line in mind.

#### Confusion is nothing new

Finally, research efforts are made in the context of IVF's success. On average, IVF has been doing an OK job, working (in the end) for roughly half of those who try it. That makes alternative approaches less urgent. At the same time it masks the fact that growing drivers of infertility today—most notably, people seeking to start their families later—are not the sort of physical problems that IVF was designed to address. Thus an increasing number of people find themselves left behind by reproductive medicine, with all the frustration and heartache that follows.

Added to this, IVF's technical success is not of the sort of thing basic scientists are used to building on. The technique did not spring from insights into how fertility worked or could be improved, but on first contriving a change of venue that maximised the chances of fertilisation and then making repeated attempts at implantation and pregnancy. Its success came from learning how



► to extract eggs, recognise viable embryos and transfer them to the womb. Getting better at those things provides babies to some; it does not explain how they are made.

"We are doing things a little bit backwards because we are missing the base," says Rita Vassena, CEO of Fecundis, a Spanish-Argentinian biotech company. "We don't have a clear understanding even of how normal physiology in detail works...Because we are missing this very substantial bed of understanding underneath what we do, it is very hard for us to do something because [for example] we know that if we change this receptor then this cascade will work differently and the cell will do [something different]. By and large, we don't know." This is very different to many areas of medical research—most notably, at the moment, cancer—where a layered understanding of how cells function is used to design treatments that are meant to correct specific problems.

Rather than being optimised according to an understanding of what happens naturally, current practices are developed on the basis of what has worked in the past. Different clinics have different practices for how to store sperm samples ahead of fertilisation. Embryologists who have analysed the commercial solutions in which clinics grow embryos have found different make-ups. That might suggest that the exact nature of the incubation medium does not matter much; alternatively it might mean that there is a long way to go to perfect procedures and maximise an embryo's chance of survival. Having found evidence that ambient pressure controls whether the eggs of mice are dormant or not, Hayashi Katsuhiko of Osaka University suspects pressure and temperature may be vital to the fate of an embryo. Again, such factors are not standardised across labs.

In her previous role as scientific director of the Eugin Group, which operates 69 clinics in 11 countries, Dr Vassena noticed that IVF was falling short of what happens naturally in their donation programme. A woman who has conceived and given birth naturally after just two or three months of trying can be taken as having a

30–50% success rate per egg. When such a woman donated eggs for IVF, Dr Vassena noticed the success rate frequently fell to 10% or so. "Our goal should be to [get] as close as possible to natural fertility," she says. "We are far away from that."

Help seems to be at hand. Basic research into stem cells has brought forth the possibility, though still a distant one, of making eggs and possibly sperm for use in clinics through IVG (see previous article). The provision of eggs for research is a nearer-term possibility, freeing researchers from their reliance on donations. And the insights derived from watching and manipulating the production of eggs and sperm should prove very useful. Roughly a quarter of infertility is due to anovulation, a condition where women do not produce oocytes. This sort of fundamental research might provide a treatment for that. It is quite plausible that IVG will contribute more to infertility as a research tool than as a clinical alternative.

### Time after time

Research will not be limited to eggs and their development. Work done with stem cells and their derivatives could make good the current lack of human tissues that can be used for research. Stem cells that have been nudged into mimicking early embryonic cells and placed in a dish are able to self-assemble into three-dimensional structures that resemble those seen within the first weeks after fertilisation. Fertility researchers in America, Europe and Israel are using stem cells to create such "embryoids" and study the processes that go on within them.

Some embryoids are built to mimic the entire embryo, others just one aspect of its development. Neither sort "will ever be used for reproductive purposes", says Dr Clark, adding that the latter type of embryoid lacks any potential to form a baby. "They are asking very specific questions about very specific cell types." Such research should provide answers to questions about infertility—like what it is about an embryo which leads to a miscarriage—and also congenital disease—such as how does the heart form when it forms properly?

As with IVG, the challenges are not purely scientific. Both techniques raise questions about what science is ethically acceptable. The NIH is negotiating the federal ban on funding specific types of work with embryos by allocating grants to embryoid research on a case-by-case basis. The IVG question has not yet come up.

A steady supply of new ethical questions is an inextricable part of assisted reproduction. Indeed, those raised in the lab can be comparatively simple compared with those already faced by judges who have to decide questions such as whether parents can use frozen cells from deceased children to create a new generation. As what makes a human becomes better understood, and as new ways of helping the process along become more practical, new arguments for legal constraint may arise.

For many, though, they will be a price worth paying if, at the same time, in-built biological constraints are lowered. Such advances could realise new possibilities for same-sex and transgender parents and provide women with new ways to stop and reset—or render irrelevant—their biological clocks. The joy of parenthood that IVF has brought to millions could be spread yet further. The heartache of a failed IVF cycle would surely remain, but fewer would feel it. And if fewer ended up choosing quietly, privately, inconsolably to stop trying, that would be progress indeed. ■

**ACKNOWLEDGMENTS** A list of acknowledgments and sources is included in the online version of this Technology Quarterly

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Moscow murk

## All the tsar's men

Vladimir Putin struggles to restore authority after a mutiny

TWO DECADES ago Yevgeny Prigozhin, the violent ex-convict and restaurateur who heads Wagner, a Russian mercenary group, published a fairy tale he had written with his children. In it, a band of friends rescue a shrinking king by blowing a magic flute. At first he grows too fast, smashing a hole in the palace ceiling, before they bring him back down to size. "A very dangerous toy," says the king, taking away the flute.

Mr Prigozhin long helped inflate Vladimir Putin, for example by running pro-Kremlin troll farms. Now he has cut him down to size. Last month his soldiers seized a military headquarters in the southern city of Rostov-on-Don and drove towards Moscow, downing several helicopters and a plane along the way. Mr Prigozhin said his "march of justice" was meant to remove Sergei Shoigu, the defence minister, and Valery Gerasimov, head of the army, or to reverse their decision to integrate Wagner into Russia's regular forces. But he added populist anti-corruption slogans borrowed from Alexei Na-

valny, Russia's main opposition leader, pledging to purge Russia of its thieving elite. The failure of security services to prevent the plot, the army's lack of resistance and the silence of the regime's propagandists exposed Mr Putin's weakness. His bewildered appearance on television amplified the humiliation.

Under Russian law Mr Prigozhin should face prison for mutiny, recruiting mercenaries, arms trading and homicide. According to the unwritten rules of Mr Putin's mafia state he should probably be dead. Instead, on June 29th, five days after Mr Putin

vowed to crush the revolt, he met Mr Prigozhin and his commanders in the Kremlin. He regretted that they had got mixed up in a mutiny and offered to let them keep serving under a new commander.

Nobody has been charged with the deaths of some 13 pilots downed by Wagner. Mr Putin recently denied the group existed (having admitted two weeks earlier that it had been financed by the state). Mr Prigozhin is thought to be in Belarus with some of his fighters. State tv bashes him, but many of his channels on Telegram, a message app, still operate. Military officials close to Mr Prigozhin, including General Sergei Surovikin (once in charge of the invasion of Ukraine), have reportedly been detained and questioned. Some of Wagner's arms have been taken over by the army. But as *Novaya Gazeta*, an independent Russian newspaper, writes, it is too early to write off the "chef".

Whatever happens to Mr Prigozhin, his mutiny revealed the erosion of the state and the flimsiness of Mr Putin's support base. His authority has so far relied less on mass purges than on a consensus between power groups. His political opponents have ended up dead, jailed or in exile. Meanwhile he has sown rivalries between his loyalists, prevented consolidation in the army and the security services, and created parallel structures such as Wagner.

This worked in peacetime but faltered under the stress of war. Mr Prigozhin's mu-►

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► tiny was not an under-the-carpet factional squabble but a public split within Mr Putin's "pro-war" constituency. On one side stands the conformist elite, trying to keep up a pretence of normal life. On the other is a group of angry military patriots, most prominently Mr Prigozhin. Most worrying for Mr Putin, the army itself seems split.

The Levada Centre, an independent pollster, found that 92% of Russians followed the coup to some extent. Almost half sympathised with Mr Prigozhin's criticisms of corruption, military incompetence and lies about the war, though only 22% trusted the Wagner boss himself. Many of the sympathisers did not support either side, said Denis Volkov, a sociologist at Levada; they tuned in for a fight between "a toad and a viper".

The mutiny also showed that Telegram, and Mr Prigozhin's network of trolls and bloggers on it, have eroded the Kremlin's monopoly over information. While television propagandists awaited instructions, the mutiny unfolded online. Less than a quarter of young Russians trust TV. Mr Putin staged a parade of uniformed men in the Kremlin, praising them merely for not joining the mutiny, and flew to Dagestan, a Muslim region on Russia's side of the Caucasus, for a show of adoration. An eight-year-old who supposedly cried because she did not get to see the president was flown to the Kremlin and presented with 5bn roubles (\$55m) for Dagestan's needs.

The absence of public retribution against high-ranking military officers who sided with Mr Prigozhin suggests that Mr Putin is worried that purges could create rifts in the army. New cracks appeared on July 13th. Major-General Ivan Popov, commander of the 58th combined-arms army, one of the country's largest and most capable units, went public after being fired for telling his superiors what was happening at the front: huge losses, inadequate rotation and inferior counter-artillery capabilities. "The forces of Ukraine could not break through our army from the front, but our senior commander hit us from the rear," said Mr Popov in an audio message that was posted online.

What happens next depends on the battlefield. The bombing of the Kerch road bridge that connects Russia to Crimea, which Russia attributed to Ukrainian naval drones, was another blow. Mr Putin maintains that Ukraine has failed to achieve any progress in its counter-offensive. Russian commanders have defended against Ukraine's counter-offensive well ahead of prepared fortifications, instead of falling back to defensive positions. This slows the Ukrainians' progress. As one foreign military official put it: "It is like hitting a brick wall with a sledgehammer." But Mr Prigozhin's mutiny showed that if the wall crumbles, there may not be much behind it. ■

### Ukraine's nuclear plant

## Bracing for disaster

ZAPORIZHIA

### Living next to a Russian-occupied nuclear plant

**I**NITIALLY LIDA POPRUHA was not sure what to make of claims that Russia was preparing an attack at the nuclear power plant. She knew that her flat in the city of Zaporizhia sat inside a potential evacuation zone. But would there really be an explosion? Then she recalled being caught behind Russian lines last year in her family home some 80km to the east, and her fraught escape with her two children to Zaporizhia. This time she would leave before it was too late. On July 5th the Popruhas quit the city on a westbound train filled with anxious humanity.

Zaporizhia has seen more of this war's refugees and destruction than almost any other city in Ukraine. Now it must manage its role on the nuclear front line. The huge nuclear plant 50km south-west of the city has been turned into a fortified base by the Russian occupiers. Many residents have left, but others are staying put. "Where will I go, me with my walking stick?" complains Yelena Petrova, a 74-year-old pensioner selling kvass (a fermented rye drink) on a now-deserted high street.

The local children's hospital has prepared a decontamination centre and supplies of food and water for 14 days. On the first sign of nuclear danger the entire hospital will move to the basement, its chief doctor says. "Each member of staff has their instructions: stay in the building, stay low, turn off ventilation, water, wash the incoming with laundry soap." On June 29th Zaporizhia's emergency services ran a



dress rehearsal for a major incident with approximately 100 local rescue workers. Kyryko Kuzmenko, a specialist in the local emergency ministry, says they "have new radioactive hazard suits, and we have drilled for putting out a fire at the plant if it comes to it—and if we get access."

The worst case for Ukrainian planners is that Russia limits access to a nuclear emergency site. In early July Ukrainian military intelligence warned that Russia had mined two reactor blocks and a cooling reservoir, and intended to set off an explosion. Russia responded absurdly that Ukraine was preparing to attack the plant with a ballistic missile containing radioactive waste. Many fear a Russian-engineered incident if Ukraine's counter-offensive achieves a breakthrough. A Ukrainian military source insists his side would never attempt to storm the plant itself.

Earlier this month four inspectors from the International Atomic Energy Agency (IAEA) based at the plant said they had found no evidence that Russia had mined the reactor blocks—though they had not been granted full access. A Ukrainian official expresses anger: How could the inspectors issue conclusions when they had not seen the entire plant?

The plant is the largest of its kind in Europe. At one point it employed 11,000 people; approximately 3,500 remain. Some have signed contracts with the Russian occupier, but most top-level staff remain employed by Energoatom, Ukraine's state-run nuclear firm. In phone conversations several report a regime of "terror" and an absence of safety protocols. "Maxim", a technician who left the plant in early July, says the Russians view it as a perfect fortified military base. The soldiers are in charge of "everything", he adds. "If they say they need to pour 100 tonnes of sand on the reactor roof...there is no one to stop them."

Petro Kotin, the head of Energoatom, estimates that Russia has 700 soldiers at the plant. In theory, its design protects against disaster. All its reactors were shut down in September, but contrary to Ukrainian requests, Russia maintains one in "hot standby shutdown", meaning the fuel continues to react slowly. The risks of a major incident are low. An explosion now would emit 245 times less radiation than at a working reactor, says Mr Kotin. That might not even require the evacuation of people living around the plant.

But Russia could manufacture a disaster in less than 24 hours, he warns, by powering the reactor up or reducing the water in the cooling pools to critically low levels. That would be hard to do without technical assistance. Still, Oleh Glinsky, a technician who fled the plant in 2022, says one should assume the worst. "No one thought [the Russians] would blow up the dam in Nova Kakhovka, but they did." ■

## France and Europe

# Le Zeitenwende

PARIS

## A French geopolitical shift could reshape Europe

**W**HEN Olaf Scholz proclaimed a *Zeitenwende*, or “historic turning point” for Germany, after Russia invaded Ukraine, it startled Europe. The German chancellor’s promise to invest heavily in defence, though haltingly implemented, marked an abrupt change. Far less noticed is an equally arresting shift taking place in France. The implications of its turning point for Europe could be just as significant.

France’s *tournant historique* consists of a double inflection point. Each touches a fundamental precept. One is Ukraine’s membership of NATO. The other is the enlargement of the EU’s borders to the east and south. France, once sceptical about welcoming newcomers to either group, has quietly become an advocate for both.

It was in the run-up to the NATO summit in July in Vilnius, Lithuania’s capital, that many of France’s astonished allies first grasped its new approach. France lined up beside Britain, Poland and the Baltic states, arguing for a fast track into the alliance for Ukraine after the war. “We need a path towards membership,” Emmanuel Macron, the French president, declared in Bratislava, Slovakia’s capital, on May 31st.

This set France apart from not only Germany but America, “to the apparent surprise of the Biden administration”, noted Daniel Fried, an American ex-diplomat. In 2008 France and Germany blocked Ukraine from immediate membership of the alliance. Four years ago Mr Macron told *The Economist* that NATO was experiencing “brain death”. Even after Russia sent in the tanks, Mr Macron at times seemed as worried about its future security as about Ukraine’s. Yet Europe’s eastern flank has found an unexpected new champion.

France’s second shift, on EU enlargement, is less visible. A decision on whether to open membership negotiations with Ukraine (and Moldova) is not due until December 2023, after an initial discussion in October. But talks are well under way, not least because such an expansion would require complex changes to the rules governing the EU’s internal organisation. A Franco-German working group is looking at the implications. The European Commission will report back in October on enlargement, including to the Western Balkans.

France has traditionally been wary of enlargement, regarding expansion as a threat to its preferred strategy of “deepening” the union and forging a political pro-

**The beginning of a beautiful friendship**

ject. Britain, when still a member, was an arch-enlarger, and thus viewed with suspicion in Paris for seeking to turn Europe into a mere trading zone. In 2019 France vetoed the opening of membership talks with Albania and North Macedonia.

Russia’s war has transformed Mr Macron’s approach. Last year his diplomats worked hard to secure support for the EU’s decision to grant Ukraine candidate status. France lifted its veto on the bids by Albania and North Macedonia, enabling membership negotiations to begin. The warmth of Mr Macron’s speech in Bratislava dazed central and eastern Europeans, long favourable to a broader EU. “The question for us is not whether we should enlarge,” he declared, “but how we should do it.”

Many observers remain sceptical. “It was a free lunch for Macron to back Ukraine’s NATO membership,” argues a European diplomat, noting that France knew full well that the Americans would put on the brakes. The tactical interest for Mr Macron in standing up for central and eastern Europe is plain, after the credibility he lost last year over his outreach to Vladimir Putin. France’s line on NATO was partly tactical too: a robust message to Russia, it argued, would strengthen Kyiv’s hand in any future peace negotiations.

Yet there are reasons to think that this double French shift reflects a geopolitical reassessment. Mr Macron, pro-European to the core, has long been preoccupied by the need to fortify what he calls “European sovereignty”: the continent’s capacity to determine its future amidst great-power rivalry. This concern is accentuated both by the existential threat to Europe of an expansionist Russia, and by the possibility that an America led by Donald Trump, should he win next year’s election, would be less committed to European security.

France’s conclusion is that Europe “can

no longer accept ‘grey zones’ between the EU and Russia”, says an official. Unless countries on the fringes are anchored inside the EU or NATO, they will be vulnerable to autocratic powers. The last phase of enlargement happened “when we thought that liberal democracy would spread and become the dominant model”, says Laurence Boone, France’s Europe minister: “Today that’s not the case. So we need to move to a geopolitical construction.” Enlargement becomes a tool for consolidating European sovereignty. And a wider EU is not an alternative to a deeper political project, but a means of achieving it. “This really is a structural shift,” argues Benjamin Haddad, one of Mr Macron’s deputies.

None of this means that enlargement will happen any time soon. Membership talks are proceeding grindingly slowly with four Western Balkan countries; Montenegro’s began over a decade ago. Absorbing Ukraine would be complex, long and fraught. But it is now viewed in Paris as a geopolitical imperative. Mujtaba Rahman of the Eurasia Group, a consultancy, expects EU leaders to open membership talks in December. France alone cannot dictate the choices of the 27-member club. But it remains a forceful guide to those decisions. Its *Zeitenwende* could be crucial to determining the future shape of Europe. ■

**Russia’s assets abroad**

## Come and take them—if you can

**Russia’s assets are safe while the West fears precedent**

“**B**ANK ROBBERS should not expect banks to honour their safe deposit boxes.” So write Larry Summers, formerly America’s Treasury secretary, and his co-authors in a recent article arguing in favour of seizing Russian assets in Western accounts. More than €200bn (\$225bn) of Russian central-bank assets are frozen in the EU alone. Politicians in the bloc’s eastern states, not to mention in Ukraine, want them used to pay for the damages caused by Russia’s invasion. The problem is that under international law there is no clear-cut way to seize those assets without a vote in the UN Security Council, a judgment by the International Court of Justice (ICJ) or a post-war settlement. Each of those would require Russia’s agreement.

The latest to learn this was none other than Ursula von der Leyen, president of the European Commission. During a speech to the annual Ukraine recovery conference in London on June 21st, she announced that her commission, the bloc’s executive arm, ►

would come up with a proposal before the summer to make use of Russia's frozen assets. At the same time the ambassadors of the EU's 27 member states were chewing over a legal assessment of the issue by the EU's rotating chair, Sweden. The verdict of many around the table, according to those present, was that the legal obstacles would be formidable.

About a week later, the leaders of the EU's countries told the commission to restrict any proposal to what was legally plausible: a windfall tax on the private firms that hold the frozen Russian assets, and thus make profits on them. Even that plan is so controversial among member states that the proposal has been postponed until after the summer, according to press reports. The European Central Bank (ECB), too, has major reservations.

Legally, experts say, the plan is sound. Euroclear, a private clearing-house and securities depository in Belgium, had to stop all payments to Russia as a result of sanctions. It is now sitting on almost €200bn-worth of assets and cash. Smaller amounts are frozen in the accounts of similar firms elsewhere. These holdings generate gains: in Euroclear's case, €720m of pre-tax profits in the first quarter of 2023 alone. That profit could be taxed more heavily—at a rate approaching 100%—to generate revenues. The clearing house would keep something to compensate it for the cost of managing the cash (which Euroclear says amounted to €9m in the first three months of 2023) and for any higher capital requirements that regulators prescribe.

Yet the ECB and some finance ministers fear for the euro's reputation. Any move against Russian central-bank assets could undermine the euro and European government bonds as a store of value for other central banks around the world, they say. At the least, the argument goes, Europe should act in tandem with other states in the G7, the club of the world's richest democracies, to make sure the reputational loss is shared.

Critics of the ECB's position argue that any reputational damage is already done: the reserves became useless to Russia when they were frozen. The G7 made clear on July 12th that the freeze will remain in place until Russia pays for the damage it has done in Ukraine, providing an incentive for Russia to settle. Using revenues from the assets, it is argued, is a small additional harm. If agreement among the G7 can be found, the commission will probably present a proposal after the summer.

Other ideas have been mooted. The EU could try to get better returns on the assets, for example by demanding that the private entities holding the Russian funds put them into higher-yielding investments, and transfer the profits to an EU fund. But that option has been taken off the table: the

## Ukrainians in Poland Pierogi, by any other name

WARSAW

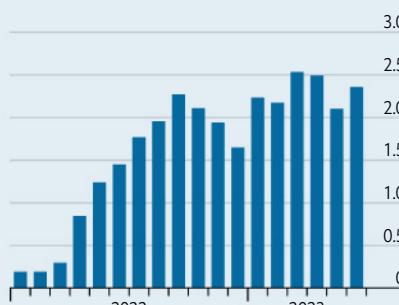
**Ukrainian immigrants are changing Poland's economy—and its diet**

"POLES ARE conservative," complains Ernest Suleimanov, who in January opened Warsaw's first Crimean Tatar restaurant. Customers love his *chebureki* (meat pastries) but have trouble with the digital menus that are ubiquitous in tech-savvy Ukraine. Mr Suleimanov is one of more than a million Ukrainians living in Poland, many of them refugees from Russia's invasion. Now they are reshaping the country's high street: since the war started, Ukrainians have opened some 8% of all new sole-proprietor businesses, and the number keeps rising.

Some Ukrainians are piloting new concepts. Olha Savchenko founded a co-working space for beauticians and

### Setting up shop

Poland, new business launches with sole Ukrainian owners, '000



Source: Polish Economic Institute

hairdressers in Warsaw, with 55 beauty stations hired by freelancers. The place has a nightclub vibe, with a barista and house music, and it is a hit. Others bring Poles a taste of the unfamiliar. Natalya Gordiyenko created Kapsula, a marketplace for fashion designers. She says Polish women are less daring than Ukrainians, preferring black and white clothes over bright colours, and prioritising fabric quality over tailoring.

Ukrainian companies have followed the émigrés. Nova Post, Ukraine's biggest private postal service, has opened branches in 21 Polish cities. Initially it brought refugees their belongings; its next goal is delivery services for online shops. In 2022 Poland lowered administrative barriers for Ukrainians setting up businesses, putting them on the same footing as locals. That makes the country an easy gateway to European markets.

Polish companies are seeking the newcomers' business too. Banks run Ukrainian-language services; one offers Ukrainians free accounts with no need for a Polish address or phone number. Supermarkets carry Ukrainian staples like salt-dried fish and crab-flavoured crisps. The word "Russia" has been excised from food labels. The potato-cheese dumplings once known as *pierogi ruskie* have been rebranded as *pierogi ukrainskiye*. As for "Russian" mustard, it is now simply "spicy".

legal risks are higher, since the EU would take a more active role in managing Russia's assets. If losses occurred on the investments, European taxpayers could, awkwardly, be liable for making whole the Russian central bank.

The EU dismissed more drastic proposals out of hand. It would be a clear breach of international law to seize Russian assets unilaterally. States are immune from other countries' legal jurisdiction and from having their property expropriated to settle debts. Under international law, sanctions on Russia are permissible only as a means to induce it to act differently. Simply confiscating assets would go beyond what global rules allow. "The rules on countermeasures contain a fine balance between what states need to be allowed to do to protect themselves and their rights, and the risk of abuse, especially by powerful states," says Federica Paddeu of Cambridge University. Such measures must be temporary, as far as possible reversible and intended as a

means to change behaviour, she adds, not as punishment.

Such scruples matter especially to the EU, a club founded on rules. Amid the geopolitical contest between America and China, where international norms seem to matter less and less, the EU is keen to uphold them where it can. In their latest attempts to become less dependent on China, European policymakers are at pains to find measures that comply with global trade rules. Less high-mindedly, state immunity protects the EU's biggest country, Germany, from claims by victims of Nazi occupation. A decade ago, the ICJ ruled that Italian and Greek courts cannot award German government assets to plaintiffs in such cases. There is little chance that Germany would agree to undermining state immunity. Taxing private profits on the Kremlin's assets may seem like too little for Ukrainians and others outraged by Russia's atrocities. But it is the most that the EU will be willing to do. ■

# Charlemagne | An American v Paris

*A spat in Brussels pits an open vision of Europe against an insular one*



PARIS, ROME, AMSTERDAM: Americans are everywhere you look in Europe these days, sweltering as they queue for tourist attractions in the midst of a heatwave. One place where they are apparently not welcome is Brussels. A proposal by the European Commission to appoint an American citizen, Fiona Scott Morton, as chief economist to its competition arm fell through on July 19th. After a week of French-led protests at the idea of *une Américaine!* advising the EU's executive arm in its trust-busting efforts, the Yale professor said she was no longer interested. What could have been a signal of admirable European openness to the world has instead underlined the growing influence of those who think the continent needs a more insular, Europe-first approach.

Ms Scott Morton's appointment on July 11th had been something of a coup for the commission and its chief competition enforcer, Margrethe Vestager. Anti-trust regulation is a niche field, and Ms Scott Morton one of its more recognised wonks, keen to advance the interests of consumers while preserving open markets and innovation. The hiring of foreign nationals by governments anywhere is rare, and unthinkable in America. Ms Scott Morton landing the job as the result of a competitive process made the EU look quietly confident, a place happy to bring in the best and the brightest regardless of their passport. In a world dominated by American tech firms, why not tap one of their compatriots (and a one-time official in the Obama administration) for insights? The EU is about to get sweeping new policing powers over digital giants; America in recent years has refreshed its thinking on regulating antitrust as it too has started taking on Big Tech.

In Paris, however, Ms Scott Morton's qualities were apparently irrelevant. Minister after minister clutched their pearls and demanded to know why Europe needed to look abroad to fill jobs. Emmanuel Macron, France's president, waded in by questioning whether the commission would lose its "autonomy of thought" if it hired one mid-level foreign adviser. A slew of MEPs and five of Ms Vestager's fellow commissioners also criticised the appointment. The French campaign got notably little support in the EU's 26 other capitals. But though many fellow academics came forward to defend her, few notable politicians did: her past work as a paid adviser to tech giants, although a common practice among

her breed of economists (including the current holder of the job she had wanted), made her a difficult cause to crusade for.

The defenestration of a would-be Eurocrat does not merely make the EU look provincial. It is indicative of France's success in its campaign to change the way the bloc thinks. The view from Paris, traditionally sceptical of globalisation and unduly free markets, used to be balanced out by more liberal voices. Bits of the EU apparatus in Brussels acted as a sort of liberal deep state, backed by small countries in northern and central Europe (not to mention Britain, once). The French view is now clearly dominant. Its core argument is that the EU is being naive by sticking to liberal shibboleths, since the rest of the world stopped playing by such rules a long time ago. Why, say, should the EU remain open to any and all foreign trade at a time when America and China have put up self-serving barriers at every turn? European state-aid rules prohibit subsidising "national champions" even though policymakers in Beijing and Washington gorge their firms with handouts. In short: America and China shamelessly put themselves first, so Europe should too. Liberal rules be damned.

The brief Scott Morton saga shows that the French still know how to get their way in Brussels. Four years ago Ms Vestager prompted dismay in Paris by (rightly) blocking a planned merger of the rail bits of Siemens and Alstom, two large European companies. Though she was decried in Paris as an "ayatollah" of free markets, the ruling stood, quietly backed by the open faction. That turned out to be a high point for liberal Europeans. The pandemic dented the appeal of globalisation and its world-spanning supply chains. War in Ukraine showed the risk of relying on others for vital inputs such as gas. The prospect of Trumpism rebooted has also set nerves jangling. Mr Macron's calls for "strategic autonomy"—Europe making plans to cope if it cannot rely on others, on anything from trade to defence—have become mainstream.

## Gosplan's revenge

The results are starting to add up. Europe's economy is looking ever-more statist, ie French. The idea of industrial policy was once taboo in Brussels. Now the need for one is accepted (the effort is led by Thierry Breton, the EU commissioner whose remit includes industry; not coincidentally he hails from France). National governments these days shower favoured firms with once-banned subsidies: Germany has spent an eye-watering €10bn (\$11.2bn) to entice Intel to build a microchip plant there. Increasingly, foreign firms keen to invest in some sectors now need official approval. At EU level, central planning-style targets have been proposed for the local production of everything from heat pumps to minerals.

Thus far, the French campaign has made steady advances against the liberal bloc rather than routed it entirely. But the momentum may shift further in France's favour. In Brussels, rumours abound of two big impending departures. The most notable is that of Ms Vestager, who has put herself forward to run the European Investment Bank, the union's financial arm. Another pro-globalisation heavyweight, Frans Timmermans, the Dutch commissioner in charge of the EU's Green Deal, is said to be mulling a return to politics in the Netherlands ahead of elections in November. A new slew of commissioners will be appointed next year, giving Mr Macron an opportunity to lobby for more influence for dirigistes.

The direction of travel is clear—and worrying. Europe will not soon descend into a planned economy. But a continent lacking in economic dynamism needs all the policymaking advice it can afford. That might even mean importing it, sometimes. ■



## Higher and higher education bills

# Crunch time

**Squeezing foreigners ever harder is not a sustainable way to pay for world-class universities**

**S**PARE A THOUGHT for students graduating from British universities this summer, after three grim years. In 2020 the pandemic forced the cancellation of their school-leaving exams, compelling them to make do with simulated grades. Lockdowns and remote learning tarnished their first years at university. Rocketing living costs and strikes by lecturers have been the latest buzzkill: because of a marking boycott, thousands will graduate late or without a proper classification. At Cambridge, one of the worst-affected places, half of final-year undergraduates are in that boat.

Students are not alone in feeling morose. The Office for Students (ofs), which regulates the sector, is monitoring finances at 31 universities. These undoubtedly include the University of East Anglia, in Norwich, which is seeking £30m (\$39m) in annual savings by September. Tuition fees paid by English undergraduates are capped by the government and have barely risen in ten years. Inflation has eaten away at their

value. The maximum charge was set at £9,000 in 2012; by September the fee will be worth only about £6,500 at 2012 prices. It is not set to be reviewed until 2025. Universities are heading towards a crunch.

By most measures they still rank among the best in the world. Britain produces far more than its share of highly cited research. Only America (with five times the population) wedges more universities into the top slots of global league tables. Dropout rates for English students are among the lowest anywhere. Britain is in the top

three destinations for foreigners seeking swanky certificates.

On taking office, the Conservatives saw universities as engines of growth. In 2012 the coalition government gave them a huge boost by agreeing to triple domestic tuition fees. At a stroke, funding per student rose by around 25%. The idea was in part about fairness, with more of the costs of doing a degree covered by graduates whose salaries are boosted by it. It was also to help universities expand faster—while keeping quality high—without being reliant on government grants. Expand they have: the share of English 18-year-olds going to university was about 38% last year, up from about 28% in 2012. For disadvantaged youngsters, it was up to 24% from about 15%.

Today the government has a chillier view of the sector. One reason is money. Student borrowers in England enter a national repayment system that collects a share of earned income over a given threshold (graduates this year will start paying when their earnings hit £27,295). Any debt outstanding when borrowers approach retirement is forgiven. The designers of this system have always assumed that sizeable sums will be written-off in this way, writes Sam Freedman of the Institute for Government, a think-tank. But recent projections suggest taxpayers will be on the hook for much more than had been ➤

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► expected—perhaps half of all that students have recently borrowed.

One reason is that, once the cap on fees was raised, almost all universities sold degrees at the maximum price permissible (the hope had been that at least some would try to compete on price). Government tinkering is also to blame: in 2017 Theresa May, then prime minister, loosened repayment terms to appeal to young voters. But what has really hurt is a banal but crucial accounting change. In 2018 the Office for National Statistics forced the government to start booking expected losses on student loans in the year they are issued (it could previously boot them far into the future).

Money worries compound other concerns. Education has an intrinsic value, but the government is struck by research suggesting around one-fifth of graduates would be better off financially over their lifetimes if they had not gone to university (that is particularly true among students of creative arts). It worries that Britons are less keen than other Europeans to do apprenticeships, or courses that require just one or two years of post-school study. Those might be as useful as degrees, and be cheaper. Ministers are also drawn into debates about "Mickey Mouse" degrees and "no-platforming", perhaps hoping to please voters irritated by woke lecturers and students.

Muddled thinking on universities has led to muddled policies. One big reform was the creation in 2018 of the ofis. The regulator aims to give youngsters certainty that their degrees are worth paying for. It puts useful pressure on those universities that have done a poor job of ensuring students finish their studies and find decent jobs. On July 17th the government confirmed that the regulator can limit recruitment to courses that fail to get at least 60% of students across those thresholds. But ministers have, over the years, also handed the ofis an assortment of tasks, such as monitoring policies on sexual misconduct and policing free-speech on campus. This distracts from original priorities, such as a goal of nurturing "challenger" universities to compete with incumbents. The regulator's rule-setting may, instead, be making it trickier to launch new outfits.

The biggest worry among vice-chancellors is the long-standing erosion of fees. These have been pushed up only once in a decade. Last year analysts for the Russell Group of universities, which includes many of Britain's best, said institutions in England were on average losing £1,750 a year per home undergraduate—this could become a £4,000 loss by the 2024-25 academic year.

Lots of universities have tightened their belts. They also seek more foreign students, who may be charged whatever the

market will bear. In 2021-22 foreigners made up 30% of all new undergraduates and postgraduates in England, up from less than 24% four years before. At the start of this century fees from non-EU students contributed about 5% of all university income. Now foreigners hand over more than 20% of their revenues. In 2020 foreign students spent £18bn on fees and living expenses.

One study using data from 2017-18 found that foreigners were on average paying £5,100 a year more than their courses cost to run. For years universities used these surpluses to subsidise research. Needs in that sphere are only growing: for more than two years the government has been failing to negotiate Britain's re-entry into Horizon, a European research collaboration programme that it left because of Brexit and that scientists say is essential to rejoin. But profits from foreigners are also having to be used to cover shortfalls in the cost of teaching English students. This year Vivienne Stern of Universities UK, an industry group, told a House of Lords committee that international recruitment "should be the cherry on the cake" for the higher education system, but has become "more like the flour".

Educating foreign students brings benefits. Yet relying on them to keep universities solvent is unwise. Until recently China sent more students than any country: institutions that take a lot of money from Chinese youngsters may become less likely to encourage teaching and research on topics that might displease Chinese officials. In the past few years arrivals from China have plateaued, as students from India and Nigeria make up the numbers instead. The newcomers bring less geopolitical baggage—but also less money. They are likelier than East Asians to fund studies with borrowed cash and so seek out lower-cost institutions. An average student from India pays about half as much in fees as a Chinese one, reckons the British Council, a government body that promotes culture abroad. They are also likelier to want to

bring along a spouse or children.

Even that source of income could be in jeopardy. The government worries that too many foreign students hurts its efforts to look tough on immigration. Universities fear it might reverse a policy, from 2019, that lets foreigners work in Britain for two years after their courses end (this is especially attractive to Indian students). Britain, meanwhile, may have to compete harder against rival destinations for foreign students. Australia said this year it would let some foreigners hang around for up to five years after graduation.

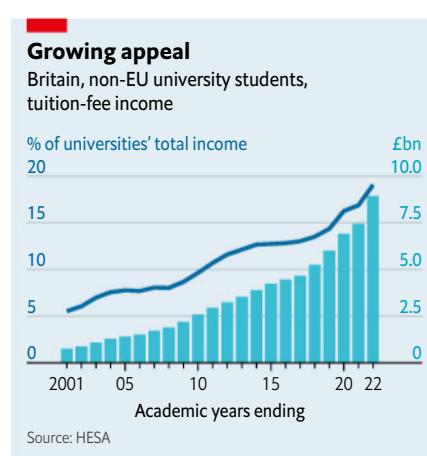
### A muddled income trap

All this is going to get harder to handle if British parents start believing that foreigners are squeezing their children out of places in their first-choice universities. Rejection rates at the most prestigious ones have been rising. That is more to do with the national increase in university-going than with foreigners. But the crunch will only continue: because of a demographic boom, the number of 18-year-olds in Britain will be 25% higher in 2030 than it was in 2020. Bigger-spending international students may become the focus of more gnarly debates.

What comes next? The government has tightened loan-repayment terms for new borrowers. The new rules will somewhat cut government spending on higher education, increasing the share of debt that future students will be asked to repay. In effect this reverses Mrs May's attempt to please the crowd six years ago. But there is no stomach to let fees float up. In May Robert Halfon, the universities minister, said putting up fees was "the last thing I can do", given the cost-of-living crisis. Fees are likely to remain frozen for at least another couple of years. Labour, which may form the next government, has only just junked its long-held opposition to any tuition fees, so sudden increases are unlikely.

As money grows shorter, universities may make some efficiencies. But they will not necessarily shed their least useful activities. Tighter budgets could mean they promote courses they find cheapest to deliver (generally not the rigorous technical degrees the government believes will make Britain more productive). That might end up increasing bills for government, if more graduates reach their twilight years without paying off their debts.

The decline in real fees feels like "a trap we don't know how to get out of", says Ms Stern of Universities UK. Universities may forgo investments in equipment and support services that gradually lower the quality of the degrees on offer. The big risk, she says, is not that a swathe of universities will go bust. "My worry is that we're going back to the 1990s, where you get a system that is slowly run into the sand." ■



# Bagehot | Cheer up, Westminster!

*The rise of the self-pitying MP*



THE HOUSE of Commons is designed to create conflict not consensus. Parliamentarians sit facing each other in the chamber and heckle. Coalitions are rare. Governments govern and oppositions oppose. Yet practically all MPs agree on one thing, that being an MP is terrible. Speak to a parliamentarian for longer than a few minutes and the complaints will come fast: the pay is woeful, patronage trumps competence, constituency work is draining, online abuse is rife and MPs are leaving in droves. The most powerful people in the country are now the most self-pitying.

What is more, pundits agree. "Why We Get The Wrong Politicians" by Isabel Hardman, a journalist, explains the everyday injustices of life in Parliament and has become a set text in sw1. Rory Stewart, a former MP and now a podcaster, said being a legislator was "bad for my brain, my body, my soul". The *Sunday Times* added to the pile: "All out! Why nobody wants to be an MP any more". It is a miserable picture. Thankfully, it is an inaccurate one. Cheer up, Westminster: things are better than they look.

For starters, talk of an exodus is overdone. Almost 70 MPs have said they will leave at or before the next election, with Ben Wallace, the outgoing defence secretary the latest. But this is no more than usual. Between 1979 and 2010, an average of about 90 MPs stood down at each election. At the last election 74 jumped. Many of those departing prematurely are doing so because they are likely to lose their seats anyway.

Complaints among MPs that incompetent bootlickers rise faster than their more talented and more principled peers are overdone. Parliament is, mostly, meritocratic. Those who are skilled rise quickly. Rishi Sunak became chancellor five years after entering Parliament; Sir Keir Starmer became party leader in the same stretch of time. Just because a few duds also reach the top does not mean that Parliament is stuffed with unused talent. This is tough to accept for anyone still on the backbenches, who gripe to journalists about it. Luckily, they have the time to do it.

Working in a swanky palace by the Thames does peculiar things to one's perspective. Pay, probably the biggest gripe for malcontent members, is only low when compared with industries where salaries have exploded, such as finance and law. At £87,000 (\$113,000), it is around double the London average. Increasing sal-

aries in Westminster may widen the talent pool, but it would not solve the fundamental problem: that the typical MP probably earns less than the best mate who went into the private sector.

Telling an MP about to spend another weekend litter-picking in their constituency that their hours could be worse would win few friends. It is, however, true. Parliament no longer regularly sits into the early morning. Recess, which kicks off for six weeks on July 20th, is not technically holiday even if many parliamentary assistants hear nothing from their bosses bar the odd call with a foreign dial tone. There are few professions which allow people the time to write books, practise law and present television shows on the side. Managing that as a head teacher would be tricky.

Other problems are self-inflicted. In recent years, MPs have willingly taken on the role of social workers rather than mere lawmakers. Now a constituency MP is expected to be able to help with everything from asylum applications to damp-ridden council flats. It is big-hearted but boneheaded. Too much focus on individual problems leads to MPs neglecting systemic ones. Politics is the quickest way to change a country; focus on that and the constituency mailbag will deal with itself.

Some things have become worse for MPs through no fault of their own. Abuse of politicians online is rife. Green-ink letters at least took effort; now nutters can send an insult at 1.13am on Twitter, confident it will be read by an MP "doomscrolling" in bed. At the same time, mild-mannered critique is sometimes painted as abuse. During a row over free school meals, Gary Sambrook, a Conservative MP in Birmingham, complained about graffiti that read "scum", which is unkind, and "Gary Sambrook eats big dinners", which is merely surreal.

Few people are willing to offer MPs a reality check. Pitying the most powerful people in the country is common among journalists in Westminster. During reshuffles, hacks sympathise with the ministers and their aides who have lost their jobs. The fact that ministers can lose their livelihood quickly is a feature, not a bug. Moaning about it is akin to complaining about democracy, and a call for a world in which human resources trumps politics.

## Nobody goes to Westminster any more, it's too crowded

For a supposedly terrible job, plenty of people still want to do it. Hordes of ambitious 30-something Labour activists are gouging each other for seats ahead of the next election. The Conservatives may be set for a hiding, yet each available seat has triggered a bunt-fight among wannabe MPs. Opposition is an opportunity. The Conservatives who ran the country from 2010 were those who signed up for duty in the 1997 and 2001 elections, when the party received drubbings. Yet a certain type of prospective politician expects to flounce into government, without muddying their hands campaigning or enduring a stint in opposition.

Complaining about life as an MP is the apogee of Britain's shift from democracy to whineocracy. Ministers sit atop the most unconstrained executive in the democratic world and complain about the "blob", a cabal of civil servants and judges who supposedly thwart their will. Literal lawmakers claim that they are powerless to change Britain.

All jobs have some drawbacks. But few come with the opportunity to wield power. Shaping a G7 country beats collecting a fat salary in the City. Britain has a centralised and responsive state. A good decision in Westminster can change the lives of millions for the better. Running a country is a privilege, not just a burden. There is no finer job. ■



China-India relations

## Asia's biggest beasts

DELHI

**Friendship between China and India could transform geopolitics**

CHINA'S RULERS like to look down on India. They scorn its turbulent politics, its creaky infrastructure and its poverty. India has looked across with a combination of fear and envy, hoping in vain to be treated as an equal. Now the tectonics of the trans-Himalayan relationship are shifting. Recent border bloodshed suggests mounting hostility. But blossoming economic ties tell a different story that could trouble America and its allies.

When India's most revered poet toured China in April 1924, Chinese intellectuals were unimpressed. Rabindranath Tagore had been feted globally as the first non-European Nobel literature laureate. A fierce critic of British rule in India, he hoped to rebuild an ancient cultural bond between Asia's oldest civilisations.

For leading Chinese thinkers, however, his call for a revival of Eastern values and spirituality rang hollow. The Chinese, they argued, could only resist the West by learning from it—and rejecting their own traditional culture. China's youth should not

become "Indianised", wrote Chen Duxiu, a co-founder of the Chinese Communist Party. "Unless, that is, they want their coffins to lie one day in a land under the heel of a colonial power."

Almost a century later, a sense of disdain still infuses perceptions of India among Chinese officials and scholars. Just look at the data, they say. At its independence in 1947, India's GDP per head was higher than China's (on a purchasing-power basis). But by the early 1990s, China had moved ahead on that and many other measures. By 2022, their populations were roughly equal but China's economy was more than three times bigger.

China's generals tend to dismiss India, too. China's crushing victory in a border war in 1962 is recalled with pride. And they contrast China's current arsenal of home-grown modern weaponry with India's continuing reliance on Russian imports. "There's no way that India can catch up with China in the next 20-30 years," says Senior Colonel Zhao Xiaozhuo of China's

Academy of Military Science.

Yet the fundamentals of the China-India relationship—military and economic—are now changing in ways that are forcing the world's biggest democracy and its largest autocracy to reassess how they deal with each other, and with the rest of the world. The hope among American and allied officials is that India's continuing frontier friction with China is pushing it irreversibly into a democratic coalition determined to constrain Chinese power. The question is: what if they find a way to shelve the border dispute?

Consider the military equation first. India has been drawing closer to America since they signed a civil nuclear co-operation pact in 2008. But their alignment has accelerated since a series of clashes on the Indian frontier with China, including one in 2020 that killed 20 Indian troops and at least four Chinese ones. That was the bloodiest skirmish there since 1967 and brought to an end a three-decade period of relative stability on the border.

India's armed forces have since undergone a historic shift of focus away from Pakistan. They have transferred about 70,000 troops as well as fighter jets and surface-to-air missiles to the frontier with China. They have also expanded joint exercises with America and its allies, especially Australia and Japan. America has provided some intelligence and high-altitude training for Indian border forces too. ➤

The war in Ukraine has provided another spur. Indian commanders fret about their dependence on Russian arms. India wants to buy advanced American weaponry and to make more in India. In Washington in June the prime minister, Narendra Modi, made progress, with deals to buy armed aerial drones and to jointly manufacture fighter-jet engines in India.

China's exact motivations on the border are murky. It may have been responding to recent Indian road-building, which enabled more extensive patrolling, or to frustration at a lack of progress in negotiations on a settlement. Or it may have wanted to penalise India for its earlier rapprochement with America, to expose the relative weakness of Indian forces and to show that they cannot rely on American help.

China sees itself as in another league from India, competing directly with America, says Deependra Singh Hooda, a former chief of the Indian Army's Northern Command, which oversees part of the Chinese border. China's message appears to be: "You're no match for the PLA (People's Liberation Army)... You're just a sideshow."

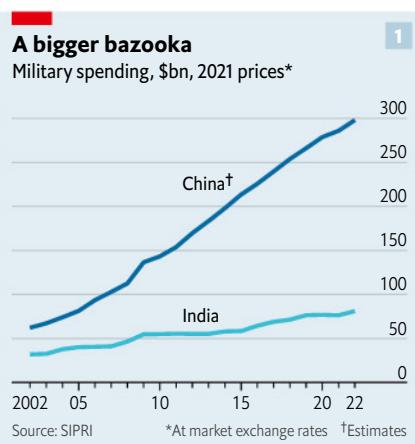
### A two-sided triangle

For whatever reason, Xi Jinping, China's leader, seems to think the fallout manageable. India's redeployments mean it can impose greater costs on China if it tries another border incursion. But China will for years keep enough military superiority to deter India from trying to recoup any perceived losses (see chart 1). And though India can help America in some areas, notably the Indian Ocean, it balks at a formal alliance and is unlikely to join a conflict over Taiwan or the South China Sea.

Nonetheless, Mr Xi has strong incentives to stabilise the border, as America steps up efforts to circumscribe Chinese power. So does Mr Modi. He seems keen to play down the frontier issue, knowing he has few military options. He is wary of drawing domestic attention to any perceived loss of territory. And compromise seems possible. After 18 rounds of talks between military commanders, troops have pulled back from five flashpoints, establishing "buffer zones" where neither side patrols. Two major flashpoints remain.

China is pushing for another round of talks and urging India not to let the border issue define the bilateral relationship. India's foreign minister, Subrahmanyam Jaishankar, met his Chinese counterpart in Jakarta on July 14th and discussed the frontier. In recent weeks he has stressed that without a peaceful and stable border, normal business ties cannot be resumed.

A survey of the economic landscape, however, puts such Indian warnings in perspective. Commerce between China and India was negligible for most of their modern history. But by 2020 trade in goods



had surged to \$88bn, with China enjoying a surplus of \$46bn and ranking as India's biggest trade partner (see chart 2). China had also become a big source of investment, notably in technology, property and infrastructure. Chinese brands are popular, too. Oppo and Xiaomi are among the bestselling mobile phones.

The border skirmish in 2020 put that all at risk. India banned some 320 Chinese apps, launched tax raids on several Chinese companies and introduced new rules requiring the Indian government's approval for Chinese investments. Indian officials say they since have rejected 157 relevant applications. And yet bilateral goods trade grew by 43% in 2021 and 8.6% last year. Chinese investment is finding ways in too, sometimes via Singapore. Shein, a Chinese online fashion company whose app was among those banned by India in 2020, is relaunching there soon in partnership with Reliance Industries, India's biggest private company.

Indian officials want to rely less on Chinese imports and to woo more investment from elsewhere, notably big multinational manufacturers looking for an alternative to China. "We need to stop looking for a China fix," Mr Jaishankar, the Indian foreign minister, said in May. "Indian growth cannot be built on Chinese efficiency."



Privately, though, many of India's business leaders predict that it will depend on Chinese imports for years to come if the Indian government is to achieve its goals in developing infrastructure and manufacturing. India's pharmaceutical industry, for instance, relies on China for roughly 70% of its active ingredients.

That does, in theory, make India vulnerable to the kind of economic coercion that China has inflicted on others. But China's leverage may be waning as it faces an economic slowdown, a shrinking population and an increasingly hostile West. Chinese companies now see India, whose population overtook China's this year, as an important source of growth, with Goldman Sachs predicting that Indian GDP will be second only to China's by 2075.

There are economic synergies in other areas too. India is the biggest borrower from the Beijing-based Asian Infrastructure Investment Bank, which China set up in 2016 as an alternative to Western-led lending institutions. India is also a member of the Shanghai-based New Development Bank, formed by Brazil, Russia, India, China and South Africa (the BRICS) in 2015.

Hearty economic exchanges are no guarantee against further border bloodshed—or even war. Both countries are led by men who feed off nationalism and historical grievances. Other tensions include China's growing influence in South Asia, its damming upstream of rivers vital to India, and the sanctuary that India affords the Dalai Lama, Tibet's spiritual leader.

Still, the burgeoning business ties will weigh ever heavier in both sides' decision-making. And stabilising the border issue, as was achieved for three decades after Rajiv Gandhi visited China as Indian prime minister in 1988, would leave ample room for co-operation. Both countries want a bigger role in global governance, reject Western criticism on human rights and climate change and share concerns about Islamic extremism. Both refuse to condemn Russia's invasion of Ukraine.

Also noteworthy is that before the recent frontier flare-up, Mr Modi seemed determined to build a close relationship with Mr Xi, taking the unusual step of hosting him in his home state of Gujarat in 2014. India and China shared similar aspirations, challenges and opportunities, Mr Modi said in Beijing the following year. "In the global uncertainties of our times, we can reinforce each other's progress."

Such a prospect may not please Americans and others who see India as a counterweight to China. Nor is it what Tagore had in mind in 1924, when he urged China to reject Western materialism and "free the human soul from the dungeon of the machine". But it may be the more realistic path towards a sustainable, mutually beneficial relationship between Asia's titans. ■



Tesla

## The swerve

### Elon Musk's new route to EV domination: be more like the industry you disrupted

**I**N 2011 TESLA stated an aim of becoming “the most compelling car company of the 21st century, while accelerating the world’s transition to electric vehicles”. At the time this was easy to dismiss as crackers. In the eight years since its founding in 2003 the firm had manufactured a piddling 1,650 EVs. Its first big-selling car, the Model S, had yet to hit the road.

Today it is almost as mad to argue that Elon Musk, the carmaker’s boss since 2008, has not achieved that goal. His company, a rare insurgent in an industry with formidable barriers to entry, has grown at neck-snapping speed. In the first quarter of 2023 Tesla’s Model Y mini-SUV was the world’s bestselling car. In the second quarter it delivered a total of 466,000 cars, beating analysts’ forecasts (see chart 1 on next page). Mr Musk’s promise of 2m sales this year, up from 1.3m in 2022, no longer seems fanciful. On July 15th the first Cybertruck, an angular, retro-futuristic pickup, rolled off the production line. Tesla has just unveiled

an expansion plan for its German factory, where it wants to double capacity to 1m vehicles per year.

Besides almost single-handedly reimagining the car, Mr Musk has done the same to the car industry. His focus on streamlined manufacturing of only a handful of models has kept costs at bay. Last year Tesla boasted operating margins of 17%; among non-niche carmakers only Porsche, which churns out fewer than 1m cars annually, matched its performance.

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Mr Musk’s ambition to dominate the auto business—by making 20m cars a year by 2030, double the current output of today’s top manufacturer, Toyota, and by creating the go-to self-driving system—certainly compels investors, who value Tesla at around \$900bn. That is down from over \$1trn in early 2022 but still more than the next nine most valuable carmakers put together. Incumbents are scrambling to electrify their product ranges and to copy Mr Musk’s vertically integrated approach to production, while fending off a wave of EV newcomers, many of them Chinese, all trying to be the next Tesla.

The question now is whether Tesla can keep growing as fast and as profitably as it has for much longer. In its latest quarterly earnings on July 19th, it reported margins of 9.6%, even lower than the 11.4% it eked out in the three previous months, as it slashed prices in order to compete with cheaper rivals (see chart 2). Its advantages as a disruptive tech firm with a Silicon Valley mindset are in danger of being eroded. To make even 5m-6m cars a year this decade, a more realistic target than Mr Musk’s goal of 20m, would require “embracing the techniques of legacy auto”, observes Dan Levy of Barclays, a bank. In order to remain a disruptive force, Tesla may, paradoxically, need to become a bit more like the stodgy car business it has shaken up.

Tesla maintains a lead over its more ➤

► established rivals in batteries, software and manufacturing productivity, notes Philippe Houchois of Jefferies, an investment bank. But competitors are catching up. In some areas, like marketing and product planning, they have overtaken it, notes Mr Houchois. When it launched the Model S—large and pricey with big batteries and a long range—it had the EV market largely to itself. Nowadays motorists can choose between 500 or so EV models from dozens of marques. Bernstein, a broker, estimates that around 220 new models may be launched this year and another 180 in 2024 (chart 3). For Tesla to grow fast in the face of all this competition will be difficult.

Unlike incumbent carmakers' "something for everybody" approach, Tesla manufactures just five models (if you count the Cybertruck) and relies heavily on two of them. The Model 3, a small saloon, and the Model Y account for 95% of the vehicles Tesla shifts. By comparison, Toyota's two bestsellers, Corolla and RAV4, make up just 18% of the vehicles sold by the Japanese firm. For Tesla to hit its target of selling a combined 3m-4m Model 3s and Model Ys, each model would need to control 50% of the cars in its class (\$40,000-60,000 mass-market cars and \$45,000-65,000 SUVs, respectively). According to Bernstein, no carmaker has ever had more than 10% in those two segments.

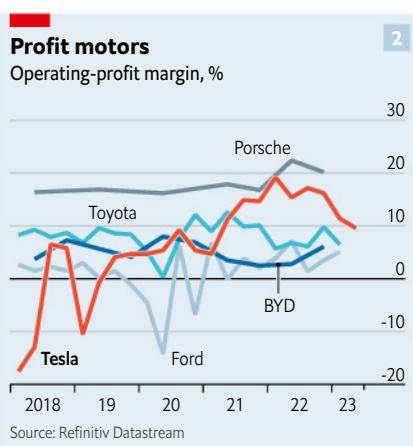
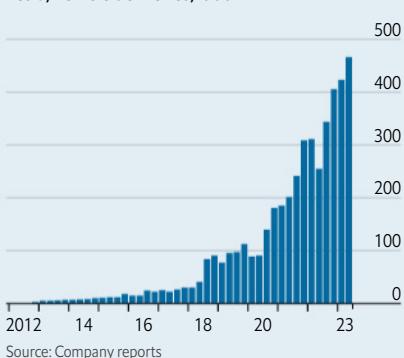
### Off the marque

And both models are ageing. The Model Y is three years old and the Model 3 has just turned six, which makes them less desirable in a business where novelty has historically counted for a lot. Carmaking's rule of thumb to keep sales chugging along is to refresh models every 2-4 years and redesign them completely every 4-7 years. Tesla's planned "refresh" of the Model 3's styling and its tech innards this year looks late by industry standards.

The company will need to go well beyond its current strategy, of offering software updates that improve some of its cars' features, or that add new ones. This may

### Production heaven

Tesla, vehicle deliveries, '000



have done the trick for its original customer base of early-adopter techies but is unlikely to cut it with the average motorist. One solution is to offer more options for its existing range. Barclays estimates that the Model 3 comes in 180 configurations, a fraction of the 195,000 trims for a comparable (petrol-powered) BMW 3 Series saloon. But this would introduce the sort of complexity Mr Musk has hitherto shunned.

Another route to higher sales is to launch new models, like the Cybertruck or a low-cost mass-market vehicle—unofficially called the "Model 2" and with prices starting at \$25,000—which Mr Musk has promised to start selling in the next couple of years. New models, though, come with new challenges. The relevant pickup market, with global sales of 1.3m, according to Bernstein, is relatively modest—and the Cybertruck's bold styling may limit its appeal. And though low-cost Teslas could expand the company's market beyond America, China and Europe, they would almost certainly generate lower margins, further depressing the company's overall profitability. Moreover, granting regional ventures greater autonomy to manage regional differences in taste, as established carmakers have historically done, again adds complexity and costs.

Mr Musk may no longer be able to avoid other expensive industry practices. One is marketing. In contrast to all other big carmakers, which spend princely sums on ads, Tesla has depended on word-of-mouth and Mr Musk's own larger-than-life persona to promote its products. Barclays reckons that eschewing ads and, by selling directly to buyers, bypassing dealers, currently saves the company \$2,500-4,000 for every car it sells. As it seeks new customers, and as Mr Musk risks affecting Tesla sales with his polarising stewardship of Twitter, his \$44bn side-project, the company is likely to forgo some of those savings. Mr Musk has conceded as much, saying that, for the first time, his company might "try a little advertising".

Another carmaking staple to which

Tesla has belatedly come around is price cuts. Mr Musk had pledged never to offer discounts or allow inventory to build up. His company has lately done both. Production exceeded sales in the past five quarters. After growing at an average annual rate of 60% for years, quarterly sales volumes expanded by an average of 30-40% between the second quarter of 2022 and the first quarter of 2023. To shift more vehicles Mr Musk began slashing prices late last year, by up to 25% on some models. Sales duly ballooned, by more than 80% in the second quarter, compared with a year ago. The flipside was those duly contracting margins. Investors have tolerated Mr Musk's price cuts more than in the case of his rivals: on July 17th Ford's share price fell by 6% after it announced hefty discounts on its F-150 Lightning EV pickup. They may not stay so forgiving for ever.

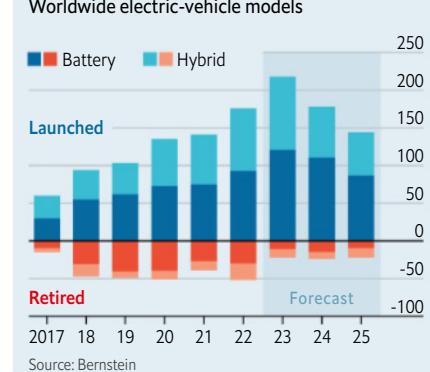
As its various costs rise, Tesla will try to keep cutting them elsewhere, notably in manufacturing. In March it unveiled what it called the "unboxed process", designed to make cars "significantly simpler and more affordable" by streamlining or even eliminating stages of production. It is unclear what exactly Mr Musk has in mind. Despite his record of engineering ingenuity, at least one previous attempt to up-end car manufacturing, by replacing people with robots for the Model 3, led to what Mr Musk himself candidly described as "production hell" and near-bankruptcy in 2018.

Mr Musk's last fresh challenge—and another one he shares with incumbent Western carmakers—is what to do about China. Tesla, which makes more than half its cars at its giant factory in Shanghai, no longer seems to hold its privileged position in the country. It was allowed to set up without the Chinese joint-venture partner required of other foreign carmakers, at a time when China needed Mr Musk to supply EVs for Chinese motorists and, importantly, to encourage China's own budding EV industry to raise its game.

That has worked too well. Tesla is thought to have sold 155,000 cars in China ►

### Carnucopia

Worldwide electric-vehicle models



► in the second quarter, 13% more than in the previous three months. But China Merchants Bank International Securities, an investment firm, reckons its market share may have slipped below 14%, from 16% in the preceding quarter, as buyers switched to fast-improving home-grown brands. In a sign that Tesla now needs China more than China needs Tesla, the company was obliged to sign a pledge on July 6th with other car firms to stop its price war and compete fairly in line with "core socialist values". Tu Le of Sino Auto Insights, a consultancy, says rumours are rife that the

Chinese authorities are pushing back against Tesla's efforts to increase manufacturing capacity in China. And that is before getting into the increasingly fraught geopolitics of Sino-American commerce.

If Tesla is to sell 6m cars a year at an operating margin of 14% by 2030, which Mr Levy of Barclays thinks possible, it probably needs to avoid at least some of these pitfalls. It would be foolish to dismiss that eventuality, given Tesla's knack for confounding sceptics. It could, for example, offset part of the decline in sales growth with new revenue streams, such as recent

deals to open its charging network to Ford and General Motors customers. As brands become defined by the digitally mediated experience of driving rather than the body shell or handling, its superior software—including, one day, self-driving systems—may allow it to keep offering fewer models than its rivals. Mr Le thinks Tesla will mitigate the China risk by manufacturing more of its cars in Germany and other countries, including low-cost ones. Tesla has been by far the most compelling car company of the early 21st century. If it is to hold on to that title, it must work for it. ■

## Bartleby Advice squad

*Our agony uncle, Max Flannel, answers your workplace questions*

**D**EAR MAX, I am an extremely nervous public speaker and I was told long ago that it can help to imagine that my audience is naked. I casually mentioned this piece of advice to another member of staff the other day and have now been reported to HR for inappropriate behaviour. What should I do?

Hmmm. I doubt you are in breach of any rules unless you have told specific individuals that you are thinking about what they look like without clothes on. But it's probably wise not to repeat this piece of advice to anyone else. That's not just because it sounds so dodgy. In my experience it's also a hopeless tip: you will almost certainly end up feeling even more nauseous. It is better, and safer, to imagine people wearing many more clothes and ideally a balaclava, too.

*My new team-mates try hard to establish an atmosphere of psychological safety. I genuinely agree with this aim, but one of our rules is that people can only talk in meetings if they are holding a wooden gourd. Whenever I am handed this ridiculous thing, I start laughing uncontrollably. Do you have any advice?*

If your team are truly believers in psychological safety, then you should be able to tell them that gourd-handling is not what you came into the workplace to do. Perhaps you could suggest another way of giving the floor to people without interruption? Is there another object that you might find less absurd? If it is too difficult to have an honest conversation with them, then say, "Oh gourd, not this again," when it comes your way and before you begin sniggering. With luck your colleagues will just think you have a lame sense of humour.

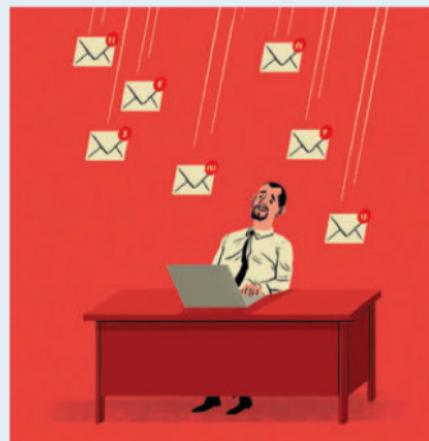
*I am a repressed older man with no real capacity to feel. This barren emotional landscape has served me well for years.*

*Now everyone around me keeps talking about the importance of kindness and authenticity, and I don't understand what the hell is going on. Please help.*

It is true that the workplace has changed in recent years: empathy and compassion have become part of the lexicon of the modern workplace. But I want you to know that you are not alone; very many people share your lack of pain. There is no stigma attached to being unable to interrogate your own feelings or to trundling along in a state of emotional vacuity; it's a condition also known as being male. It's OK to feel invulnerable.

*During the pandemic I decided to move to Montana in order to fulfil my dreams and work remotely from a ranch I bought on credit. My company is now requiring people to come into the office two days a week. Unfortunately, the office is in New York and my commute takes about 12 hours each way if I'm lucky. What should I do?*

The obvious answer is that you need to change either your job or your location. But really you need to re-examine the way you take decisions. You are terrible at it.



*My company has introduced hot-desking at our new post-pandemic office. This means I have been given a "hotbox" to carry my photos and the team gourd to whichever desk I will be working at that day. Each morning I take my hotbox out of my locker and am struck afresh by the futility of life. Can you help?*

This is a surprisingly common complaint from my correspondents. Hot-boxes have to be small enough to carry: that means there is usually room only for a couple of personal possessions. To be one of a crowd wandering around in search of a place to settle down, with your existence distilled down to a handful of mementoes and a cactus, is profoundly depressing. It's like an episode of "The Last of Us" with chinos. My advice would be to ditch the hotbox altogether and sit at a bare desk. You will work just as well and suffer from much less angst.

*Last month I got an unexpected promotion and went out with some friends to celebrate. The evening got a little out of hand and I woke in the morning to find that I had got a tattoo of my company logo. I don't expect you to be able to help, but I bitterly regret the decision and just wanted to tell someone.*

I followed up with this letter-writer directly to find out a little more. If the company in question had a fashionable brand, a logo might at least be passed off as a cool consumer choice. And with luck, the tattoo would be in a discreet place. No dice. It turns out that my correspondent works for an auditing firm. He has the letter "E" emblazoned on one eyelid, and the letter "Y" on the other. You can see how that might have seemed really clever at the time. I cannot help this poor wretch but I'll be back with more of your workplace dilemmas as soon as I have made them up.



## French supermarkets

## The Casino gamble

BERLIN

**A Czech tycoon bets big on an ailing retailer**

IT IS SOMETHING of a revolution in the country which once deemed yogurt-making to be a strategic industry. For the first time in the history of the fifth republic one of France's big retail chains will be in foreign hands. Daniel Kretinsky, a Czech tycoon who made his fortune investing in coal and natural gas, is on the verge of taking control of the Casino group, which includes a chain of hypermarkets, as well as Monoprix and Franprix, two other retail chains, and convenience stores.

In May Casino, collapsing under a mountain of debt, entered talks with creditors, shareholders and the French state to shore up its balance-sheet. Mr Kretinsky, whose existing 10% stake makes him the firm's second-biggest shareholder, joined forces with Marc Ladreit de Lacharrière, a fellow billionaire whose holding company, Fimalac, is the third-biggest, to present a rescue plan. A trio of French tycoons, Xavier Niel, Matthieu Pigasse and Moez-Alexandre Zouari, came out with a rival offer, with the backing of Attestor, a hedge fund that owns a big slug of Casino's debt.

On July 15th Mr Kretinsky submitted a revised plan, this time with the backing of Attestor, which defected from its erstwhile partners. He and his collaborators are proposing to inject €925m (\$1bn) into the ailing business in return for a 53% stake. A further €275m is likely to be provided by other creditors, but backstopped by Mr Kretinsky, Mr Ladreit de Lacharrière and Attestor. They will also convert €4.7bn of Casino's debt into equity.

Unable to match this proposal, Messrs Niel, Pigasse and Zouari withdrew their bid the following day. They blamed, among other things, unwarranted scepticism towards their offer from Casino's management. In fact, says Clément Genelot of Bryan, Garnier & Company, an investment bank, the trio put forth a less attractive proposition, with a more meagre capital injection and without explaining where some of the money would come from.

With his competitors out of the picture, Mr Kretinsky looks poised to prevail. He wants to put Philippe Palazzi, a former executive at Metro, a big German retailer of which the Czech mogul owns more than 40%, and Jean-Paul Mochet, who used to run Monoprix and Franprix, in charge of the turnaround.

The new bosses will have their work cut out. Mr Genelot thinks that reviving Cas-



Can the losing streak end?

no will require a bigger cash injection than the €1.2bn proposed in Mr Kretinsky's plan. The cost could be nearer €3bn, he reckons. To make its shops more attractive the company needs not just to remodel them but also lower its prices, which are 40% higher than in rival supermarkets as a result of Casino's desperate effort to boost margins. It must also win back suppliers put off by late payments. Within a year the future owners may either need to cough up more cash or sell off a valuable asset such as Monoprix, a fixture of French city centres, where shoppers can stock up on quality garb and grub.

One problem Casino may be able to avoid is meddling by the French government. In early 2021 Bruno Le Maire, the finance minister, balked at the proposed \$20bn acquisition of Carrefour, another one-time French supermarket star, by Alimentation Couche-Tard of Canada. At the time he argued that the government wanted to preserve France's food security and sovereignty. This time Mr Le Maire has stressed the need to be "vigilant" about Casino's 53,000 jobs in France—which, together with Casino's headquarters in the backwater city of Saint-Etienne, Mr Kretinsky has promised to preserve. But the state has so far mostly stayed out of it, possibly because it is keenly aware that the only remaining alternative to Mr Kretinsky's bid is liquidation.

"For shareholders this is a huge destruction of value," says Tomás Mannion of Sarria, a research firm. They will be left with 1.8% of equity and a tiny fraction of their original investment. That includes Jean-Charles Naouri, Casino's chairman, chief executive and majority shareholder, who will lose control of the group after 30 years. Despite a doctorate in mathematics, Mr Naouri, considered one of France SA's most formidable intellects, was unable to make Casino's sums add up. Mr Kretinsky is wagering that he can do better. ■

## Video games

## Shooter to win

**A mega-deal's winners and losers**

THE GAME is on. Or so ruled an American appeals court on July 14th when it threw out another effort by the Federal Trade Commission to block Microsoft's \$69bn acquisition of Activision Blizzard, a games developer, which a federal judge had cleared three days earlier. A few days later Sony and Microsoft agreed to keep "Call of Duty", Activision's hit first-person shooter, on Sony's PlayStation console, increasing the pressure on Britain's trustbuster, the last holdout, to approve the merger.

Microsoft's truce with Sony follows similar agreements with Nintendo, another Japanese gaming company, and Nvidia, an American chipmaker which also owns a cloud-based gaming service. It allays Sony's fear that it would be cut off from "Call of Duty", which reportedly generated \$1.5bn in revenues for Sony in 2021. However, it is not a clear-cut victory for the PlayStation-maker. Its arrangement with Microsoft is limited to "Call of Duty", and does not extend to Activision's other blockbusters, such as World of Warcraft.

For its part, Microsoft hopes the deal will help it Candy Crush it in mobile gaming. In 2023 global spending on mobile games is forecast to hit \$125bn, around two-thirds of the industry's overall revenues, according to Omdia, a research firm. Activision's popular mobile apps, including Candy Crush and a smartphone version of "Call of Duty", may enable Microsoft to conquer Asia, Sony's historic stronghold. It had better, for the company is losing the console wars. Its Xboxes have consistently been outsold by PlayStations. This year Sony is expected to sell 22m PlayStation 5s, twice the forecast for the Xbox. Whether mobile supremacy is worth the \$69bn price tag is another matter. Giant deals often destroy value in a way that puts the most trigger-happy "Call of Duty" pros to shame.

The biggest winners from the deal, besides Activision shareholders, may be other game developers, such as Take Two and Electronic Arts. Their popular franchises, Grand Theft Auto and FIFA, respectively, make the companies ripe targets for acquisition, which Microsoft's regulatory success makes less likely to be challenged. Share prices across the industry have been rising since the American ruling, possibly in anticipation of a takeover spree.

## Foodmaking

# A new big cheese

**Startups are producing real dairy without a cow in sight**

IT LOOKS LIKE cheese. It smells like cheese. It tastes like cheese (specifically mature cheddar). And it is cheese—at least under the microscope. “Synthetic dairy” is made with the same ingredients as the conventional sort. But instead of getting the main ingredient from a live ruminant, Better Dairy, a three-year-old British cheesemaker, derives some of it from yeast. These microbes are fed sugar, which they then convert into milk proteins in a process which is similar to brewing.

Plenty of milk alternatives have hit café counters and supermarket shelves in recent years. Plant-based beverages made from things like soybeans, almonds and oats make up 15% of all milk sales by value in America and 11% in western Europe, reckons the Good Food Institute (GFI), a think-tank. Yet lovers of real dairy, which plant-derived products cannot quite mimic, still need cows, goats and ewes. “Precision fermentation” companies like Better Dairy hope to change that—and take a fat slice of the \$900bn global dairy market.

Remilk, an Israeli startup, has recently received approval to sell its fare in America, Israel and Singapore. Perfect Day, a Californian one, already sells synthetic milk, ice cream and cream cheese. It recently signed contracts to sell its proteins to Nestlé, a food giant, and to Starbucks. In its latest funding round two years ago it raised \$350m, valuing it at \$1.6bn. All told, precision fermenters have raised nearly \$3bn from investors since the start of 2021.

Synthetic dairy dispenses with certain undesirable aspects of milk and milk-making. Lactose, to which some people are allergic, and hormones, which have been linked to some adult diseases, can be stripped out. Fermentation tanks do not need to be pumped full of antibiotics and can be set up anywhere—handy at a time of rising worries about food security and climate change. The process uses less water and, because it requires less energy and less land, emits fewer greenhouse gases than conventional dairy production, which is responsible for more than 3% of annual planet-warming emissions, almost twice as much as aviation (and a lot of it from belchy cows).

One challenge for the innovators is winning consumers’ trust. Steel tanks lack the familiarity of cows. A quarter of respondents to a survey in America aren’t keen to try “precision-fermented” fare

(which may explain why producers prefer to call it “animal-free”). Regulators create hurdles, too. Although the startups are confident they will get the green light—the technique is already used for flavourings and insulin—they worry about the time this will take and about labelling disputes. According to GFI, even in America, the land of free enterprise, it takes about nine months. In Europe it takes twice as long; the first products will not reach European supermarkets until 2024.

The technology is also a work in progress. For now Better Dairy’s cheddar still uses bovine casein, one of the proteins in milk; the firm is working on a synthetic version that would make its cheese properly vegan. And the process remains costly. A fermenter that can hold about 30 litres of milk can cost £150,000 (\$190,000). Buying a cow, which can produce about as much in a day, will set you back £1,600. ■

## Digital platforms

# The rickshaw wars

**A battle of travel apps highlights the promise and perils of the India stack**

**I**N INDIA’S STARTUP capital of Bangalore, auto-rickshaw drivers are no less prized than software engineers. Given the city’s chaotic traffic, rickshaws are sometimes the fastest way to get around. But finding one isn’t easy. Threats, pleas and moral appeals are necessary before a driver accepts a ride. The experience is no better with Ola and Uber, two ride-hailing firms which offer rickshaw services for a commission.

Help is at hand. An app called Namma Yatri, launched in November by the rick-

shaw drivers’ union, directly connects riders to drivers, with no commission for digital middlemen. It averages around 68,000 trips a day, from only 2,000 at the start of the year, and boasts more than 78,000 drivers and 1.4m customers on its platform.

Namma Yatri is built on a new open network that represents the next phase of the “India stack”—a set of digital services created by the state. With a national biometric system and a hugely successful payments network in place, the government has now set its sights on reshaping India’s e-commerce market. The Open Network for Digital Commerce (ONDC) allows smaller retailers to reach buyers, bypassing private marketplaces like Amazon. In theory, it unbundles every part of the shopping process, allowing shoppers to choose from thousands of sellers and select delivery options by different providers rather than relying on overweening incumbents.

ONDC is still new. Besides the ride-sharing app, early pilots have focused on food and local grocery deliveries. Questions abound about who bears responsibility when things go wrong, from fake products to payment disputes. No app has so far reached the scale to match the incumbents, which are also toying with the platform. In February Amazon announced that it would integrate its logistics services with ONDC. In April PhonePe, a Walmart-backed payments system, launched a local delivery app on the open network. Still, the Indian government’s aim seems clear: it desires a noisy digital bazaar instead of one with a few big monopolies.

Or does it? Piyush Goyal, the commerce minister, wants big e-commerce firms to use ONDC for all their operations. Fence-sitters risk being banned from the platform. He has also vowed to use the “full force of the government” to promote it, putting Amazon and Flipkart on notice. So much for openness and competition. ■



Driving change

## Schumpeter | Stars v suits

*A blockbuster strike by Hollywood's actors and writers may become a flop*



**M**UNCHING POPCORN, a crowd of glamorous movie people and somewhat less glamorous journalists gathered in a London cinema on July 13th for the premiere of "Oppenheimer", a new film from Universal Pictures. As the audience waited for the entrance of the movie's stars—Cillian Murphy, Emily Blunt, Matt Damon and others—they were greeted instead by an apologetic Christopher Nolan, the film's director. His cast had just gone home, he announced. "They're off writing their signs, to join the picket lines."

The strike called moments earlier by America's Screen Actors Guild, which coincides with one by the Writers Guild of America that began in May, has detonated a bomb under America's entertainment industry. The reverberations will travel much farther: nine of the ten biggest box-office hits worldwide last year were American-made, and American streaming services now reach into living rooms everywhere. As the stars face off against the studios, the world's great entertainment machine has ground to a halt.

The last time writers and actors went on strike together Ronald Reagan was president—not yet of the United States, but of its actors' union. The argument then, in 1960, was about television, and how big-screen actors should be compensated when their work was replayed on the small screen. Today's confrontation is also about new technology.

One concern is artificial intelligence. Writers and actors want guarantees that it won't be used to churn out scripts or clone performers. The bigger argument is over streaming. The "streaming wars" have seen a surge in content spending, as century-old studios compete for subscribers with deep-pocketed new rivals like Apple and Amazon. Worldwide, TV and film companies spent more than \$230bn on programming last year, nearly double their expenditure a decade earlier, estimates Ampere Analysis, a research firm. Jobs in American show business are growing about twice as fast as employment overall.

Some "talent" still feel short-changed. Streamers make generous upfront payments, but they offer a smaller share in their projects' future success. So whereas an appearance in a flop is much better paid than it was a decade ago, being part of a smash hit no longer means being set up for life. And although the streamers' output tends to be creatively fulfilling, with more potential for

awards than broadcast TV, their shorter seasons make work precarious. Actors and writers want higher minimum wages and a success-based payment when shows are released.

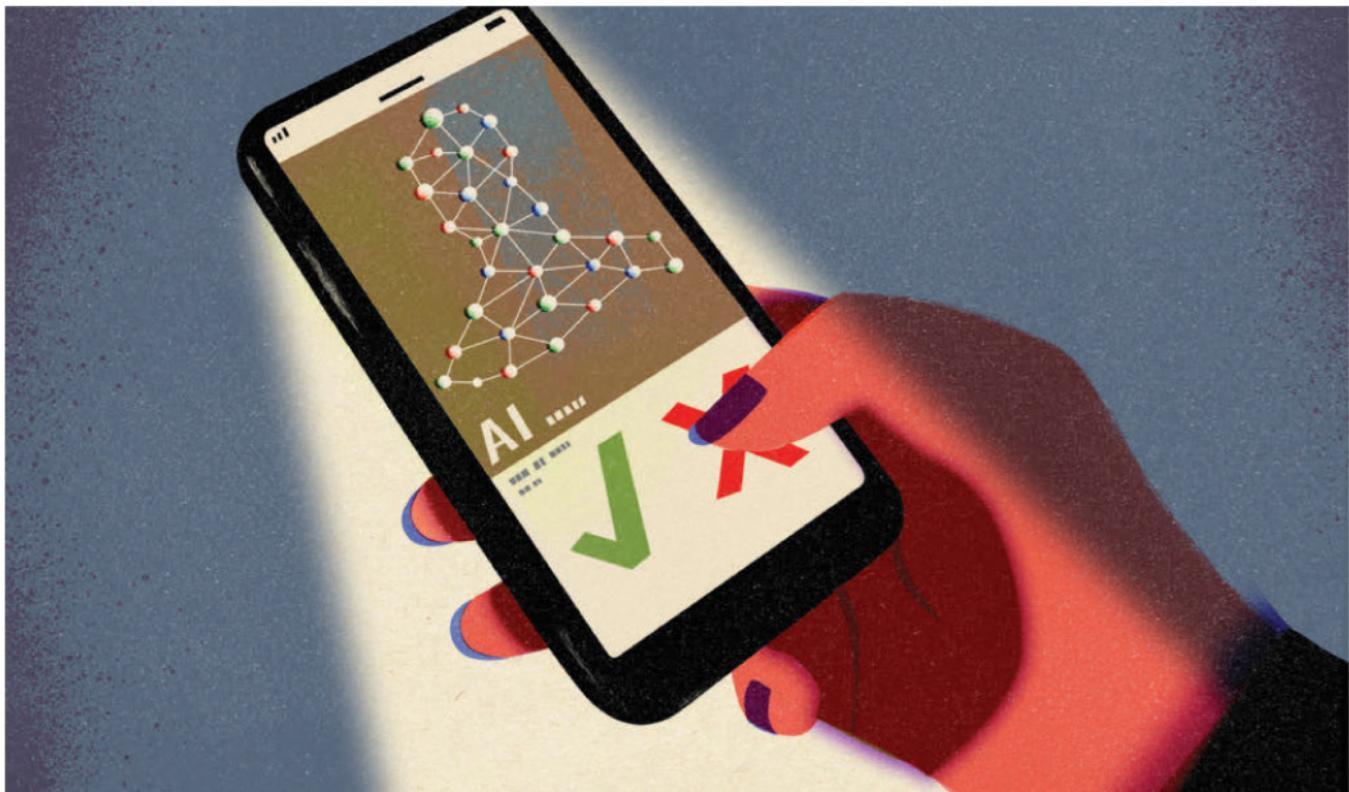
On the face of it they are in a strong position. Without writers, the creative pipeline is empty. Without actors, works-in-progress like Ridley Scott's "Gladiator" sequel have been shut down. Even completed films will struggle without stars to promote them. Disney had to rustle up entertainers in Mickey and Minnie costumes to walk the red carpet at the premiere of "Haunted Mansion" on July 15th. The Venice film festival next month will be a lonely affair. The Emmy awards, in September, could be derailed; some wonder if the strike might even last until the Oscars, next March. Unsurprisingly, the striking stars are also proving better at communicating their concerns than the suits in the studios. Fran Drescher, current president of the actors' union, drew on her years starring as "The Nanny" to scold "disgusting" studio chiefs for their fat salaries. Bob Iger, Disney's boss, responded with an interview from a Sun Valley getaway known as "billionaires' summer camp"; around the same time news leaked that he recently commissioned a new yacht.

Yet the stars will struggle more than they did when Reagan was in charge. Strikes are less disruptive to TV schedules now that there is no longer a schedule to disrupt. The on-demand era means viewers face a sea of choice on opening their apps; any gaps are less obvious. Streaming has also made Hollywood less reliant on America, both in terms of its audience and in terms of production. Netflix is the most extreme example: more than two-thirds of its 238m subscribers live overseas, and nearly two-thirds of the shows it commissioned in the past 12 months are being made abroad, according to Ampere Analysis. (It may even be happy to shift its viewers' consumption away from expensive American productions and towards to these lower-cost shows, speculates one sometime rival.)

In a world dominated by franchises, actors also wield less economic clout than they used to. Last month Warner Bros replaced its Superman; Sony has fielded multiple Spider-Mens (the most recent is animated). As Anthony Mackie, who plays Captain America, has put it: "The evolution of the superhero has meant the death of the movie star." And as audiences tire of superheroes, studios are finding new franchises. This year's highest-earning movie so far is Universal's animated reboot of "Super Mario Bros".

### Cut! Cut costs!

Above all, the distressed state of the entertainment business means studios are in no shape to increase their outgoings. Big titles like "Indiana Jones" continue to fizzle at the box office, which this year is expected still to be a quarter lower than before the pandemic. The broadcast and cable-TV businesses are in terminal decline. In his Sun Valley interview Mr Iger was frank about their future: "The business model that forms the underpinning of that business, and that has delivered great profits over the years, is definitely broken," he said. Wall Street has begun to demand that streamers deliver not just growth but profit, causing an almighty rush to trim costs. Even before the strike, projects were being cancelled. Last year Warner Bros canned a completed "Batgirl" film. The industrial action provides helpful cover for more cost-slashing: "A lot of shareholders and executives are happy to clean up their balance-sheets," says one former streaming executive. The actors are delivering Oscar-worthy performances at the picket lines. This time, they face a tough crowd. ■



Artificial intelligence

## Machine dreams

BOSTON AND TOKYO

New tech is taking longer to spread through economies. That is bad news for AI

TO UNDERSTAND THE impact that artificial intelligence may have on the economy, consider the tractor. Historians disagree about who invented the humble machine. Some say it was Richard Trevithick, a British engineer, in 1812. Others argue that John Froelich, working in South Dakota in the early 1890s, has a better claim. Still others point out that few people used the word "tractor" until the start of the 20th century. All agree, though, that the tractor took a long time to make a mark. In 1920 just 4% of American farms had one. Even by the 1950s less than half had tractors.

Speculation about the consequences of AI—for jobs, productivity and quality of life—is at fever pitch. The technology is awe-inspiring. And yet AI's economic impact will be muted unless millions of firms beyond tech centres like Silicon Valley adopt it. That would mean far more than using the occasional chatbot. Instead, it would involve the full-scale reorganisation of businesses, as well as their in-house data. "The diffusion of technological improvements", argues Nancy Stokey of

the University of Chicago, "is arguably as critical as innovation for long-run growth."

The importance of diffusion is illustrated by Japan and France. Japan is unusually innovative, producing on a per-person basis more patents a year than any country bar South Korea. Japanese researchers can take credit for the invention of the QR code, the lithium-ion battery and 3D printing. But the country does a poor job of spreading new tech across its economy. Tokyo is far more productive than the rest of the country. Cash still dominates. In the late 2010s only 47% of large firms used com-

puters to manage supply chains, compared with 95% in New Zealand. According to our analysis, Japan is roughly 40% poorer than would be expected based on its innovation.

France is the opposite. Although its record on innovation is average, it is excellent at spreading knowledge. In the 18th century French spies stole engineering secrets from Britain's navy. In the early 20th century Louis Renault visited Henry Ford in America, learning the secrets of the car industry. More recently, former AI experts at Google and Meta founded Mistral AI in Paris. France also tends to do a good job of spreading new tech from the capital to its periphery. Today the productivity gap in France between a top and a middling firm is less than half as big as in Britain.

During the 19th and 20th centuries businesses around the world became more French, with new technologies diffusing ever faster. Diego Comin and Martí Mestieri, two economists, find evidence that "cross-country differences in adoption lags have narrowed over the last 200 years." Electricity swept across the economy faster than tractors. It took just a couple of decades for personal computing in the office to cross the 50% adoption threshold. The internet spread even faster. Overall, the diffusion of technology helped propel productivity growth during the 20th century.

Since the mid-2000s, however, the world has been turning Japanese. True, consumers adopt tech faster than ever. According to one estimate TikTok, a social-►

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▶ media app, went from zero to 100m users in a year. ChatGPT was the fastest-growing app in history until Threads, a rival to Twitter, launched this month. But firms are increasingly cautious. In the past two decades all sorts of mind-blowing innovations have come to market. Even so, according to the latest official estimates, in 2020 just 1.6% of American firms employed machine learning. In America's manufacturing sector just 6.7% of companies use 3D printing. Only 25% of business workflows are on the cloud, a number that has not budged in half a decade.

Horror stories abound. In 2017 a third of Japanese regional banks still used COBOL, a programming language invented a decade before man landed on the moon. Last year Britain imported more than £20m (\$24m) worth of floppy disks, MiniDiscs and cassettes. A fifth of rich-world firms do not even have a website. Governments are often the worst offenders—insisting, for instance, on paper forms. We estimate that bureaucracies across the world spend \$6bn a year on paper and printing, about as much in real terms as in the mid-1990s.

### Best and the rest

The result is a two-tier economy. Firms that embrace tech are pulling away from the competition. In 2010 the average worker at Britain's most productive firms produced goods and services worth £98,000 (in today's money), which had risen to £108,500 by 2019. Those at the worst firms saw no rise. In Canada in the 1990s frontier firms' productivity growth was about 40% higher than non-frontier firms. From 2000 to 2015 it was three times as high. A book by Tim Koller of McKinsey, a consultancy, and colleagues finds that, after ranking American firms according to their return on invested capital, the 75th percentile had a return 20 percentage points higher than the median in 2017—double the gap in 2000. Some companies see huge gains from buying new tech; many see none at all.

Although the economics can sound abstract, the real-world consequences are fa-



miliar. People stuck using old technologies suffer, along with their salaries. In Britain, average wages at the least productive 10% of firms have fallen slightly since the 1990s when adjusted for inflation—even as average wages at the best firms have risen strongly. According to Jan De Loecker of KU Leuven and colleagues, “the majority of inequality growth across workers is due to increasing average wage differences between firms”. What, then, has gone wrong?

Three possibilities explain lower diffusion: the nature of new technology, sluggish competition, and growing regulation. Robert Gordon of Northwestern University has argued that the “great inventions” of the 19th and 20th centuries had a far bigger impact on productivity than more recent ones. The problem is that as technological progress becomes more incremental, diffusion also slows, since companies have less incentive and face less competitive pressure to upgrade. Electricity provided light and energy to power machines. Cloud computing, by contrast, is needed only for the most intensive operations. Newer innovations, like machine learning, may be trickier to use, requiring more skilled workers and better management.

Business dynamism fell across the rich world in the first decades of the 21st century. Populations aged. Fewer new firms were set up. Workers moved companies less frequently. All this reduced diffusion, since workers spread tech and business practices as they move across the economy.

In industries run or heavily managed by the government, technological change happens slowly. As Jeffrey Ding of George Washington University notes, in the centrally planned Soviet Union innovation was world-beating—think of Sputnik—but diffusion was non-existent. The absence of competitive pressure blunted incentives to improve. Politicians often have public-policy goals, such as maximising employment, that are inconsistent with efficiency. Heavily regulated industries make up a big chunk of Western economies today: such sectors, including construction, educa-

tion, health care and utilities, account for a quarter of American GDP.

Could AI break the mould, diffusing across the economy faster than other recent technologies? Perhaps. For almost any firm it is easy to dream up a use-case. No more administration! A tool to file my taxes! Covid-19 may have also injected a dose of dynamism into Western economies. New firms are being set up at the fastest pace in a decade, and workers are swapping jobs more often. Tyler Cowen of George Mason University adds that weaker firms may have a particular incentive to adopt AI, because they have more to gain.

AI can also be incorporated into existing tools. Many coders—maybe most—already use the technology on a daily basis owing to its integration in everyday coding instruments through Github's Copilot. Word processors, including Google Docs and Microsoft Word, will soon roll out dozens of AI features.

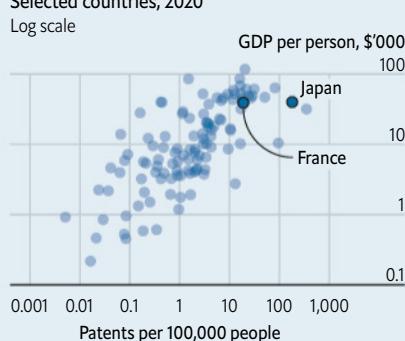
### Not a dinner party

On the other hand, the most significant benefits from new forms of AI will come when firms entirely reorganise themselves around the new technology; by adapting AI models for in-house data, for example. That will take time, money and, crucially, a competitive drive. Gathering data is tiresome and running the best models expensive—a single complex query on the latest version of ChatGPT can cost \$1-2. Run 20 in an hour and you have passed the median hourly American wage.

These costs will fall, but it could take years for the technology to become sufficiently cheap for mass deployment. Bosses, worried about privacy and security, regularly tell *The Economist* that they are unwilling to send their data to modify models that live elsewhere. Surveys of small businesses are not encouraging. One, by GoDaddy, a web-hosting company, suggests that around 40% of those in America are uninterested in AI tools. The technology is undoubtedly revolutionary. But are businesses ready for a revolution? ■

### Working smart, not hard

Selected countries, 2020



### Laboured

Britain, labour productivity, output per hour  
% change on ten years earlier





## Post-covid economics

# Feel-bad recovery

## China's struggling economy poses a test for Xi Jinping

WHEN JANET YELLEN visited Beijing this month she did her bit for the local restaurant trade. America's treasury secretary dined with her team at an establishment known for Yunnanese dishes, which subsequently unveiled a "God of Wealth" menu in her honour. She also hosted a lunch with female entrepreneurs and economists (including a representative of The Economist Group). Although restaurants have prospered since China dropped its covid controls at the end of last year, the gods of wealth have been less kind to the rest of the country's economy—as GDP figures released on July 17th revealed.

They showed that the economy grew by 6.3% in the second quarter compared with a year earlier. That looks impressive. But it was slower than expected. And the figure was flattered by a low base in 2022, when Shanghai and other cities were locked down. The economy grew by only 0.8% in the second quarter compared with the first three months of the year, an annualised rate of merely 3.2% (see chart 1).

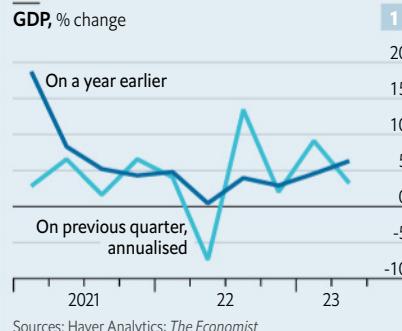
Obstacles to growth were both foreign and domestic. The dollar value of China's exports, for example, shrank by more than 12% in June, compared with a year earlier—the sharpest drop since the height of the pandemic in February 2020. "The recovery of the world economy has been sluggish," said Fu Linghui of the National Bureau of Statistics, by way of explanation. Meanwhile, the recovery of China's property

market is lost in the cabbage patch. Sales of flats fell by 27% in June compared with a year earlier. They are now running well below the pace economists think would be justified by underlying demand, given China's urbanisation and the widespread desire for better accommodation.

China's "nominal" growth, before adjusting for inflation, was also weaker than the inflation-adjusted figure; something that has happened only four times in the past 40 quarters. It suggests that the price of Chinese goods and services is falling. Indeed, it implies they fell by 1.4% in the year to the second quarter, which would be the sharpest drop since the global financial crisis (see chart 2).

### Another rebound needed

China



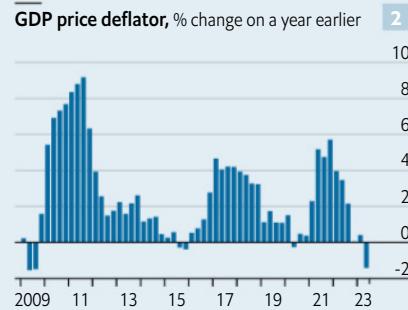
Consumer prices did not rise at all in June compared with a year earlier, and producer prices—charged at the factory gate—fell by 5.4%. China's statisticians have blamed this weakness on changes in global commodity prices, such as the falling cost of oil. That is an unconvincing explanation for the weakness of China's nominal growth, because GDP should count only the value added to a good in China itself, thus excluding the value of imported commodities. Perhaps deflationary pressures are spreading. Or perhaps China's statisticians have got their sums wrong.

### Mulish response

Some members of the public feel the economy is doing even worse than the official figures suggest. There is a "temperature difference" between the macroeconomic data and "micro feelings", as one commentator put it. In response, Mr Fu of the National Bureau of Statistics pointed out that macroeconomic data are more comprehensive and reliable than "micro feelings"—prompting a netizen to joke that if state statisticians say you are okay, you should adjust your feelings accordingly.

The government's own feelings towards the economy are hard to read. During the global financial crisis, when world trade fell off a cliff, China's authorities swooped in with vast stimulus, which propelled economic growth and spilled over to the rest of the world. Today they seem in no such rush. The country's central bank has cut interest rates a little. Tax breaks on electric vehicles have been extended. The state's planning agency has held pep talks this month with firms ranging from Baidu, an internet giant, to Spring Tour, a tourism agency, and Donkey Meat Cao Catering, a firm serving donkey burgers. Leaders have released 31 guidelines exhorting officials to promote the private sector. But no detailed fiscal-stimulus plan has emerged.

This lack of urgency may reflect the government's enduring confidence in the recovery. Officials may believe that the economy still has enough momentum to ↗



► meet their targets for the year, including for GDP growth of around 5%. The government's restraint may also betray its misgivings about additional stimulus. Policy-makers do not want a lending and spending spree to erode the profitability of state-owned banks or undermine financial discipline among local governments.

The government can draw some comfort from the job market. China's economic reopening so far has been led by services industries, such as restaurants, that tend to be labour-intensive. China's cities have added 6.8m jobs in the first six months of

the year, more than half of the government's 12m target for the year. Although unemployment among urban youth increased to 21.3%, the overall jobless rate remained steady at 5.2% in June, below the target of 5.5%.

But the labour market can be a lagging indicator of economic momentum. If growth remains weak, unemployment will eventually edge up. By that point, the government will be forced to do more to revive the economy. Options include further cuts to interest rates, a weaker currency and extra support for property developers.

The problem is that such "quick and easy" measures might not be enough, argue Yu Xiangrong and his colleagues at Citigroup, a bank. Slower, more difficult options include cash handouts to poor families, as well as additional investment in green infrastructure, financed by state-guided policy banks or even—heaven forbid—central-government bonds. Chinese policymakers are willing to tolerate a temperature difference between official data and public feelings. They will be unwilling to tolerate a glaring gap between the economy and their targets. ■

## Buttonwood Greenback setback

*The dollar's dip is unlikely to become a sustained decline*

THE ENDLESS queues, filled with American accents, outside Dishoom, a chain of upmarket British curry houses that has gained international fame thanks to TikTok, tell a story which anyone who has recently visited Paris, Rome or Tokyo can confirm: the dollar is mighty. American tourists are rushing to take advantage of bargain sterling-, euro- and yen-denominated holidays.

Those who booked early will have scored the biggest bargains, however. The dollar is still strong by the standards of the past two decades. But since its peak in September, it has dropped by 13% against a basket of currencies. The sell-off accelerated last week, when the dollar fell by 3%—a big move for a currency. The DXY index, which measures the currency against six others, is at its lowest since April 2022, just after the Federal Reserve started to raise interest rates.

The recent weakening is welcome news for those parts of the world, particularly developing countries, which rely on financing in foreign currencies. Emerging-market issuance of dollar bonds hit an 11-year low in 2022. Frontier markets—the smallest, least liquid and often poorest such markets—issued less than \$10bn of dollar bonds last year, down from \$30bn in 2021.

Sadly for these countries, there is reason to doubt the dollar's dip is the start of a new phase. To understand why, consider what caused the fall. The recent sell-off was prompted by American inflation data, released on July 12th, which showed consumer prices rose by just 3% year-on-year in June—still above the Fed's 2% target, but the lowest rate in over two years, and below analysts' expectations. Investors now wonder if the Fed is about to declare victory in its fight against inflation.

Another reason for the recent decline is that inflation is falling more slowly outside America, particularly in Britain and the euro zone. Even in the land of low inflation, Japan, consumer prices rose by 3.2% year-on-year in May—higher than America's figures a month later. Central bankers in such countries may have more fighting ahead. Higher rates would drag investment from dollar-denominated assets into higher-yielding currencies.

The third reason for the decline is middling American growth. The country's GDP is expected to increase by a modest 1.3% this year. Stephen Jen, now of Eurizon Capital, an asset-management firm, first posited the idea of a "dollar smile" a couple of decades ago. The theory suggests that when America is powering ahead of the world, the dollar strengthens as investors pour in. But the currency can also strengthen when the world's largest economy is in the doldrums, since a depressed American economy is a threat to global financial stability. That paradoxically adds to demand for the country's safe Treasury bonds. Mr Jen today sees the American

economy's lukewarm growth, which puts it in the middle of the smile, as a sign of dollar weakness to come.

Yet these driving forces are hardly guaranteed to continue. Each could suddenly reverse, causing the dollar to strengthen once more. If inflation proves to be stickier than expected in America, for instance, and stops dropping quite so rapidly, Fed policymakers have made clear that they would be willing to keep raising interest rates aggressively. Moreover, it is still possible that America's economy will slow under the weight of higher interest rates, despite the remarkable resilience it has so far displayed.

Indeed, it may transpire that other rich economies are simply running a few months behind America. American prices rose more rapidly than those elsewhere in 2021, and the Fed began raising interest rates earlier than most central banks the next year. Britain's latest inflation figures, released on July 19th, showed prices rising by 7.9% year-on-year in June, below the 8.2% forecast. Whether an investor believes the surge in inflation was caused by a transitory burst of supply-side factors, or is the result of monetary and fiscal largesse, they will think there is a good chance inflation elsewhere will follow America's downwards trend. If this does happen, monetary policy in America and the rest of the world would look more similar.

The global situation would also look similar to that found—with the exception of recent years—since the dollar's sharp rally in late 2014 and throughout 2015. Now, as then, the American economy is stronger than its competitors and American stocks are more favoured than those elsewhere. With these two pillars of strength in place, it is difficult to imagine a markedly weaker dollar.



## Investment strategies

## Balancing act

### Big tech's winning streak is straining the logic of passive investing

**D**ON'T LOOK for the needle in the haystack. Just buy the haystack!" So wrote Jack Bogle, who founded Vanguard Asset Management in 1975 and brought index investment to a mass market. Subsequent decades proved him right. "Passive" strategies that track market indices, rather than trying to beat them, now govern nearly a third of the assets managed by global mutual funds. Since a stockmarket index weighted by company size is just the average of underlying share owners' performance, it is impossible for investors, in aggregate, to beat it. In the long run, even professional fund managers do not.

Yet today's haystack has grown unusually top-heavy. Since the start of the year, America's seven biggest corporate behemoths—Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia, and Tesla—have left the rest of the stockmarket in the dust. Giddy on AI optimism, investors have raised these firms' combined value by 69%, a much larger increase than that seen in broader indices. The "magnificent seven" now account for 29% of the market value of the S&P 500, and a whopping 61% of the NASDAQ 100, up from 20% and 53%, respectively, at the start of the year.

That leaves index investors in a tight spot. On the one hand, owning shares that have done so blisteringly well that they dominate your portfolio is a nice problem to have. On the other, it is somewhat awkward. After all, part of the buy-the-haystack logic's appeal lies in the risk-lowering benefits of diversification. Now, buying the NASDAQ 100 appears less like spreading your bets and more like placing them on a few hot companies whose prices have already soared. A supposedly passive investment strategy has come to feel uncomfortably similar to stock-picking. ■

Nasdaq is therefore stepping in to alleviate the discomfort. As Cameron Lilja, who runs its indexing operations, notes, the NASDAQ 100 is a "modified market-capitalisation weighted" measure. This means the weights assigned to firms' shares are usually in proportion to each company's total market value, but that those of the biggest firms can be scaled back if they come to represent too much of the index.

In particular, if the combined weight of shares that each account for more than 4.5% of the index exceeds 48%, as is now the case, Nasdaq's methodology prescribes a "special rebalance" to cut this to 40%.

This is designed, says Mr Lilja, to ensure funds tracking the index comply with regulatory diversification rules. And so on July 24th Nasdaq will reduce the sway of its seven biggest firms (and, conversely, increase that of the other 93 constituents).

The result will be a more balanced index, but also some difficult questions about just how passive "passive investing" really is. The biggest fund tracking the NASDAQ 100, Invesco's "QQQ Trust", invests more than \$200bn (roughly the value of Netflix, the index's 14th-largest firm). Following the rebalancing, it will need to quickly sell large volumes of shares in its biggest holdings and buy more in its smaller ones. It is hard to argue that such a move simply tracks the market rather than—at the margins, at least—influencing it.

The need for rebalancing also highlights a criticism of index investing: that it is really a form of momentum play. Putting money into a fund that allocates it according to firms' market value necessarily means buying more of the shares that have done well. Conversely, keeping money in such a fund means not taking profits from the outperformers, but continuing to hold them as they grow bigger. Even if chasing winners is often a lucrative strategy, it is not an entirely passive one.

Meanwhile, as America's stockmarket grows ever more concentrated, some spy an opportunity. On July 13th Invesco announced an "equal-weight" NASDAQ 100 fund, investing 1% of its assets in each of the index's constituents. This sort of strategy will mainly appeal to private investors, who, unlike professional fund managers, can afford to be "index agnostic", says Chris Mellor, one of those overseeing the launch. This year, the outperformance of the biggest companies would have left investors lagging behind. But trends like this periodically reverse—as in 2022, when the giants plunged (see chart). Mr Mellor guesses that the new fund could garner perhaps a tenth of the assets of its mainstream counterpart. Its administrators, at least, will still be making hay. ■

### Weighty matters

NASDAQ 100, July 1st 2022=100



## Banking after the turmoil

## What crisis?

WASHINGTON, DC

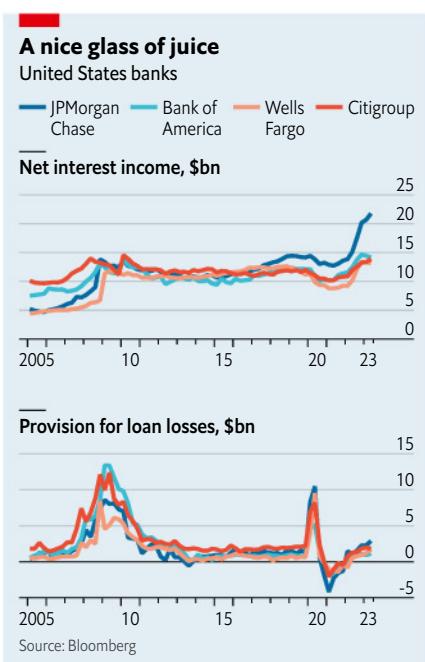
### American finance is in rude health

FROM ONE perspective, it seems like a torrid time to be a banker. A handful of financial institutions failed in the first quarter of the year after their depositors fled, spooked by the impact of higher interest rates. After these failures, smaller banks struggled to keep hold of deposits, pushing up their interest costs. At the same time, the economy is cooling, owing to higher rates, raising the prospect of job losses and defaults. Higher rates have almost entirely shut down activity in capital markets, too. The climbing cost of debt has put off would-be acquirers in the business world, prompted firms to delay issuing bonds and encouraged startups to postpone initial public offerings.

The misery is particularly obvious at the most famous of all Wall Street institutions: Goldman Sachs. The firm is also the most exposed to ups and downs in deal-making and most reliant on trading revenues, meaning it has struggled over the past year or so. Goldman hit another low on July 19th, when it reported its worst quarterly profits in three years. Cyclical woes have been compounded by an ill-fated push into consumer lending, which now looks like a serious error. In the second quarter the firm wrote off \$500m of its investment in GreenSky, an online lender acquired by David Solomon, Goldman's boss, in 2021. The poor results will only add to the pressure Mr Solomon is under.

Things are much sunnier for the rest of America's big lenders, however. Despite the recent turmoil, between July 14th and July 18th they reported strong quarterly results. Their seemingly perverse success is explained by the fundamentals of banking. When a financier provides a loan he must consider two things above all else. The first is the interest he can expect to receive. By handing over \$100 he might hope to earn, say, \$5 a year for the life of the loan, before the \$100 is paid back. The other is the risk that the borrower will default, failing to repay the principal. These risks and rewards must be balanced such that, even if some borrowers default, the income is sufficient to compensate. In other words, the juice must be worth the squeeze.

For most institutions, the juice has never been more worth it. Thanks to the highest interest rates in 15 years, net interest income at Bank of America, Citigroup, JPMorgan Chase and Wells Fargo hit a record \$63bn in the second quarter (see ►)



► chart). All that extra juice does not seem to have come with much additional squeeze. Provisions for loan losses—the money banks must set aside to protect against defaults, based on their assessments of the economic outlook—have risen only modestly, to around \$7.5bn. True, that level is higher than in recent quarters. But it is hardly alarming. Aggregate provisions were far higher in 2020 and, indeed, in almost every quarter from 2007 to 2012.

All told, quarterly net interest income, minus provisions for loan losses, has hovered at around 1.4% of the banks' total loan books a quarter, or about 6% annualised, throughout 2023. This is higher than at any time since 2005. Forget the turmoil: so long as you do not work at Goldman, there has rarely been a better time to be a commercial banker. JPMorgan even posted its best ever quarterly profits.

There are flickers of life in capital markets, too. Debt and equity-issuance numbers surpassed expectations. Bank bosses sound increasingly optimistic. "We're seeing less anxiety around funding, as most large corps are biting the bullet and paying higher rates to take advantage of issuance windows," reported Jane Fraser of Citi.

These results support the conclusion, which is gradually becoming the consensus on Wall Street, that the American economy has taken the most extreme dose of monetary tightening in 40 years on the chin. The housing market appears to have bottomed out, as does the stockmarket. Meanwhile, the labour market remains robust. The hope is that financial markets really have adjusted to sky-high rates more smoothly than expected. For once, bankers will not be the only ones celebrating their bumper profits. ■

## Financial transactions

### FedLate

#### Instant payments reach America, many years after the rest of the world

**A**MERICA'S FINANCIAL plumbing is overdue a spot of maintenance. The current payment "rails"—built by a group of the country's biggest banks to replace paper cheques—are more than half a century old and run on antiquated code. Although robust, the system is painfully slow. American payments are less sophisticated than those in the rest of the rich world, and indeed those in much of the poor world, too.

It is a problem the Federal Reserve is trying to fix with a centralised instant-payments system. Aptly called FedNow, this will soon allow Americans to ping money to their compatriots, via their existing financial institutions, and for payments to settle straight away. The Fed is gearing up for the launch of its new scheme in late July, with 41 banks and 15 payment providers all set to use the service once it goes live.

At the moment, bank transfers are cheap but processed in batches, often taking days to settle. Peer-to-peer networks, like Cash App, appear much quicker to customers but, beneath the surface, rely on the old system. Regulators have warned that funds held on such apps might not qualify for deposit insurance in the event of a failure. Credit cards, which offer juicy rewards at the cost of even juicier fees, also use existing rails. According to the San Francisco Fed, nearly a third of payments last year were made using plastic.

Typically, Americans use different methods for different types of payment: a water bill is paid via bank transfer; \$100 owed to a friend is sent through a payment app; a purchase on Amazon is made with a credit card. A single, real-time payments solution could improve the quality of all.

JPMorgan Chase and Wells Fargo, two heavyweight banks, have signed up to FedNow. But Wall Street is not entirely on board: a longer list of institutions, including Bank of America, Citigroup and Goldman Sachs, is absent. Although the current system is slow, it is also profitable for those involved. Financial institutions can take advantage of slow settlements to park cash in interest-bearing short-term securities overnight, or merely keep the money at the Fed to accrue interest. They also pocket late-payment fees and some make money from their own instant-payment systems, such as The Clearing House, which is run by a group of banks.

Some observers, recalling the banking turmoil this spring, worry that FedNow might destabilise the financial system. A report by Moody's, a credit-ratings agency, warns that the new scheme could make bank runs more likely by making it easier for depositors to flee. Such worries are likely to prove overblown, however. The current system, where weekends are closed for business, provided little relief to Silicon Valley Bank and others a few months ago. Moreover, since FedNow is a back-end system, participating institutions are able to set limits in line with their risk appetite. They can, for instance, cap payments or limit transactions.

Other countries are also light years ahead of America—and do not appear more vulnerable to bank runs. In India, for example, instant payments are the norm, accounting for 81% of domestic electronic transactions last year (see chart). In Thailand and Brazil they accounted for 64% and 37% respectively. Emerging markets have embraced instant payments in part because of demography (consumers are younger and more open to change), in part because of a crackdown on cash (policy-makers are keen to shrink the size of grey markets, and increase tax takes) and in part because, unlike in America, new payment systems did not have to push aside existing ones, and those who benefited from them.

FedNow is unlikely to transform payments immediately. The scheme will only support "push" transfers—ones that consumers initiate themselves. By contrast, FedNow's counterparts in Europe and India also have "pull" capabilities that businesses may use when given permission (which enable, say, regular payments for electricity). Fed officials claim to have no plans to extend the system for such uses, but bankers suspect it is the next step.

Mass adoption will face one more hurdle: the American consumer, over whom paper-based payments retain a particular hold. According to ACI Worldwide, a payments firm, around a fifth of all cash transfers in the country happen via cheque. Still, it will be nice for them to have the option, just like the rest of the world. ■

## Paper pushers

Real-time payments, 2022  
% of all electronic transactions





## Climate change

### Turning up the heat

As the northern hemisphere swelters, is climate change speeding up?

ESTIMATES OF Earth's average temperature, having set a new record on July 3rd, have yet to fall back below the previous record, which was set just last year. That a run of very hot days should happen in July is, by itself, perhaps unsurprising. Two-thirds of the Earth's land is in the northern hemisphere, and land warms up faster than water does, so northern summers are the hottest times of year for the planet as a whole. But the highest temperatures tend to come later in the season. That this year's should start so early, rise so high and run so long is unprecedented.

So is what is happening in the oceans (see chart on next page). Since March 13th the sea-surface temperature in low- and mid-latitudes has been higher than on the same day in any year since 1979. Normally highest in the southern summer (most of Earth's water is in the south), temperatures are at record levels in the southern winter.

→ Also in this section

63 Unassembling cars

64 When mammals attack

Within the rising global averages lie savage peaks in particular places. On July 16th a site in the Turpan Depression in Xinjiang, sometimes called China's Death Valley, reported a high of 52.2°C. In America, in Death Valley proper, the same day saw a peak of 53.9°C. Of more immediate concern than isolated spikes in deserts, temperatures have been dangerously high in places where hundreds of millions of people live, too. On July 6th, after the city measured its highest July temperature ever, authorities in Beijing announced their second red alert for heat in two weeks. July 19th marked the 19th day in a row that the temperature in Phoenix, Arizona, has exceeded 43°C (see United States section). Things are similarly sweltering in Italy and many nearby countries (see map on next page).

#### Life in the greenhouse

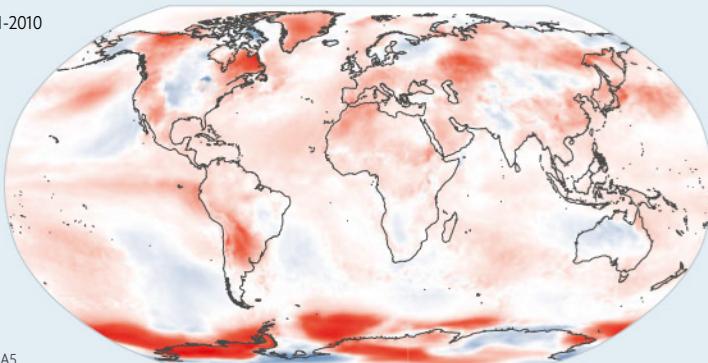
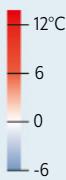
Asked how such a thing might be, one climate scientist replies drily "I suspect it might have something to do with accumulation of greenhouse gases in the atmosphere." More greenhouse gas in the atmosphere results in more of the warmth from the sun being trapped near the surface and absorbed by the oceans. The level of carbon dioxide, the most important long-lived greenhouse gas, as measured at Mauna Loa, a mountain peak in Hawaii, reached 424 parts per million in May, the highest it has been for over 3m years. Methane and nitrous oxide, two other long-lived greenhouse gases, have also reached levels never before experienced by humans. The world is now, on average, around 1.2°C warmer than it was before humans started thickening the glass in the greenhouse.

The climate has natural variations, too, and the most famous of them, the El Niño Southern Oscillation (ENSO), is adding to the warmth. ENSO is a sloshing back and forth in the winds and currents of the tropical Pacific ocean which sometimes sees the waters suck up more heat, and sometimes sees them give more heat out. In June the world entered an "El Niño" phase, in which heat is released. The greatest effect of an El Niño on global temperatures tends to be seen after it has been in place for a year or so. But today's ocean temperatures look like evidence of this one getting off to a flying start.

On top of these global effects, there is the fact that moving the top of a bell curve even a touch to the right can change the values in the tail a lot. According to James Hansen, a climate scientist at Columbia University, the sort of summer which would have been a once-in-a-century event between the 1950s and 1980s has become a once-every-five years event now. If sweltering summers are more likely everywhere, the chances of more than one region being affected at a time go up, too. ►

### Summertime, and the living's uneasy

Average air temperature,  
July 1st-12th 2023  
Deviation from 1981-2010



Source: Copernicus, ERA5

► So are the thickening of the atmospheric blanket, an outpouring of heat from the Pacific and the random effects of year-on-year variation enough to explain this summer's freakish temperatures? Or is there something more going on?

Dr Hansen thinks there is. He argues that the rate at which the world is warming seems to have gone through a step change in the 2010s, though he has not yet convinced his peers. This summer's surprises, especially a run of record temperatures in the North Atlantic, might help change that. "I wouldn't be surprised if we see papers appearing over the next few years saying [the Atlantic anomaly is] more than just another extreme," says Myles Allen, a climate modeller at Oxford University.

Several things could be speeding up warming. One is the change to the stratosphere brought about by the eruption of Hunga Tonga-Hunga Ha'apai, a submarine Pacific volcano, in January 2022. This was the largest eruption on Earth since Mount Pinatubo, in the Philippines. In 1991 Pinatubo injected tens of millions of tonnes of sulphur-dioxide gas into the stratosphere, where it reflected some of the sun's light. The result was a worldwide cooling of about 0.5°C that lasted about a year.

The Hunga eruption did not throw anything like that much sulphur into the stratosphere. But it did pump in a great deal of water vapour; between 70m and 150m tonnes. Water vapour is a powerful greenhouse gas. In the lower atmosphere it condenses out into rain or snow fairly quickly. In the stratosphere, though, it lingers for longer. The Hunga eruption is thought to have increased the amount of water vapour in the stratosphere by 13%. That would have warmed the planet—though if Hunga is playing a role, it is one that is already waning.

Other possible influences are waxing. When ice ages end, methane levels in the atmosphere shoot up, ushering in the warmer climate of the "interglacial" to come. Some scientists cite recent increases in methane levels as evidence that something similar may be afoot today. Methane levels rose throughout the 20th century, mainly because of the rising use of fossil fuels and agriculture. They flattened off at the beginning of the 21st century, but are now growing faster than ever.

Some of this is doubtless still because of farming and fossil fuels. But a paper by Euan Nisbet, an Earth scientist at Royal Holloway, and his colleagues, and recently

accepted for publication in *Global Biogeochemical Cycles*, argues that not all the extra methane can be explained that way.

The researchers think that the surplus may be coming from the growth of tropical wetlands, whose plants produce the gas when they rot. This is one candidate for the mechanism that drives the methane spikes seen at the end of ice ages. If true, it opens up the possibility of a feedback loop starting today similar to the ones that seem to have operated in the past. More methane means more warming, which means more wetlands, and therefore more methane.

That idea is speculative, for now. Perhaps a more plausible culprit is falling emissions of sulphur. The burning of coal and heavy fuel oil produces a lot of sulphur dioxide. Once in the atmosphere that gas forms sulphate particles. These particles cause air pollution leading to hundreds of thousands of deaths every year. Environmental regulators have been trying to reduce sulphur emissions for decades.

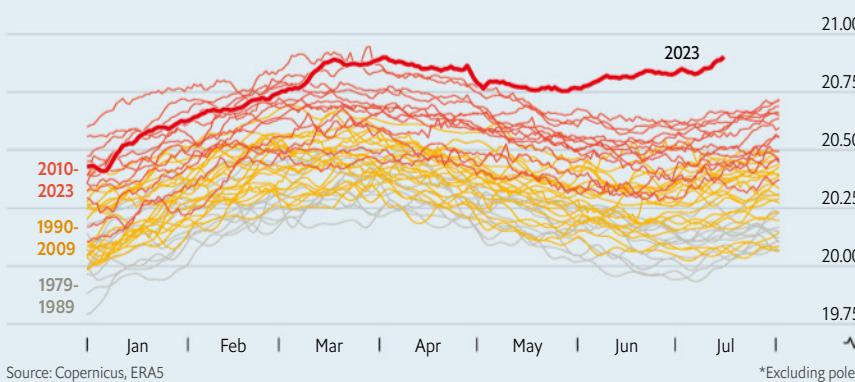
But sulphate particles in the lower atmosphere reflect sunlight, just like those created in the stratosphere after volcanic eruptions. And, unlike those in the normally bone-dry stratosphere, particles lower down can help create clouds which reflect away more sunshine still. Controls on pollution mean that this climate-cooling side effect has been weakening.

Of particular relevance are new regulations on the sulphur content in shipping fuel that came into force in 2020. The regulations were brought in by the International Maritime Organisation on the basis of estimates that they would save around 40,000 lives a year. They are thought to have reduced sulphur emissions from shipping by more than 80%. The evidence is visible as a worldwide decline in "ship tracks", long, thin clouds created when sulphate particles in a ship's exhaust provide nuclei around which water droplets can form. Fewer, fainter ship tracks and other clouds mean less sunlight is bouncing back out to space, and is instead being absorbed by the oceans below.

The indirect effects that aerosol particles have on cloud cover are notoriously hard to capture in climate models. Estimates of how much cooling shipping pollution might have caused vary by a factor of ten. But Dr Hansen thinks the changes could plausibly explain most of the quicker warming that he sees in the data. From 1970 to 2010 the warming trend was 0.18°C a decade. Since around 2015, Dr Hansen thinks it has been between 0.27°C and 0.36°C per decade—between half as high again and twice as high. A study by Dr Allen and his colleagues published last year sees a similar increase in the trend, but warns that it may be strongly influenced by natural variability, with aerosol effects playing a much smaller role than that which Dr

### Surf's up (and up)

Average global sea-surface temperature\*, °C



Source: Copernicus, ERA5

\*Excluding poles

Hansen would assign them. "Quantifying the role of human influence in these apparently unprecedented events is hard," Dr Allen cautions.

A sweltering world might try to find a way to keep the cooling properties of sulphates without the drawbacks for air quality and health. In 2006 Paul Crutzen, an atmospheric scientist, suggested this might be done by continuously injecting small amounts of sulphur directly into the stratosphere. Since there is no rain to flush them out, high-flying stratospheric particles last much longer than those in the lower atmosphere.

That means that a few million tonnes of sulphur dioxide added to the stratosphere—technically quite plausible—could provide as much cooling as the 100m tonnes or so that humans dump into the lower atmosphere each year. And as with warming itself, its effect on extremes would be greater than its effect on averages. Unwelcome things in the tail of the distribution could be made a lot less likely.

#### Sunscreen for the planet

This idea, a form of "solar geoengineering", is controversial, and with good reason. Its effects on stratospheric chemistry cannot yet be predicted accurately. Of particular concern are what it might do to the ozone layer, which screens out a good deal of the sun's harmful ultraviolet radiation before it reaches the ground.

Because solar geoengineering's effects on rainfall, as well as temperature, would differ from place to place, a cooling tailored to the needs of one country might not be to the taste of others. Settling such disputes is beyond any current system of global governance. Above all, a technology that could cool the planet without ending fossil-fuel use might well slow or even scupper that phase-out.

So far these worries have carried the day. Research on solar geoengineering has been side-lined, and its possible role in climate policy has gone largely undiscussed. All those who take part in such discussions as there are stress that solar geoengineering should at best be seen as a complement to decarbonisation, shaving off extreme risks while the world moves towards a fossil-free economy. But the fear that it would instead be treated as an alternative is sufficiently persuasive as to be pervasive.

If 2023 is not an aberration, though, and the world really is moving into an accelerated phase of warming, that reluctance might be reassessed. Emissions reduction should be able to slow the warming of the Earth within a few decades. Pursued with real zeal, it might bring it to an end this century. But it provides no cooling in the meantime. If that proves to be what the world wants, solar geoengineering is the only thing which looks able to provide it. ■

#### Recycling

## The new scrap kings

POOLE

**High-tech "deproduction" lines are turning the car business into a circular industry**

HANGING ON THE wall in the offices of Charles Trent, a vehicle-recycling company based in Poole on Britain's south coast, is a black-and-white photograph from the 1920s. It shows rows of old jalopies piled high in the scrapyard. Marc Trent, Charles's great-grandson and the firm's current boss, smiles at the photo and remarks: "those days have long gone."

He is referring to a time when motorists usually had a bit of mechanical nous and used scrapyards as repositories of spare parts when their cars broke down. Customers, spanners in hand, would search for a donor car, negotiate a price, then remove the required component themselves.

Nowadays the customers are more likely to be professional mechanics and garages buying online. The parts they find will have already been removed, cleaned, tested and often guaranteed. As often as not they are dispatched overnight. It is all part of the transformation of what was once a murky and informal business. Stricter rules, supply-chain snarls and higher prices for both cars and components mean that firms like Charles Trent—and even some big carmakers—are turning into sophisticated recycling operations.

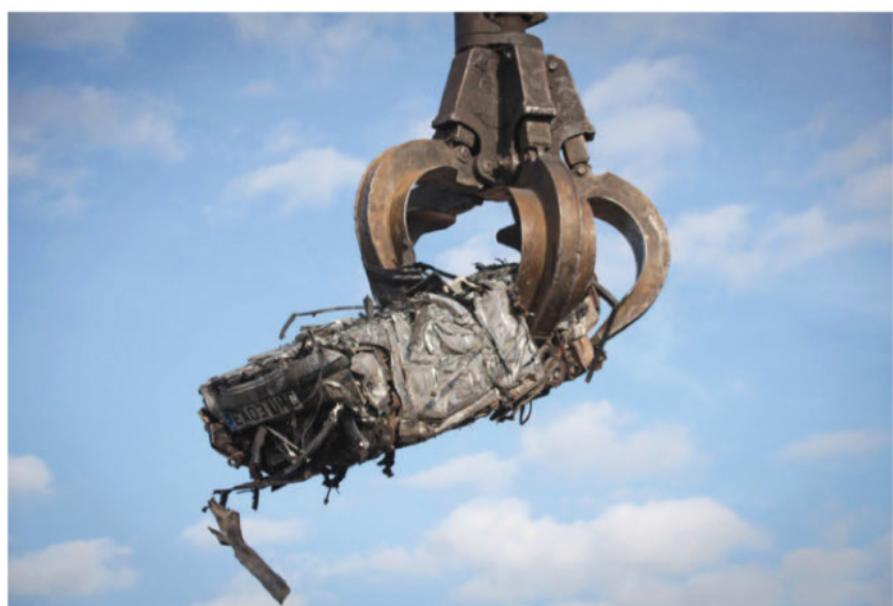
At its Poole facility, for instance, Charles Trent has invested around £10m (\$13m) to set up a "deproduction" process for "end-of-life vehicles" (ELVs), as scrap

cars are now called. When it is fully operational, the plant should be able to render more than 100 ELVs a day into their constituent parts. With plans for five more plants, the firm aims eventually to disassemble 300,000 vehicles a year, around a fifth of the total number scrapped in Britain. In total, just over 96% by weight of an ELV can be either reused or recycled, says Mr Trent.

To do that, the firm will build something that looks much like a modern car-assembly line, but which runs backwards. When an ELV arrives, it is assessed for parts that could be reused or refurbished, the details of which go into an elaborate computer system which oversees the entire process. The car is then "depolluted", which involves removing the wheels and decanting fuel, oil and air-conditioning gases.

The vehicle is then loaded onto the line. Technicians, using much the same equipment found in modern car plants, systematically remove the panels, interiors, engines, gearboxes, and everything else that a different set of technicians had carefully screwed into place years before. Some are sent for recycling. Others are cleaned, tested and put up for resale. The bare shell of the vehicle is fed into a crusher, before going off to be melted down and used again.

Worn parts, such as engines and gearboxes, can be refurbished or even "remanufactured", a more involved process de-►



Picked clean and ready for recycling

► signed to return them to the condition they were in when new. LKQ is a Chicago-based firm that operates 170 dismantling plants in North America that process 700,000 EVs a year. It reckons remanufacturing uses about 15% as much energy, and produces about 30% as much carbon emissions, as making a new part from scratch.

A number of factors are driving the transformation. Carmakers are having to take greater responsibility for what happens to their products. (The European Union, for instance, is considering tighter recycling targets.) Reusing parts helps cut manufacturing emissions.

Other pressures come from the market rather than the statute book. Rising prices for raw materials and parts make the cost savings from second-hand components more attractive. According to eBay, an online marketplace, used car parts are up to 70% cheaper than new ones. (eBay uses a certification scheme, with approved sellers and money-back guarantees to reassure buyers.) Second-hand parts are often faster to get hold of as well as cheaper, thanks to the supply-chain problems that have dogged the car industry since the covid-19 pandemic. Many insurance companies, which once eschewed their use, now allow some recycled components, such as body panels, in repairs.

Carmakers are getting in on the act, too. The Stellantis group (whose biggest shareholder, Exor, also part-owns *The Economist's* parent company) this year converted a factory at its Mirafiori complex in Turin, Italy, into a centre for reconditioning components and cars. The company's brands include Chrysler, Peugeot and Fiat.

While an ordinary production line builds a single type of car, a deproduction line must deal with all sorts, says Loïc Bey-Rozet. Mr Bey-Rozet runs Indra Automobile Recycling, a French firm jointly owned by Suez, an environmental-services group, and Renault, a carmaker. It manages 380 independent recyclers in France, which between them dealt with 600,000 EVs last year. It also runs a demonstration plant in Romorantin, in central France, which develops dismantling techniques for all manner of vehicles. The firm supplies "de-production" systems to recyclers around the world, including Charles Trent.

#### Going electric

One of the things the firm is working on is how to deal with electric vehicles (EVs). These already require special handling. Dangerous voltages can linger in the vehicles' electronics, for instance, even when their batteries are flat. If those batteries are damaged, they can catch fire or explode.

At the same time, the mechanical simplicity of electric cars, at least compared with internal-combustion ones, means that the batteries are by some distance

their most valuable parts. Good batteries are resold; damaged ones are sent to specialists that are setting up operations to recover the useful materials which they contain. Once the batteries are gone, though, there are comparatively few juicy pickings left for the recyclers.

So, to try to capture more value from dismantling EVs, Indra is hoping to find ways to refurbish damaged batteries in-

stead. This is possible because often it is not the entire battery that fails, but just one of the many smaller modules from which they are made up. Replacing the damaged part could give the rest of an old battery many more years of useful life. Doing that, though, will demand even greater technical skills and yet more specialised technology. But if there's money in it, the scrap kings will do it. ■

#### Palaeontology

## Role reversal

### A spectacular new fossil shows a mammal making a meal of a dinosaur

**T**HAT DINOSAURS ate the mammals that scurried beneath their feet is not in doubt. Now an extraordinary fossil newly described in *Scientific Reports*, unearthed by a team led by Gang Han at Hainan Vocational University of Science and Technology in China, shows that sometimes the tables were turned.

The fossil—dated to about 125m years ago, during the Cretaceous period—was formed when a flow of boiling volcanic mud engulfed two animals seemingly locked in mortal combat. The one on top is a ferret-like mammal known as *Repenomamus robustus*. The animal below is a herbivorous relative of *Triceratops* known as *Psittacosaurus lujiatunensis*. Animal interactions such as this are exceptionally rare in the fossil record.

One possibility is that the mammal was scavenging something already dead, rather than hunting live prey. These days it is uncommon for small mammals to attack much larger animals. But it is not unheard of. Wolverines, for instance,

occasionally take caribou. And Dr Han and his colleagues point out that scavengers typically leave tooth marks all over the bones of the animals. The dinosaur's remains show no such marks. There is also a chance the fossil could be a fake. Many of the most convincing forgeries have come, as this one did, from China—though Dr Han and his colleagues argue that the complex and entwined nature of the skeletons makes that unlikely, too.

Assuming it is genuine, the discovery serves as a reminder that not all dinosaurs were enormous during the Cretaceous and not all mammals were tiny. From nose to tail, the dinosaur is just 1.2 metres long. The mammal is a bit under half a metre in length. Despite being half the size, the mammal has one paw firmly wrapped around one of its prey's limbs, and another pulling on its jaw. It is biting down on the dinosaur's chest, and has dislodged two of its ribs. Before they were interrupted, it seems that the mammal was winning.



A fight, interrupted



"Oppenheimer" v "Barbie"

## Bombs and a bombshell

What two Hollywood blockbusters reveal about our times

THEY MAKE an intriguing pair of rivals: he in a dark suit and porkpie hat, she in a gingham dress and matching hair bow. His domain is a vast scientific-research facility in New Mexico; hers is a fluorescent-pink party house with a slide. J. Robert Oppenheimer (played by Cillian Murphy, an Irish actor) spends his days corralling the finest scientific minds in America to create a nuclear bomb—work a colleague calls “the most important fucking thing to ever happen in the history of the world”. Barbie (played by Margot Robbie, an Australian actress) may seem like she has the perfect life, but she has existential worries too. Do her friends and fellow dolls, she wonders, “ever think about dying?”

No recent movie matchup has been as eagerly awaited as “Barbie” and “Oppenheimer”. Released on July 21st in America and Britain, the two films will serve as a test of whether viewers can be coaxed off their couches to return to cinemas. The incongruity in the films’ subject and tone has

delighted the internet. People have created memes, remixed the trailers into jarring “Barbenheimer” hybrids and debated whether to see the biographical drama or the fantasy comedy first.

The brouhaha is partly a result of the film-makers. Christopher Nolan, the writer-director of “Oppenheimer”, is the closest thing Hollywood has to a mad scientist. He shoots on film and mostly eschews computer-generated imagery, blowing up an actual Boeing 747 for a previous film. The nuclear reactions in “Oppenheimer”

were also created by producing actual explosions (albeit not nuclear ones), brightened by aluminium and magnesium powder. His films toy with narrative conventions and tricksy subjects, such as the unconscious mind and theoretical astrophysics. They have earned a combined total of around \$5bn in ticket sales; “Dunkirk”, released in 2017, is one of the highest-grossing films ever made about the second world war.

Greta Gerwig, the director and co-writer of “Barbie”, has her own large fan club. She started out in the “mumblecore” genre of independent film (so named for its focus on dialogue) but has since had hits with “Lady Bird” (2017) and an adaptation of “Little Women” (2019). Her work claims humbler gross ticket sales of \$300m. For “Barbie”, she has cited old Hollywood musicals and films about the afterlife, such as “Heaven Can Wait” (1943), as inspiration.

The two films encapsulate some of the caprices of the modern movie industry. “Barbie” is one of many productions to exploit decades-old intellectual property. Mattel, a toymaker, has sold roughly a billion dolls since it first introduced Barbara Millicent Roberts (call her “Barbie”) to consumers in 1959. Ms Robbie, who is also a producer of the film, has said she was drawn to the project because the Barbie name is “more globally recognised than practically everything else other than ►

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► Coca-Cola". It is easy to imagine that a sequel is already in the works.

"Oppenheimer", by contrast, holds no such franchise potential. The scientist may be "one of history's most essential and paradoxical" figures, as Mr Nolan has put it, but he is not likely to return for "Oppenheimer 2: Learning to Love the Bomb". It is a serious, standalone drama—the kind of film made less frequently as studios focus on sequels and spin-offs. Its opening weekend is predicted to fetch \$40m–50m in ticket sales, compared with around \$80m for "Barbie".

Though "Oppenheimer" features stars such as Emily Blunt and Matt Damon, the sombre story is not obviously a crowd-pleaser. That it has also been made with a large budget of \$100m reflects the faith that studios have in certain film-makers and the risks they allow them to take. "There have been films previously about the development of the atomic bomb in the 1940s and 1950s, and they haven't been box-office successes," says Sheldon Hall, a film historian and co-author of the book "Epics, Spectacles and Blockbusters: A Hollywood History". "This film is being hinged on Nolan's reputation," he adds.

The "Barbenheimer" rivalry brings a more serious question for the public: whether to favour realism or escapism. As war rages on in Europe, and countries including China and North Korea continue to develop their nuclear arsenals, the origin story of these weapons of mass destruction may feel too real and raw. "Oppenheimer" is not a film that will ease viewers' anxieties. It explores the physicist's concerns about the horrifying power of his weapon and other bombs; it also shows how the American government attempted to silence him when those opinions became politically unpopular. Oppenheimer has disturbing visions of the bomb's victims in excruciating pain, their skin peeling. "Some people leave the movie absolutely devastated," Mr Nolan has said. "They can't speak."

#### From Hiroshima to Barbie Land

Ms Gerwig's production is much more playful. She has described the set—which contributed to a global shortage of pink paint—as "a dopamine generator". The film's tone is witty and slyly self-referential: it pokes fun at Mattel, here run by a team of men, and the vexed history of the toys. (The Barbies mistakenly assume that all women revere them as role models.) It has the kind of plot that only makes sense if a viewer does not think about it deeply.

"Barbie" recognises the alluring comfort of dream worlds. At one point Weird Barbie, a doll that has been handed around and mistreated, offers Barbie a choice, symbolised by a high heel and a clunky Birkenstock sandal: "You can go back to your

regular life, or you can know the truth about the universe." Barbie chooses the stiletto and is quickly chastised. "You have to want to know, OK? Do it again."

"Barbie" and "Oppenheimer" offer another version of the Birkenstock-stiletto dilemma. History suggests more viewers will opt for escapism. During the Great Depression, many of the highest-grossing films were musicals or historical epics. The same was true during the second world war. Movies that did broach the subject of conflict, including "Gone with the Wind" and "Sergeant York", were often set in the past; those that were contemporaneous, such as "Casablanca", tended to tell love stories rather than tales of grisly com-

bat. In 1968, at the height of the Vietnam war, the biggest movie in America was "Funny Girl". In 2007, during the financial crisis, it was a film from the "Pirates of the Caribbean" franchise.

David Thomson, another film historian and author, reckons that, at a time of economic strain, war and populism, viewers will not want to see a serious film as much as they will want to see a frivolous one. "Comedies have always done well at the movies," he says, because they do "something that the movies were made for, which is to reassure people and give them a couple of hours of escape from pretty big problems." Who wants reality when life in plastic is so fantastic? ■

#### Climate change

## The heat also rises

#### Extreme temperatures separate "the cool and the damned"

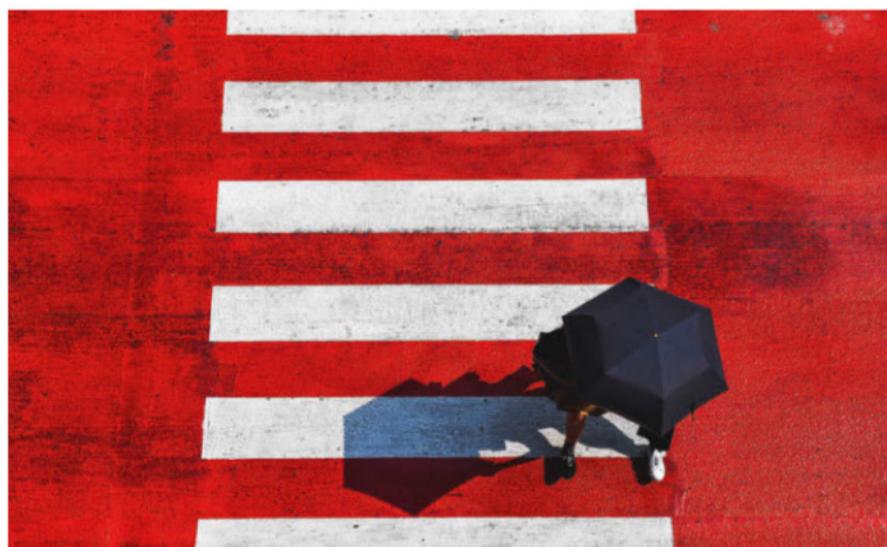
**The Heat Will Kill You First.** By Jeff Goodell. Little, Brown and Company; 400 pages; \$29 and £25

IT MAY BEGIN with a cracked throat, lips that stay dry no matter how many times they are licked. As the heat overwhelms the body, the head throbs and vision goes blurry, before the world turns black. This is probably how Sebastian Perez felt on the day he died.

In late June in Willamette Valley, Oregon, where oak and Douglas fir trees dot the state's lush wine country, top temperatures usually hover around 25°C (77°F). On

the morning of June 26th 2021 it hit 38°C, but Mr Perez still went to work as usual, to try to ensure that the young trees at the nursery where he was employed had enough water to withstand the searing heat. By 3pm the temperature had risen to 41°C, and Mr Perez had collapsed. A migrant farmworker, he had journeyed to Oregon to make enough money to build his wife Maria a house back in Guatemala. "I promised I would wait for him," she says, "and now he's coming home in a box."

"The Heat Will Kill You First", a new book by Jeff Goodell, a longtime climate journalist, reads like an anthology of horror stories. A couple and their one-year-old ►



The fire of a thousand suns

► daughter die of overheating on a hike in northern California. A Parisian woman returns to her flat after a heatwave in 2003 to find her home caked with blood and urine. Her upstairs neighbour had died, and no one found the body for more than a week.

The book is a remarkable exploration of the deadly consequences of rising temperatures wrought by humans pumping greenhouse gases into the atmosphere. Unlike wildfires and hurricanes—which create whirls of flame, paint skies an apocalyptic orange and drown cities—heatwaves cannot easily be captured on film. Heat slaughters silently, snuffing out more American lives each year than any other type of weather. “How do you make visible the story of an invisible killer?” asks Mr Goodell. Some policymakers are trying, by creating new heat-warning systems and naming heatwaves as they do hurricanes.

The book’s biggest takeaway is that the harm from heat falls unfairly on those least able to protect themselves. “A heatwave is a predatory event,” writes Mr Goodell, “one that culls out the most vulnerable people.” Rich places and people can plant trees for shade, paint heat-absorbing asphalt to reflect more sunlight, retile zinc roofs, make their cities oases of air-conditioning or move to colder places. But adaptation is much harder for poor people and places. At the end of a chapter devoted to “cheap cold air”, Mr Goodell concludes that “the most enduring legacy of air-conditioning may be the divide it has created between the cool and the damned.”

The book isn’t all fire and brimstone. Unlike some climate-science writers who drown readers in data and seem to write only for other activists, Mr Goodell tells his story colourfully. Readers meet many memorable people working to raise awareness of climate change by figuring out which extreme weather events can be attributed to it, and helping its victims by leaving water for migrants crossing the Arizona desert or campaigning for safer conditions for farmworkers.

The author’s intrepid reporting will make some readers feel lazy. To illustrate the effects of melting sea ice, Mr Goodell faces down polar bears in the Canadian Arctic and crosses a treacherous passage on the way from Chile to Antarctica by boat. In West Texas he scales a rock formation made of the skeletons of ancient sea creatures, which 260m years ago was under water.

Other readers may feel frightened after reading this book. In July the average global air temperature broke records three times in a week. A third of Americans live in areas where the government is currently issuing warnings about extreme heat, and Europe looks poised to break previous temperature records. “The Heat Will Kill You First” could not be more timely. ■

## New fiction

**Opposites that never meet**

**Nothing Special.** By Nicole Flattery. Bloomsbury; 240 pages; \$26.99 and £16.99

**W**HEN MAE, 17 years old and adrift, is offered a job as a typist for Andy Warhol, she is given instructions. “Don’t become invested in how good you are at this,” says Anita, the head secretary. Her role is to listen to tapes and transcribe them, no more. In “Nothing Special”, Nicole Flattery, a raucously talented young Irish writer, takes inspiration from the imagined lives of the young women who were never credited but worked on “a, A Novel” (1968), an experimental book the Pop Art supremo compiled from unedited conversations with his stable of muses, whom he called his “superstars”.

Betrayed by her best friend, ostracised by her peers and ignored by most around her, Mae is a lifelong outsider who takes more comfort in objects than people. The Factory, Warhol’s studio, reminds her of a doll’s house, “with girls arranged everywhere, spread on every surface, lying across the couch, the faded carpets”. Her father is absent, and she lives with her mother, a charming but self-centred waitress with a fondness for booze. A “moody, prickly girl”, she persistently mistakes cruelty for care and tells a doctor, “I keep doing things that are nothing like the way I want to behave.” Ms Flattery took dead-end jobs, female friendship and power imbalances as themes in “Show Them A Good Time”, her acclaimed short-story collection

from 2019, and “Nothing Special” ventures into that familiar terrain.

Warhol plays the role of an extra, rather than a lead, in the novel. As is true of many of today’s “superartists”, such as Jeff Koons (who once had 120 artists working in his studio), Warhol’s work, brilliant as it was, did not emerge from his singular talent. He relied heavily on others’ toil. He appears to Mae in dreams, but she is never introduced to him. When he enters the room, everything brightens as if “suddenly everybody knew exactly where to direct the beam of their attention-seeking”. A spectral figure, he is “vast and untouchable”, but when he speaks to people, they become “more alive, more human, in that moment”. “Nothing Special” expertly captures the hold celebrity artists exert over peons and patrons alike.

Through Mae, Ms Flattery also limns the “internal disorder” and “gloomy impatience” of adolescence and early adulthood vividly. Like J.D. Salinger’s Holden Caulfield and Sylvia Plath’s Esther Greenwood, Mae is a lonely but memorable character. Friends disappoint her, school is dull, boys are unreachable. Puberty seems “both boring and disgusting”. Attention is intoxicating but elusive. “It was so beautiful to be filmed by someone who had loved you,” she says twice in the book, once of her mother, and later, of Edie Sedgwick, Warhol’s tragic addict-muse. With a style like Lorrie Moore’s, Ms Flattery is witty, propulsive and darkly delightful to read.



The male gaze

## The past and future of espionage

## Hi, spy

**Spies: The Epic Intelligence War Between East and West.** By Calder Walton. *Simon & Schuster*; 688 pages; \$34.99. *Abacus*; £25

**I**N JUNE 1941 Josef Stalin received a warning from the NKVD, the forerunner of the KGB, that a Nazi attack on the Soviet Union was imminent. "You can tell your 'source' in German air force headquarters to go fuck himself," was the Soviet leader's response. "He's not a 'source', he's a disinformant." The invasion came a week later. The anecdote is one of many gems unearthed from the archives in "Spies", a lucid history of the intelligence contest between America, Britain and Russia.

The author, Calder Walton, is an accomplished historian, having contributed to the authorised history of MI5, Britain's domestic security service. He is also the assistant director of an intelligence programme at Harvard University that attracts current and retired spooks, lending his book both scholarly clout and an insider feel. "Spies" explains how espionage and covert action shaped the cold war, but its enduring message is the folly of failing to realise you are in an intelligence war in the first place.

In December 1917 Vladimir Lenin founded the Cheka, the secret police, to terrorise the enemies of the Bolshevik revolution and steal secrets abroad. It quickly grew to be 100,000-people strong and used news agencies, trade missions and companies to spy across Europe. In the early 1930s Russian spies burrowed deep into Western governments. The most notorious moles were the Cambridge Five, who rose high in MI6. (One of them, Kim Philby, briefly wrote for *The Economist*.)

Western democracies were often oblivious. In 1929 Henry Stimson, America's secretary of state, shut down the country's codebreaking agency on the basis that "gentlemen do not read each other's mail". In 1936 Britain's ambassador in Moscow refused to allow MI6 to open a station in the embassy because "it was liable to cause embarrassment". On the eve of the second world war, notes Mr Walton, "Soviet intelligence perversely had more graduates of British universities than Britain's own intelligence services, MI5 and MI6."

During the second world war, Britain's Foreign Office went so far as to ban espionage against its new Soviet ally. British codebreakers at Bletchley Park were not permitted to monitor, let alone decrypt, Soviet communications. When America



Spot the know-it-all

bought a Soviet code-book from Finnish officers in 1944, the president ordered his spooks to return it to the Soviets.

Stalin, meanwhile, intensified his efforts, placing a higher priority on espionage against his allies than against Nazi Germany. When Stalin met Churchill and Roosevelt at Yalta in 1945 to hash out the post-war European order, his intelligence on them "probably surpassed that of any leader in history", writes Mr Walton. Remarkably, Stalin knew about both Bletchley Park's successes and the American atomic-bomb project years before Harry Truman, who learnt of those momentous secrets only on becoming president.

It is hardly news that the Soviet Union spied a lot. But there are few accounts as comprehensive as this one, spanning the Bolshevik revolution to the present day, while weaving in new archival material, some declassified as recently as 2022.

There are also lessons for the present. The final chapter of "Spies" persuasively draws a comparison between the West's previous contest and its new one. Mark Kelton, a former head of counter-intelligence at the CIA, suggests that the scale of current Chinese espionage against America's government at least matches Soviet activity in the 1930s. It may even exceed it. A report published on July 13th by the British Parliament's intelligence committee said China "almost certainly maintains the largest state intelligence apparatus in the world—dwarfing the UK's Intelligence Community".

Much as in the 1930s, America and its allies were lamentably slow to recognise and then blunt the threat. As late as 2017, counter-terrorism, not the risks posed by China or Russia, received the most funds among American intelligence priorities. All that has changed. In 2020 the FBI said it was opening a new China-related counter-intelligence case every ten hours. In a

speech on July 1st, Bill Burns, the director of the CIA, said that he had doubled the share of the budget devoted to China-related activity in the previous two years. But recognising a challenge is different from containing it. Mr Walton reckons that American intelligence agencies are unlikely to have penetrated the Chinese leadership as they did that of Vladimir Putin prior to the invasion of Ukraine. More worryingly, some intelligence insiders believe that a Chinese mole might have sabotaged the CIA's operations in China a decade ago.

America and its European allies insist they do not want a cold war with China. "That, of course, overlooks one of this book's central conclusions," argues Mr Walton: "Western powers can be in a cold war irrespective of whether they seek one and before they recognise it." ■

A new podcast on fertility

## At the sharp end

"The Retrievals", a tale of agony and addiction, makes listeners squirm

**T**HE WOMEN remember pain ripping through the most intimate parts of their bodies. "It felt like someone had... gutted me," says one. Another recalls bucking her hips wildly on the operating table. These harrowing experiences at Yale Fertility Centre are the subject of "The Retrievals", a gripping new podcast from Serial Productions and the *New York Times*.

Donna Monticone, a nurse, withheld fentanyl, a painkiller, from an estimated 200 women over five months in 2020. (She later admitted to stealing the drug.) Patients undergoing in vitro fertilisation

# Johnson Speak easy



*Technology is making it possible to clone voices and cause trouble*

JENNIFER DESTEFANO answered a call from a number she did not recognise. "Mom, I messed up," her daughter's voice told her, sobbing. "These bad men have me." A man proceeded to demand money, or he would drug her daughter and leave her in Mexico. But while she kept him on the phone, friends managed to reach her daughter, only to discover that she was, in fact, free and well on a skiing trip in Arizona. The voice used on the phone was a fake.

Ms DeStefano, still shaken, told this story to a US Senate subcommittee hearing on artificial intelligence in June. The dangers that voice-cloning technology pose are only now starting to be uttered aloud. In recent months, most of the attention paid to artificial intelligence (AI) has gone to so-called "large-language models" like ChatGPT, which churn out text. But voice cloning's implications will also be profound.

A brief sample of a voice can be used to train an AI model, which can then speak any given text sounding like that person. Apple is expected to include the feature for iPhones in its new operating system, iOS 17, due to be released in September. It is advertised as helping people who may be in danger of losing their voice, for example to a degenerative disease such as ALS.

For those eager to try voice cloning now, ElevenLabs, an AI startup, offers users the chance to create their own clones in minutes. The results are disturbingly accurate. When generating a playback, the system offers a slider that allows users to choose between variability and stability. Select more variability, and the audio will have a lifelike intonation, including pauses and stumbles like "er..." Choose "stability", and it will come across more like a calm

and dispassionate newsreader.

Taylor Jones, a linguist and consultant, took a careful look at the quality of ElevenLabs's clone of his voice in a YouTube video. Using statistical tests he showed that there were a few things off in "his" pronunciation of certain vowels. But a lower-tech test, a "conversation" with his own mother, fooled the woman who raised him. ("Don't you ever do that again," she warned.) Johnson repeated the experiment with his own mother, who did not miss a beat in replying to clone-Johnson.

For several years, customers have been able to identify themselves over the phone to their bank and other companies using their voice. This was a security upgrade, not a danger. Not even a gifted mimic could fool the detection system. But the advent of cloning will force adaptation, for example by including voice as only one of several identification factors (and thus undercutting the convenience), in order to prevent fraud.

Creative industries could face disruption too. Voice actors' skills, trained over a lifetime, can be ripped off in a mat-



ter of seconds. The *Telegraph*, a British broadsheet, recently reported on actors who had mistakenly signed away rights to their voices, making it possible to clone them for nothing. New contracts will be needed in future. But some actors may, in fact, find cloning congenial. Val Kilmer, who has lost much of his voice to throat cancer, was delighted to have his voice restored for "Top Gun: Maverick". Others may be spared heading to the studio for retakes. It is the middling professional, not the superstar, who is most threatened.

Another industry that will have to come to grips with the rise of clones is journalism. On-the-sly recordings—such as Donald Trump's boast of grabbing women by a certain private body part—have long been the stuff of blockbuster scoops. Now who will trust a story based on an audio clip?

Slightly easier to manage might be the false positives: recordings purporting to be someone but which are fakes. Sophisticated forensic techniques could be of use here, proving a clip to be AI, say, in a courtroom. The opposite problem—the false negatives—will arise when public figures deny authentic recordings. Proving that a clip is genuine is hard, perhaps even impossible. Journalists will need to show how they obtained and stored audio files—unless, as so often, they have promised a source anonymity.

During his first presidential run, Mr Trump did more than anyone to popularise the term "fake news"—and that was well before voice cloning, deepfake videos, artificially generated images and the like were widespread. Now, ever more people caught up in wrongdoing will be tempted by the defence, "It wasn't me." Many people will have even more reason to believe them.

► (IVF) were forced to endure egg retrievals, during which a doctor pierced their vaginal wall with a needle, "stone-cold sober". These women were betrayed twice: by the medics who, the patients say, ignored their pain and by Ms Monticone, a mother who had undergone IVF treatment herself.

The tale of agony and addiction has mesmerised people across the English-speaking world and topped Apple's podcast chart in North America. Two factors explain its success. The first concerns plot: stories about nefarious caregivers are chilling, and the podcast has a true-crime

quality that is spellbinding.

The second reason relates to the storytelling. The taut, five-part series probes personal themes of motherhood, betrayal and loss, which suit the intimacy of the format. Earbud-wearers will wince at the personal, excruciating details. This is how Serial Productions has mastered long-form audio: by presenting astounding stories that people want to hear. The same producers were behind "Serial" in 2014, a true-crime series that re-examined a murder case. Until then podcasting was a nascent industry. The show's success—it became

the first podcast to win a Peabody journalism award—helped launch the format and fuelled a boom in richly detailed, investigative productions. In 2020 the *New York Times* snapped up the company for a reported \$25m.

"The Retrievals", which releases its episodes over five weeks, will soon be over, but the real-life drama will not. Sixty-eight women are suing the Yale clinic for medical malpractice and medical battery, among other allegations. Yale says it has changed some of its practices. Listeners, however, have already chosen a side. ■

## Economic data

	Gross domestic product % change on year ago latest quarter* 2023†			Consumer prices % change on year ago latest 2023†		Unemployment rate %	Current-account balance % of GDP, 2023†	Budget balance % of GDP, 2023†	Interest rates 10-yr govt bonds latest, %	change on year ago, bp	Currency units per \$ Jul 19th	% change on year ago	
United States	1.8	Q1	2.0	1.3	3.0	Jun	3.9	3.6	Jun	-2.9	-5.7	3.8	74.0
China	6.3	Q2	3.2	5.5	nil	Jun	1.2	5.2	Jun‡	2.4	-3.0	2.4	7.22
Japan	1.9	Q1	2.7	1.3	3.2	May	2.6	2.6	May	3.2	-5.8	0.5	-15.0
Britain	0.2	Q1	0.6	0.3	7.9	Jun	6.7	4.0	Apr††	-3.3	-4.3	4.5	23.0
Canada	2.2	Q1	3.1	1.2	2.8	Jun	3.5	5.4	Jun	-0.1	-1.0	3.4	140
Euro area	1.0	Q1	-0.4	0.8	5.5	Jun	5.6	6.5	May	1.7	-3.3	2.4	110
Austria	1.9	Q1	0.4‡	1.0	8.0	Jun	7.6	4.6	May	1.1	-2.4	3.0	10.1
Belgium	1.3	Q1	1.5	0.8	4.2	Jun	3.6	5.7	May	-1.9	-4.4	3.0	118
France	0.9	Q1	0.7	0.7	4.5	Jun	5.6	7.0	May	-1.7	-5.0	3.0	10.1
Germany	-0.5	Q1	-1.3	-0.2	6.4	Jun	6.0	2.9	May	5.1	-2.3	2.4	110
Greece	2.3	Q1	-0.3	2.0	1.8	Jun	3.9	10.8	May	-6.8	-2.3	3.7	10.1
Italy	1.9	Q1	2.2	1.2	6.4	Jun	6.4	7.6	May	0.1	-4.7	4.1	60.0
Netherlands	1.9	Q1	-1.3	0.9	5.7	Jun	5.2	3.5	May	6.5	-2.3	2.8	10.1
Spain	3.8	Q1	2.4	2.0	1.9	Jun	3.2	12.7	May	1.5	-4.2	3.5	111
Czech Republic	-0.2	Q1	-0.2	0.6	9.7	Jun	10.3	2.5	May‡	-1.9	-4.5	4.1	10.1
Denmark	1.9	Q1	2.3	0.5	2.5	Jun	5.0	2.8	May	9.8	0.7	2.7	110
Norway	3.0	Q1	1.0	1.6	6.4	Jun	4.8	3.4	Apr‡‡	17.6	12.5	1.4	6.66
Poland	-0.3	Q1	16.1	1.3	11.5	Jun	12.3	5.0	Jun§	-1.1	-4.9	5.4	-1.3
Russia	-1.8	Q1	na	-1.6	3.2	Jun	6.0	3.2	May§	5.4	-4.2	11.2	208
Sweden	0.8	Q1	2.4	1.0	9.3	Jun	7.1	7.9	May§	4.2	-0.3	2.4	91.5
Switzerland	0.6	Q1	1.1	1.2	1.7	Jun	2.6	2.0	Jun	7.1	-0.7	0.8	12.8
Turkey	4.0	Q1	1.3	3.3	38.2	Jun	44.3	8.8	May§	-5.4	-4.8	17.7	-34.6
Australia	2.3	Q1	0.9	1.5	7.0	Q1	5.5	3.5	Jun	1.0	0.2	3.9	34.0
Hong Kong	2.7	Q1	23.0	3.5	2.0	May	2.4	2.9	Jun‡‡	6.6	-1.5	3.7	7.81
India	6.1	Q1	5.3	6.2	4.8	Jun	5.3	8.1	Apr	-1.3	-5.7	7.1	82.1
Indonesia	5.0	Q1	na	4.9	3.5	Jun	3.8	5.5	Q1§	0.9	-2.6	6.2	-125
Malaysia	5.6	Q1	na	3.9	2.8	May	2.7	3.5	May§	3.1	-5.0	3.8	14,995
Pakistan	1.7	2023**	na	1.7	29.4	Jun	31.2	6.3	Jun	-1.5	-7.0	15.4	-21.9
Philippines	6.4	Q1	4.5	5.3	5.4	Jun	5.7	4.5	Q2§	-5.3	-6.3	6.3	54.5
Singapore	0.7	Q2	1.1	1.0	5.1	May	5.0	1.8	Q1	16.3	-0.7	2.9	4.5
South Korea	1.0	Q1	1.3	1.3	2.7	Jun	3.0	2.7	Jun§	1.9	-2.4	3.6	1,266
Taiwan	-2.9	Q1	-2.4	0.6	1.8	Jun	2.0	3.5	May	12.5	-0.9	1.2	3.8
Thailand	2.7	Q1	7.8	3.2	0.2	Jun	1.8	1.3	May§	1.3	-2.7	2.8	34.0
Argentina	1.3	Q1	2.7	-3.0	116	Jun	116.3	6.9	Q1§	-2.6	-4.5	na	-51.9
Brazil	4.0	Q1	8.0	2.4	3.2	Jun	4.8	8.3	May§‡‡	-1.9	-7.5	10.8	12.5
Chile	-0.6	Q1	3.4	0.1	7.6	Jun	7.7	8.5	May§‡‡	-3.6	-1.9	5.3	143
Colombia	3.0	Q1	5.9	1.6	12.1	Jun	11.5	10.5	May§	-4.0	-4.2	10.1	3,976
Mexico	3.7	Q1	4.1	2.1	5.1	Jun	5.0	3.0	May	-1.9	-3.7	8.7	21.7
Peru	-0.4	Q1	-2.2	1.5	6.5	Jun	6.5	6.0	Jun§	-1.6	-2.0	6.7	9.0
Egypt	3.9	Q1	na	3.8	35.8	Jun	30.8	7.1	Q1§	-1.9	-6.4	na	-38.8
Israel	3.8	Q1	3.2	2.9	4.2	Jun	4.3	3.6	Jun	4.7	-2.4	3.6	3.59
Saudi Arabia	8.7	2022	na	1.0	2.7	Jun	2.2	5.1	Q1	3.4	-1.2	na	0.3
South Africa	0.2	Q1	1.4	0.5	5.7	Jun	5.7	32.9	Q1§	-1.7	-5.6	10.3	-5.0

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 Jul 19th	% change on:			index Dec 30th 2022
	one week	Dec 30th 2022	Dec 30th 2022		one week	Dec 30th 2022	Dec 30th 2022	
United States S&P 500	4,565.7	2.1	18.9					
United States NAScomp	14,358.0	3.2	37.2					
China Shanghai Comp	3,198.8	0.1	3.5					
China Shenzhen Comp	2,037.1	0.3	3.1					
Japan Nikkei 225	32,896.0	3.0	26.1					
Japan Topix	2,279.0	2.6	20.5					
Britain FTSE 100	7,588.2	2.3	1.8					
Canada S&P TSX	20,491.2	2.1	5.7					
Euro area EURO STOXX 50	4,362.3	nil	15.0					
France CAC 40	7,326.9	-0.1	13.2					
Germany DAX*	16,108.9	0.5	15.7					
Italy FTSE/MIB	28,712.3	0.6	21.1					
Netherlands AEX	775.0	0.9	12.5					
Spain IBEX 35	9,451.8	nil	14.9					
Poland WIG	71,636.2	2.8	24.7					
Russia RTS, \$ terms	1,015.1	1.0	4.6					
Switzerland SMI	11,120.2	0.9	3.6					
Turkey BIST	6,571.3	3.6	19.3					
Australia All Ord.	7,538.2	2.7	4.4					
Hong Kong Hang Seng	18,952.3	0.5	-4.2					
India BSE	67,097.4	2.6	10.3					
Indonesia IDX	6,830.2	0.3	-0.3					
Malaysia KLSE	1,403.0	0.4	-6.2					

## US corporate bonds, spread over Treasuries

Basis points	latest	Dec 30th 2022
Investment grade	142	154
High-yield	440	502

Sources: Refinitiv Datastream; Standard & Poor's Global Fixed Income Research. \*Total return index.

## Commodities

The Economist commodity-price index	2015=100	Jul 11th	Jul 18th*	% change on month	% change on year
Dollar Index	All items	144.1	147.4	-1.9	-2.1
	Food	136.0	135.5	-3.6	-6.2
Industrials	All	151.7	158.5	-0.5	1.3
	Non-food agriculturals	110.8	111.6	0.2	-30.4
	Metals	163.8	172.4	-0.7	11.1
Sterling Index	All items	170.5	172.0	-4.5	-10.0
Euro Index	All items	145.4	145.5	-4.8	-10.8
Gold	\$ per oz	1,932.1	1,982.8	2.4	15.7
Brent	\$ per barrel	79.5	79.6	4.9	-25.9

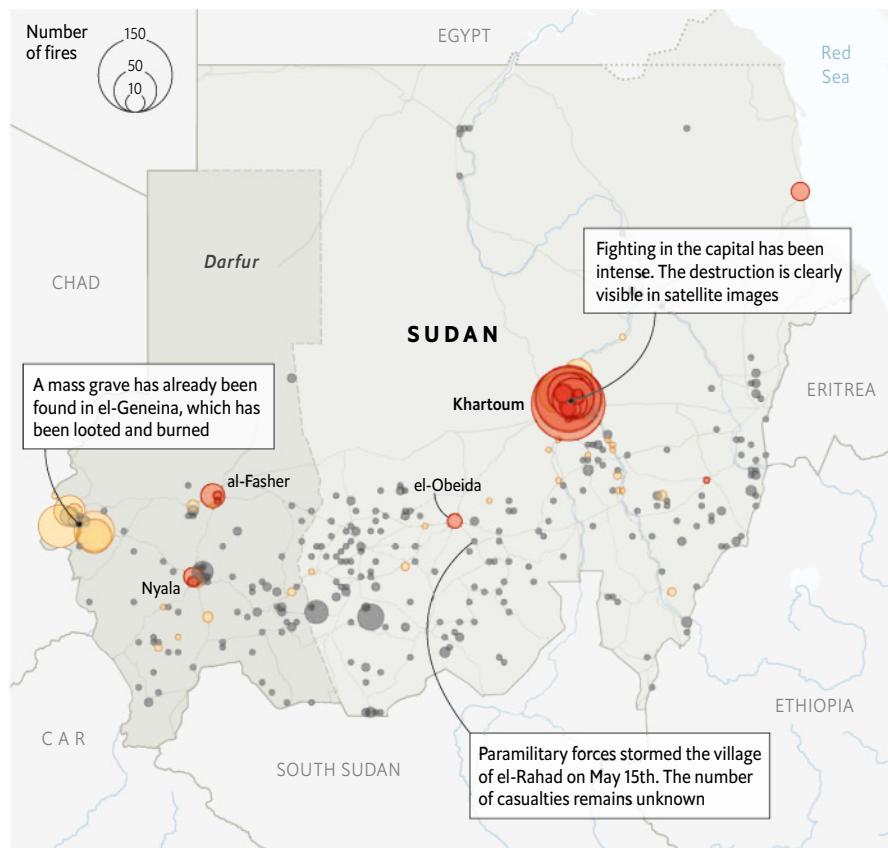
Sources: Bloomberg; CME Group; Cotlook; Refinitiv Datastream; Fastmarkets; FT; ICCO; ICO; ISO; Live Rice Index; LME; NZ Wool Services; Thompson Lloyd & Ewart; Urner Barry; WSJ. \*Provisional.

For more countries and additional data, visit [economist.com/economic-and-financial-indicators](http://economist.com/economic-and-financial-indicators)

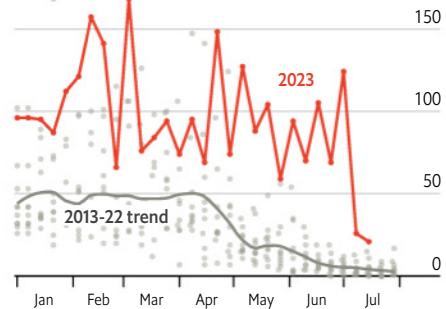
## → Throughout southern Sudan, the number of fires detected from space is abnormally high

Fires in inhabited areas, excess compared with a year earlier, April 15th-July 16th 2023

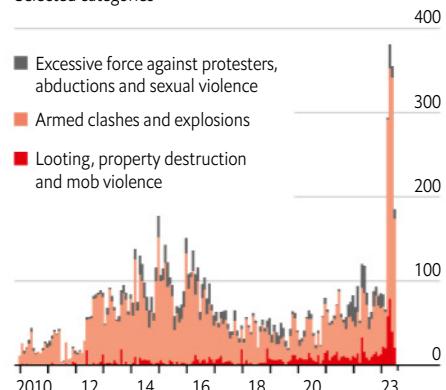
● Villages ● Towns/suburbs ● Cities



Fires in inhabited areas, by week  
Excluding large factories and oil facilities



Violent events, by month  
Selected categories



Sources: NASA; ACLED; GRID3; Google Earth; *The Economist*

## Crescent of fire

Data from satellites suggest that violence has surged in much of Sudan

SUDAN'S CIVIL war is thought to have uprooted at least 3m people. Such estimates are highly imprecise, because so little information is available. Local journalists and activists have been besieged—literally, in some cities—and foreign reporters cannot get close to the fighting. Soldiers have attacked telecoms infrastructure, stopping news from getting out.

Yet some witnesses are beyond the reach of Sudan's warring factions: satellites flying over the country. Data from their instruments can provide evidence of war crimes, such as the burning of villages. They can also reveal how the current carnage compares with that of the recent past.

NASA, America's space agency, runs a satellite-based system called FIRMS, which detects places with unusually high temperatures. It was designed to track forest fires, but logs natural and man-made con-

flagrations alike. Fire rates in Sudan vary by month, peaking during the dry season from September to March. But many more fires have been recorded in this year's wet season than in those of the past decade.

To isolate fires plausibly tied to fighting, we filtered out hot spots near cement factories, power stations and oil facilities, as well as areas marked as unpopulated in maps by GRID3, a non-profit. Since the war began in April, FIRMS has recorded five times as many fires in the remaining areas as the average for these months in 2013–22.

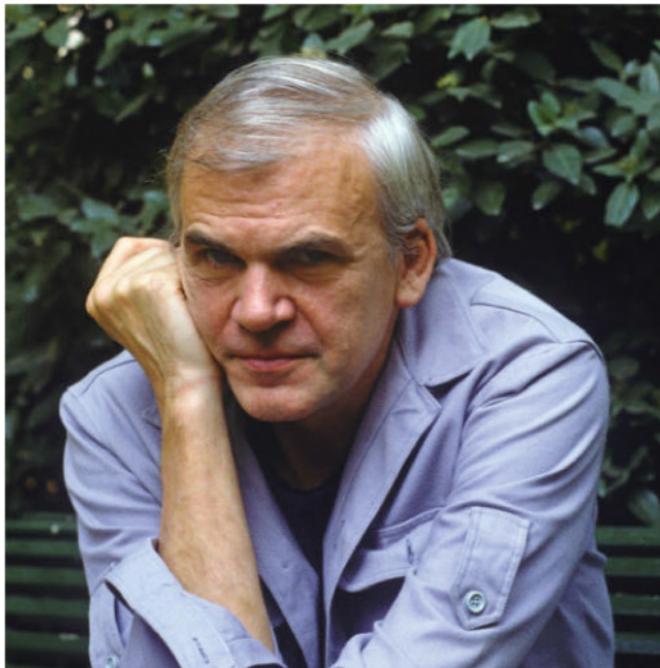
The spread of recent fires is as striking as their scale. When the civil war started, it pitted Sudan's regular army against the Rapid Support Forces, a paramilitary group. At first, much of the destruction was confined to the capital, Khartoum, where belligerents were fighting for control of the government. Yet by the end of April, abnormally numerous fires had erupted across most of southern and western Sudan.

Satellite images confirm that fires detected in both Darfur, the site of the 21st century's first genocide, and Khartoum stem from violence. High-resolution photos of areas where FIRMS detected lots of fires show buildings burned to the ground. According to the Sudan Conflict Observa-

tory, a research outfit at Yale University commissioned by America's State Department to monitor a series of partially observed ceasefires, at least 0.7 square kilometres of el-Geneina in West Darfur had been affected by fire by late June. In nearby Murnei, at least two square kilometres were torched in just two days last month.

The increase in fires also aligns with reports trickling out from the country. The Armed Conflict Location and Event Data Project (ACLED), a non-profit, finds that the current rate of violent events reported in Sudan is twice as high as the previous maximum since its records began in 1997 (though such data may be more complete in recent years). Just like the fire maps, ACLED's log shows fighting across the south, a region previously spared from mass violence—though the rise in fires seen from space greatly exceeds the number of violent events tracked by ACLED.

Estimating the death toll is a far harder task. Fire counts reveal nothing about victims, and of the 1,150 violent events logged by ACLED since April 15th, 388 are listed with "casualties unknown". When news does emerge, it is likely to be grim. On July 13th the UN said it had discovered 87 bodies in a mass grave outside el-Geneina. ■



## When angels laugh

**Milan Kundera, novelist and author of "The Unbearable Lightness of Being", died on July 11th, aged 94**

JUST BEFORE the Prague Spring in 1968, when the Communist regime in Czechoslovakia seemed briefly to relax, Milan Kundera managed to publish a novel about a joke. The joke, sent by a young man to a girlfriend on a postcard, read: "Optimism is the opium of the people! A 'healthy' atmosphere stinks of stupidity! Long live Trotsky!" It landed the young man in a lot of trouble.

The novel, his first, sold well. But when later that year Soviet tanks rolled in, forcing his country back into line, "The Joke" disappeared from bookshops. He himself was kicked out of the Communist Party (he had been expelled before, in 1950, for being critical, but had reapplyed) and was fired from his lecturer's job at the Academy of Fine Arts. Since no one was now allowed to employ him, he played dance gigs in the taverns of mining towns. Eventually, though, there was nothing doing in Czechoslovakia, so he and his wife Vera left for France, and stayed.

In retrospect, writing "The Joke" had been a bad decision. But it was good at the time. That was life. You had only one, with no second or third chances to take a different course. His novels were full of characters struggling, like him, to unpick the past, predict the future and, on the basis of that, jump the right way. In the most famous of them, "The Unbearable Lightness of Being", the protagonist Tomas first appeared standing at a window, ruminating. Should he invite the lovely bartender Tereza to his room, or not? Would he get too involved? If so, how would he get out of it? After spending the night with her, the questions only multiplied.

Tomas, like his creator, made a bad (or good) decision to defy the party. He lost his post as a surgeon and became a window cleaner. He also decided, for good or bad, to stay with Tereza. But all through the novel he had wrestled with his creator's favourite theme, the weighing of opposites. The Greek philosopher Parmenides had stated, in particular, that lightness was positive and heaviness negative. Lightness was the realm of the soul, space,

separateness and freedom; heaviness was to be earth-and-body-bound, rule-bound and constricted. Clear enough.

But not so fast. Lightness also made both history and life insubstantial, airy as a feather, the happenings of a day. It justified betrayal, irresponsibility and breaking ranks (as he from the party), where heaviness stressed duty and obedience. Most important, lightness was about forgetting, and heaviness insisted on remembrance. What was the self, but the sum of memories? In "The Book of Laughter and Forgetting" the heroine, Tamina, clung constantly to the memory of her dead husband even when making love with other men. Was that a good or a bad thing?

The question applied especially to Czechoslovakia, in its highly vulnerable position on the map. How could it survive without remembering its past great men, Hus, Comenius, Janacek, Kafka, or without the language they had spoken? Memory gave it identity, and gave Czechs themselves the only power they had against the states that oppressed them. In 1967 Mr Kundera appealed to fellow-writers to seize the moment with their pens. But he still resisted the thought of enclosing cultures within borders. Borders between ideas were there to be crossed.

In Paris after 1975, living in an attic flat on the rue Récamier, feasting on frogs' legs and eventually writing a trio of novels in French, it seemed to him that notions of "home" and "roots" might be as illusory as the rest of life. His Czech citizenship had been revoked and, though he still mostly spoke Czech, he was almost indifferent when, in 2019, he got it back. Like Goethe, he saw literature becoming global and himself as a citizen of the world.

He had been one for a long time. His youthful reading was mostly French: Baudelaire and Rimbaud, but especially Rabelais and Diderot. French wit and experiment wonderfully foiled the socialist realism imposed on art and literature by the post-war Soviet regime. He fed it into his writing to defy the kitsch all around him. Sadly, it was kitsch he had fallen for himself when, at 18, he eagerly joined the party: all those heavy, emotional images of wheatsheaves, mothers and babes, hero-workers brandishing spanners, the glowing brotherhood of man. He saw himself as a knife-blade, cutting through the sweetish rose-tinted lies to show the shit—and the mystery—beneath.

Because truth was mysterious. And novels were a wide-open territory of play and hypotheses where he could question the world as a whole: digressively like Sterne in "Tristram Shandy", or adventurously, like Cervantes's Don Quixote. No answers, questions only; answers (in advance) were what kitsch provided. He played with philosophical musings, psychological analysis, investigations of misunderstood words, irony, eroticism and dreams. It could make a mish-mash for readers, especially Anglophone ones, and no other novel did as well as "Unbearable Lightness", though "Laughter and Forgetting" and "Immortality" sold respectably. The Nobel talk came to nothing, and he was glad, because he preferred reclusive delving to any sort of fame.

He liked to call his novels "polyphonic": a word learned from his father, a concert pianist and musicologist. The many voices, parts and motifs in his work were united by "novelistic counterpoint" into a single music. His chief hero in the enterprise was Janacek, whose photo hung beside his father's in the Paris flat: a composer who had refused to write by the rules but made directly for the heart of things. He doubted he himself had got anywhere close. Since the world couldn't be stopped in its headlong rush, it was best just to laugh at it. The devil laughed, because he knew life had no meaning; the angels, as they flew over, laughed too, knowing what the meaning was.

As a child he often sat at the piano playing two chords *fortissimo*, C minor to F minor, until his father furiously removed him. But as those chords became heavier he felt himself grow lighter until, in a moment of ecstasy, he seemed to float free of time. If that was unbearable lightness, he—and many others—spent an awful lot of their brief, insignificant lives trying to find it again. ■

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**Tony Parisi**  
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