Bloomberg

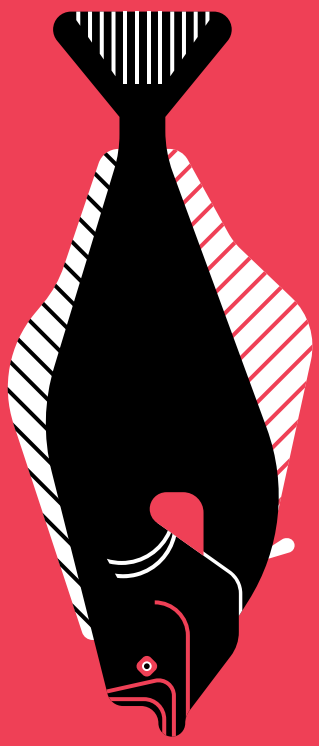
Issue 8 | January — June 2018

SPECIAL SECTION
THE FUTURE OF WORK

QuickTake

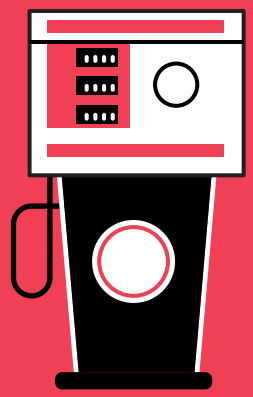
Hard-to-explain topics, explained simply

Inside



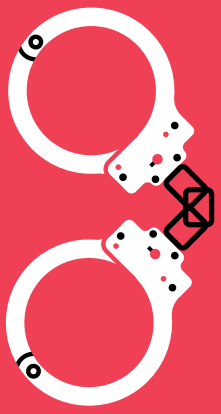
90%
Share of world's fishing grounds harvested at or beyond sustainable limit

1.7%
Share of cash in Sweden's economy, world's most cashless



2040
Year the U.K. and France will ban sale of new gas-only cars

9-fold
Increase in deaths from terrorism worldwide since 2000



426,000
Chinese officials punished for corruption in 2016

191m
Number of esports enthusiasts

2
Estimated years of life gained by sitting less than three hours a day

$200b
Amount Qatar plans to spend to host the 2022 World Cup

$14.99
82>
0 71486 02362 3

10:08 **On Air**
Seth Goldberg | BIO
Scotia Capital Director

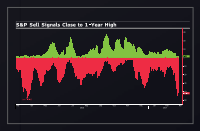
10:07 **Featured Function**
P/E Graph/ Valuation (GE)
INDU INDEX GE<GO>

10:06 **Breaking News**
Draghi on Inflation Rate Forecast

10:06 **Data Check**
INDU Index 20061.57
4176.35 26.30% GP

10:04 **Data Check**
SFINL Index 498.24 -2.10% GIP
JPM Equity 3534.08 1.12% GIP
HWXD Index 166.13 -0.72% GIP

10:03 **Featured G Chart**
S&P Sell Signlas Close
to 1-Year High
G #BTV 6677 <GO>



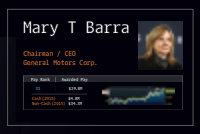
10:02 **On Air**
Gary Cohn | BIO
US National Economic Council
Director

10:01 **Data Check**
DXY Index 100.30
0.14 0.13% GIP

10:00 Financials Highest Since 2007

09:59 **Featured Function**
P/E Graph/ Valuation (GE)
INDU INDEX GE<GO>

09:58 **On Air**
Mary Barra | BIO
General Motors Co. CEO



09:57 Notable Top S&P Performers

09:57 **Featured Function**
Line Chart (GP)
CBT4TNCN INDEX GP<GO>

09:56 Yellen Testifies Before Senate

09:55 **Data Check**
DXY Index 100.30
0.14 0.13% GIP

This is interactive business TV.
Only Bloomberg.
Only on the Terminal.

TV<GO> bloomberg.com/ITV

Editor's Letter

With the future of work looking ever more automated, this eighth edition of QuickTake magazine dives deep into the subject.

Which professions will suffer the most from the rise of artificial intelligence? Is a guaranteed salary for everyone — jobless or not — a realistic way to cope with the threat of higher unemployment? Will getting up from your office chair regularly give you a longer life? (Hint: When you finish this, take a walk.)

QuickTakes provide a fun-to-read entry point to current debates like these, helping readers make sense of complex issues. You can use them to get smart fast on financial trends, global affairs and public policy puzzles.

A library of more than 250 QuickTakes can be found on the Bloomberg Terminal at QUICK <GO> and on the web. These are living articles, revised and updated as events unfold. They include companion videos and more resources for curious readers — links to carefully chosen reference sources and the best of Bloomberg News and Bloomberg View.

I hope you'll find the time with QuickTakes well spent.

John Micklethwait
Editor-in-Chief
Bloomberg
January 2018

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January — June 2018

Retirement, Delayed

By Suzanne Woolley

Some people need the money; others love the work too much to give it up. Either way, fewer people are retiring at 65.

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GUIDE TO 2018

JANUARY

The overhaul of European Union financial-services regulations known as MiFID II takes effect Jan. 3.
QuickTake: MiFID II

Starting Jan. 13, EU banks must share data about their customers with fintech upstarts and other rivals.
QuickTake: Fintech

The World Economic Forum in Davos, Switzerland, convenes Jan. 23-26 with the theme "Creating a Shared Future in a Fractured World."

FEBRUARY

China's ban on individuals using virtual private networks, which circumvent internet censorship, comes into force.
QuickTake: Great Firewall of China ▶ p43

Janet Yellen's term as U.S. Federal Reserve chair ends Feb. 3. Jerome Powell has been nominated to replace her.
QuickTake: Central Bank Independence

Winter Olympics are held Feb. 9-25 in South Korea, with a test 5G network in place for the games.
QuickTake: 5G ▶ p39

MARCH

Vladimir Putin is expected to run for a fourth term as Russian president; first round of voting is March 18.
QuickTake: Vladimir Putin

On March 24, Qantas begins nonstop, 17-hour flights to London from Perth, Australia, using a Boeing 787 Dreamliner.

U.S. President Donald Trump's deadline to pass a law that allows young, undocumented immigrants to work, go to school and remain in the U.S.
QuickTake Q&A: Immigrants' Dreams at Risk

APRIL

U.K. companies must for the first time report disparities between men's and women's pay by April 4.
QuickTake Q&A: Gender Wage Gap

The Bloomberg New Energy Finance "Future of Energy Summit" takes place in New York on April 9-10.
QuickTake: Peak Oil ▶ p48

Bank of Japan Governor Haruhiko Kuroda's term ends April 8, though he's expected to serve a second four-year term.
QuickTake: Abenomics

MAY

MSCI includes domestic Chinese stocks for the first time when it announces the composition of its widely followed emerging markets indexes May 14.
QuickTake Q&A: Chinese Stocks' New York Boost

Expanded EU internet data protection rules take effect May 25, increasing consumer control over how companies collect and use their information.
QuickTake: Privacy vs. Security

Italy must hold a general election by late May.
QuickTake Q&A: Political Risk in Italy

JUNE

The World Cup soccer tournament opens in Russia June 14; the final takes place July 15 in Moscow.
QuickTake: The World Cup ▶ p55

Cities around the world hold annual gay pride events. The original parade in New York marks the anniversary of the Stonewall riots.
QuickTake: Gay Rights ▶ p57

Saudi Arabia awards its first driver's licenses to women beginning June 24.
QuickTake: Saudi Arabia's Strains

QuickTakes can be your guide to events in 2018. Related QuickTakes in this book are noted with a page number. Others can be accessed via the Bloomberg Terminal or by searching for the name and "QuickTake" in your web browser.

By Phyllis Halliday and Anne Cronin

JULY

Mexico holds a general election July 1. Voters elect a new president and members of the Chamber of Deputies and Senate.
QuickTake: Mexico's Troubles ▶ p31

Canada's target date to legalize recreational marijuana and its sale.
QuickTake: Marijuana Legalization

A total lunar eclipse July 27 is visible in South America, Europe, Africa, Asia and Australia.

AUGUST

Greece's third financial bailout expires Aug. 20, requiring a new deal with creditors.
QuickTake: Greece's Financial Odyssey

Malaysia must hold a general election by August.
QuickTake: Malaysia's Muddle

Pakistan's general election could come this month.
QuickTake: Pakistan's Turmoil

SEPTEMBER

World leaders gather in New York on Sept. 18 for the United Nations General Assembly. The Bloomberg Global Business Forum takes place alongside the event.

BMW AG begins selling a fully electric version of its Mini car with the start of the 2019 model year.
QuickTake: Electric Vehicles ▶ p50

OCTOBER

EU's target date to complete a Brexit deal to give the European Parliament time to approve the terms before the U.K. leaves the bloc on March 29, 2019.
QuickTake: Brexit

Brazil holds the first round of its general election Oct. 7 to choose a president and national and state representatives. The second round of voting is Oct. 28.
QuickTake: Brazil's Highs and Lows

NOVEMBER

U.S. elections are Nov. 6. At stake are all 435 seats in the House of Representatives and a third of the Senate.

Thai elections will take place this month, according to the leader of the military government that seized power in 2014.
QuickTake: Thailand's Troubled Democracy

The 100th anniversary of the end of World War I is marked at the 11th hour of the 11th day of the 11th month.

DECEMBER

SpaceX plans to send the first two private citizens on a trip around the moon on its Falcon Heavy rocket.
QuickTake: Space Taxis

Saudi Arabia plans to sell a stake in its giant state oil company in late 2018. The timing may slip.
QuickTake: Mohammed bin Salman ▶ p35

Finland's two-year experiment of paying 2,000 people a basic income of 560 euros ($653) a month ends Dec. 31.
QuickTake: Universal Basic Income ▶ p16

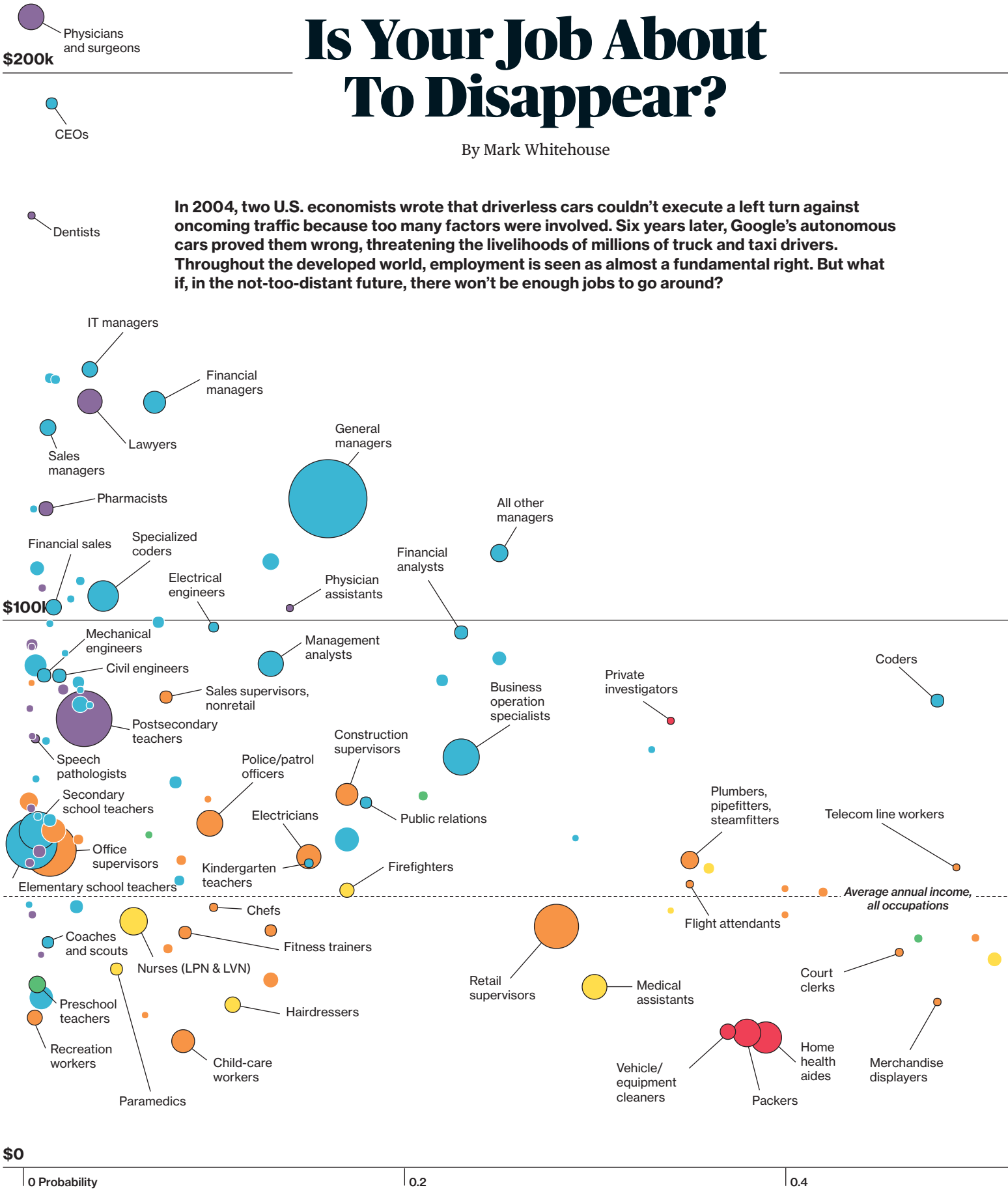
Chapter 1

THE FUTURE OF WORK

Is Your Job About To Disappear?

By Mark Whitehouse

In 2004, two U.S. economists wrote that driverless cars couldn't execute a left turn against oncoming traffic because too many factors were involved. Six years later, Google's autonomous cars proved them wrong, threatening the livelihoods of millions of truck and taxi drivers. Throughout the developed world, employment is seen as almost a fundamental right. But what if, in the not-too-distant future, there won't be enough jobs to go around?



That's what some economists think will happen as robots and artificial intelligence become capable of performing human tasks. Of course, past technological upheavals created more jobs than they destroyed. But some labor experts argue that this time could be different: Technology is replacing human brains as well as brawn.

The effect on jobs of free-trade agreements and immigration has already caused significant political upheaval, as the resurgence of populism in the U.S. and Europe demonstrates. Some economists say the world is on the cusp of much bigger change in the labor market, on the scale of the Industrial Revolution.

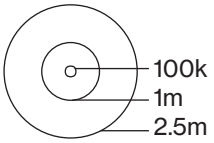
Two researchers at the University of Oxford, Carl Frey and Michael Osborne, estimate that nearly half of all U.S. jobs are at risk. Using their figures on automation probability, the graphic below shows what could be the fate of hundreds of occupations in coming decades. Lower-paid positions requiring the least amount of education are more likely to disappear.

There's ample room for skepticism. Productivity growth globally has been slow, exactly the opposite of what one would expect if robots were taking over. Also, artificial intelligence might end up replacing specific tasks rather than entire jobs, augmenting rather than replacing humans. History teaches that it's hard to predict how technological change will unfold.

Typical education level

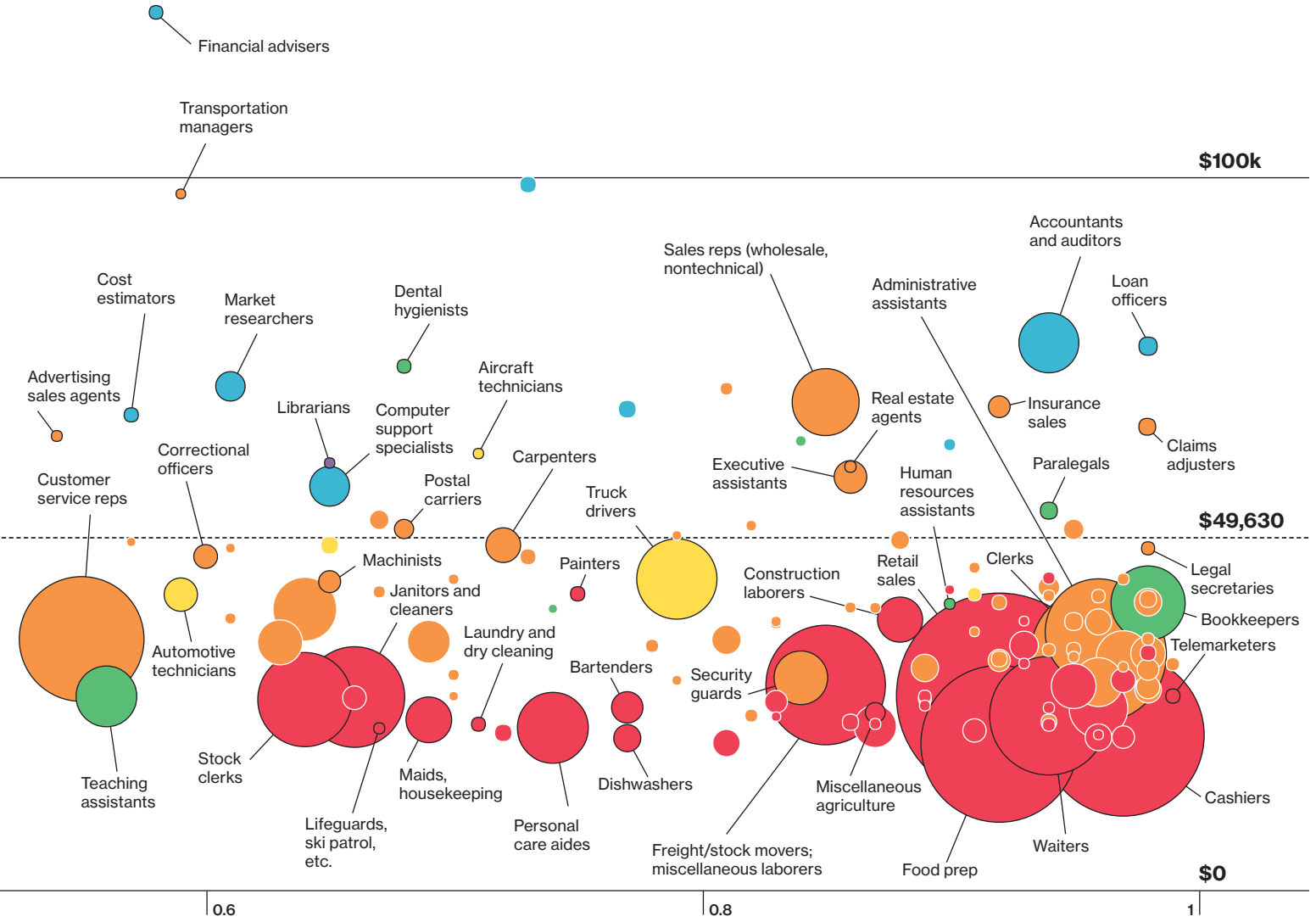
- No formal education
- High school diploma (or equivalent)
- Postsecondary nondegree award
- Some college or associate degree
- Bachelor's degree
- Advanced degree

Number of U.S. workers



DATA: FIGURES ARE FROM "THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERIZATION?" BY CARL FREY AND MICHAEL OSBORNE. AVERAGE ANNUAL WAGE AND TYPICAL EDUCATIONAL REQUIREMENTS ARE U.S. BUREAU OF LABOR STATISTICS ESTIMATES FOR 2016 AND 2014, RESPECTIVELY. SOME AVERAGE ANNUAL WAGES WERE DERIVED BY MULTIPLYING THE AVERAGE HOURLY WAGE BY THE NUMBER OF HOURS IN A TYPICAL U.S. WORK YEAR (1,790).

GRAPHIC: MIRA ROJANASAKUL, CEDRIC SAM AND DOROTHY GAMBRELL



NOTE: JOBS WITH MORE THAN 100K WORKERS

Wall Street's Robot Revolution

By Hugh Son and Jenny Surane

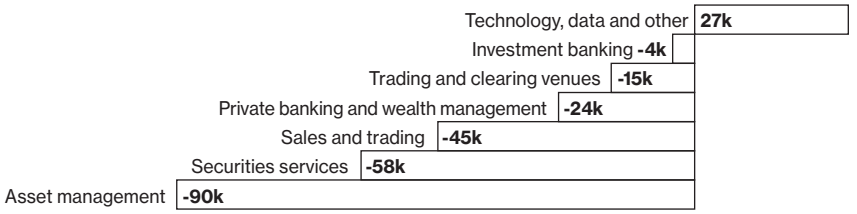
Wall Street's robot revolution has begun. JPMorgan Chase & Co. is rolling out a program called LOXM that executes equities trades so well, it's replacing the humans who used to do that. Goldman Sachs Group Inc. is in the midst of automating the initial public offering process. Innovations in financial technology — fintech — are creating competition in fields long dominated by well-established institutions. Vikram Pandit, who ran Citigroup Inc. during the financial crisis, says technological advances could make 30 percent of banking jobs disappear in five years. David Siegel, co-founder of quant hedge fund Two Sigma, is worried that machines will soon make swaths of the workforce obsolete. But all hope is not lost.

What makes robots qualified for Wall Street work?
Artificial intelligence, a branch of computer science that aims to imbue machines with aspects of reasoning. Today the term includes machine learning, which is the ability of computers to learn by ingesting data, and natural language processing, the ability to read or produce text. Robotic process automation is a more simple form of AI that performs rote tasks like answering administrative requests.

Who is most at risk of losing their job to a robot?
The first to go will be those with roles that are repetitive in nature: support functions, back-office processing, producing reports that rely on structured data. (At JPMorgan, bots will handle 1.7 million requests this year, doing the work of 140 people, for tasks such as resetting employees' passwords.) Accountants who "spend a lot of the time basically being an abacus" were singled out by Deutsche Bank AG Chief Executive Officer John Cryan as being at risk of losing their jobs. McKinsey & Co. partner Jared Moon predicts that technologies sweeping through investment banks will relieve rank-and-file employees of about a third of their current workload.

Who else should be worried?
Consider the junior investment banker, who spends much of his or her time collecting and analyzing data and then creating reports. Consulting firm Kognetics found that investment-banking analysts spend almost half of their 16-hour days on tasks like modeling and updating charts for pitch books. Machine learning programs are already very good at this. Workers in compliance and regulation have a different worry: Over the last five years, their ranks have doubled, while overall headcount at banks declined 10 percent. Automating those activities – so-called regtech – could be good news for financial institutions looking to control the rising cost of compliance, and bad news for people looking to keep their jobs.

Artificial Intelligence Will Create or Crush Bank Jobs Globally by 2025



SOURCE: OPIMAS LLC

What jobs are most threatened by fintech?
Startups including LendingClub Corp. and On Deck Capital Inc. pioneered online lending, quickly matching consumers looking to borrow with people looking to make a profit on interest. Now banks are looking to compete, announcing their own online loan portals and inking partnerships with fintech companies. That makes loan officers and clerks among the professions most vulnerable to automation.

Is there good news for anybody?
Management consultant Opimas LLC says as many as 27,000 new jobs will be created globally for technology and data workers. American banks are investing more in AI than European or Asian banks, so they will potentially see market share gains, according to Moon.

What's the strongest case for keeping humans at the wheel?
It's still hard to automate empathy or trust, so as long as clients want to phone a salesperson, people will have jobs. Transactions in commodities, bonds that trade infrequently and more exotic types of credit are harder to automate. Computers are learning to understand bond covenants and court documents, but contract interpretation remains a challenge. In cases where institutional buyers want to make a large block trade, or are particularly interested in discretion, they will still want to call on human traders. But banks are working on cataloging such conversations so computers get better at anticipating client desires.

How should those starting out in finance prepare?
"Be tech-savvy, be client-savvy or be data-savvy," says Richard Johnson of Greenwich Associates. In other words, learn to work with the tech as banks deploy it across their business. Focus on relationship management, which probably can't be done by computers. Or focus on data science, helping banks analyze the information that AI needs. McKinsey's Moon is more blunt: "Learn to code in Python," the programming language used by investment banks.

Telecommuting

By Rebecca Greenfield

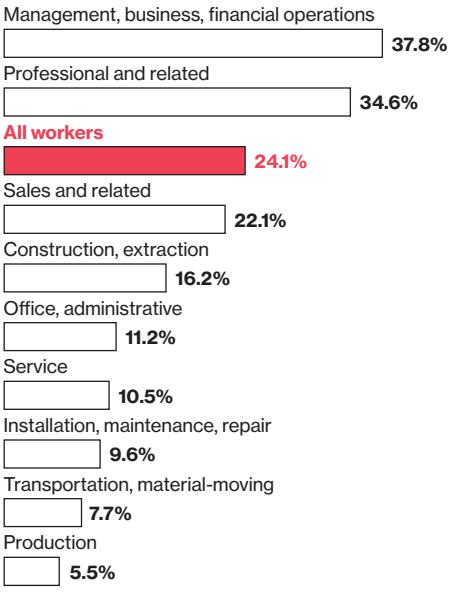
Working from home, once code for slacking off on the couch, is now a legitimate way to punch the clock. In the last 20 years, telecommuting — anything from taking a couple of hours in the morning to send emails to setting up shop full time in a home office — has gone from niche benefit to in-demand perk. Globally about a fifth of workers do some or all of their work at home, and that doesn't include those camping out in communal spaces. Technological improvements like better Wi-Fi and video chat have made getting work done outside a traditional office easier for many jobs. But the freedom to work from wherever, some argue, has come at the expense of corporate culture and productivity. Some bosses want to bring the work-from-home boom to an end.

The Situation

In the U.S., 60 percent of companies offer remote-work arrangements, up from just 20 percent in 1996. Telecommuting is just as popular in India, Indonesia and Mexico. But after decades of expanding work-from-home policies, some employers are rethinking them. International Business Machines Corp., once a telecommuting pioneer, gave thousands of remote workers an ultimatum in mid-2017: Relocate to one of the computer company's offices or find a new job. After 20 consecutive quarters of falling revenue, IBM calculated that its workers would perform better in close proximity to colleagues. Yahoo! Inc. made a similar move while going through financial troubles in 2013, as did Best Buy Co. and Honeywell International Inc. Cutting back on remote work risks irking employees. The flexibility telecommuting provides is especially important to working moms and dads at a time when the share of two-parent households in which both work full time is at an all-time high in the U.S.

Telecommuting Is More for Some Jobs Than Others

Percentage of U.S. workers, by type, doing at least some of their work at home in 2015



SOURCE: BUREAU OF LABOR STATISTICS

The Background

"Telework" was first proposed as an alternative to commuting that would cut down on pollution, traffic and oil consumption. In a 1973 book, former NASA engineer Jack Nilles imagined a world where workers reported to smaller offices closer to their homes rather than downtown headquarters. A few U.S. companies conducted early experiments with his vision, or a version of it. In the 1980s, retailer J.C. Penney Co. let its call-center employees work from home, for example. But remote work didn't gain traction until an amendment to the Clean Air Act in 1990 required companies with more than 100 employees in "severely polluted" areas, such as Chicago and New York, to reduce commuting among staff. Nilles had envisioned a "sufficiently sophisticated telecommunications and information-storage system," which came later in the form of the internet. Its invention accelerated the telecommuting trend through the 1990s and the dot-com boom. Companies also realized they could save money by reducing office space. Today, working from home is promoted as a perk to workers looking to escape commutes and the lack of privacy and noisiness of the modern open office.

The Argument

Companies that have cooled to telecommuting cite the changing nature of work. Today, only about a third of companies group workers by job type, according to a 2016 Deloitte LLP study. Instead, most organizations use project teams made up of different specialists. Critics of telecommuting think members of project teams work more efficiently in the same place than scattered across locations. They also suspect that some workers abuse work-from-home privileges to take it easy. Studies have found that remote workers are just as productive as people in offices, if not more so. But that might be true only for certain types of workers. The most widely cited study looked at call-center employees, whose jobs don't require much teamwork. A review of studies concluded that the most successful arrangements involve at least some face time in the office. Researchers have argued that increasing the opportunities for telecommuting and flexible hours could help close the pay gap between men and women. Working moms can find it hard to advance because of rigid workday schedules that make it difficult to balance child-care duties with a job. On the other hand, working remotely can have its own drawbacks. It can be isolating, which is why some who do it seek out social experiences at co-working spaces like WeWork. And one study found that the spouse who works from home gets saddled with more household chores.

60%

Share of U.S. companies offering remote-work arrangements

Retirement, Delayed

By Suzanne Woolley

The baby-boom generation has left its mark on music, fitness and politics. Next up: retirement. While many people in developed countries dream of the same golden age of relaxation, sun and travel that their parents enjoyed, a growing number in their 60s have looked at the numbers and decided to keep working. It takes a lot of savings to finance a 30-year vacation. For some, working is a choice — why give up a good income and fulfilling career? Demographic pressures have led governments to encourage that decision. The generation famous for rewriting the rules is rethinking life after 65.

The Situation

From 2025 to 2050, the number of people age 65 and older is projected to nearly double to 1.6 billion worldwide. But the birthrate has been declining. This means fewer workers and fewer people paying into pension programs. So governments are encouraging people to work longer and raising the age to qualify for public pensions. This has had an impact: The share of retirement-age people who were working grew over the decade through 2015 to 6 percent in Germany, 10 percent in the U.K. and 18 percent in the U.S. In Japan, where the median age is 46.9, 22 percent of seniors are working and surveys show 80 percent want to work. (Japan's demographics make it the world's oldest country after Monaco.) Often this isn't a voluntary decision; many seniors find it hard to live comfortably on pensions alone. Only a small percentage of citizens in China and India are in any pension system.

The Background

German Chancellor Otto von Bismarck offered the elderly the world's first national old-age pension system in 1889.

Still at It

Share of Americans age 65 and older who were working

SOURCES: U.S. CENSUS BUREAU AND BUREAU OF LABOR STATISTICS

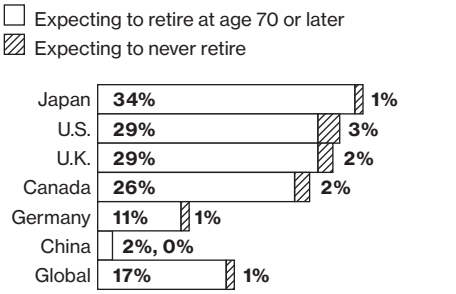
In the U.S., the first private pension plan was begun by American Express in 1875. By 1929, a tenth of America's workforce had company pension plans. Yet that same year, even before the Great Depression hit, 56 percent of Americans 65 and older couldn't support themselves. This led to the 1935 Social Security law, which provided them a government pension. During World War II, wage controls in the U.S. led employers to offer pensions to attract workers. Private pensions expanded through the 1970s until they covered almost half of U.S. workers. A mix of private and public plans emerged in other wealthy countries. By the 1950s, many retirees had money to spend and wanted to play. During the next three decades, the number of golf courses in the U.S. doubled. America's first retirement community, Sun City, opened outside Phoenix in 1960. The U.S. led a shift away from pensions with guaranteed benefits with the introduction of 401(k) plans in 1980. The new system moved the responsibility to save onto workers, who put a share of their salary into tax-advantaged accounts they manage themselves. Workers in such plans who invested heavily in the stock market lost value with every crash, and tough economic times led many to take early withdrawals. Many American baby boomers start retirement without much savings: 30 percent of them have less than $50,000. And big bills loom. Medical costs are rising and student loan debt follows more Americans into retirement.

The Argument

In the U.S., some politicians have called for more tax breaks to encourage retirement savings. But studies have shown these breaks largely benefit the wealthiest, who'd save anyway. Senator Bernie Sanders, who ran for president as a Democrat in 2016, has called for an increase in Social Security payments to help those seniors who rely on the program for all or most of their income. Opponents say the nation can't afford this, since Social Security already accounts for almost a quarter of all federal spending. The U.S. has begun to raise the age to qualify for Social Security to 67; Spain, the U.K., Australia and other nations are also phasing in increases in retirement ages for government pensions. Meanwhile, older people who want to work can face age discrimination, which became harder to prove in the U.S. after a 2009 Supreme Court ruling that plaintiffs had to demonstrate that age was the main reason for dismissal. Healthy seniors often want to stay on the job, whether they need the money or not. Yet studies show that even white-collar workers' skills can fade with age. Others argue that lingering seniors prevent younger people from advancing in corporations and academia.

Workers of the World

About a third of workers in the U.S. and Japan expect to work past age 70



SOURCE: AEGON RETIREMENT READINESS SURVEY 2017

PHOTO: TJ PROECHEL

Universal Basic Income

By Paula Dwyer

Should the government guarantee every citizen an annual stipend, no strings attached, no questions asked? That sounds like an idea that liberals would love. But what if the stipend took the place of the many programs that make up the safety net in most countries? That might appeal to conservatives but make liberals queasy. The idea is known as universal basic income, though in the U.S. it might be described as Social Security for all. Experiments are planned or underway in parts of Europe, Africa and North America. The results might shift long-standing debates: How big should the safety net be, and what mix of incentives and protections would make it more effective?

The Situation

Some of the biggest basic-income evangelists can be found in Silicon Valley, where technology billionaires such as Mark Zuckerberg and Elon Musk see it as a solution to potentially large job losses – and consumer backlash – from driverless cars, robotics and other forms of automation. Y Combinator, a venture-capital company, is sponsoring its own experiment with 100 families in Oakland. Around the world, numerous other trials are in the works. Finland began a two-year experiment in January 2017 involving 2,000 randomly selected people already receiving unemployment benefits. The Canadian province of Ontario began trials in three cities in the summer of 2017, while five Dutch municipalities approved plans for a variety of tests, such as allowing welfare recipients to earn income without losing benefits. Possibly the most rigorous study is by GiveDirectly, a New York-based nonprofit that is giving 6,000 Kenyans a guaranteed income for at least a decade. Not everyone is a fan. Swiss voters in 2016 soundly rejected a proposal for a basic income of about 2,500 Swiss francs ($2,460) per adult citizen each month. In the U.S., 2016 Democratic presidential nominee Hillary Clinton revealed in her book "What Happened" that she considered making a universal basic income a central piece of her economic plan but rejected it because of the cost.

€560

Monthly stipend in Finland's basic income trial

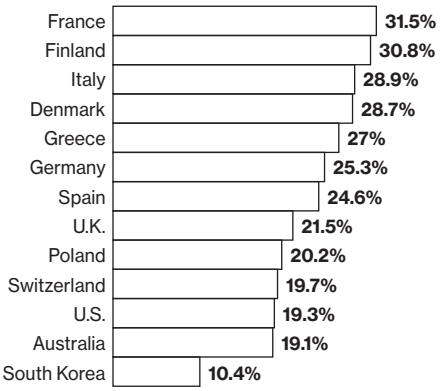
The Background

The idea of a government-guaranteed minimum income dates back centuries, with some saying a version originated with the humanist philosophers of the 16th century. British philosopher and Nobel laureate Bertrand Russell was one of the 20th century's earliest advocates. A type of basic income was debated, and rejected, at the 1920 U.K. Labour Party conference. But it wasn't until the 1960s that it became part of the mainstream political discussion, when U.S. President Richard Nixon proposed an income floor. The earned-income tax credit, a form of basic income, took its place, but only to supplement the earnings of the working poor. The tax credit had been first proposed in 1962 by conservative economist Milton Friedman. One of his aims was to end the "earnings cliff," in which government aid disappears once income exceeds a cap. Such a limit discourages recipients from working. The tax credit is widely considered an effective anti-poverty program, but the earnings-cliff issue is more complicated than ever: The U.S. now has more than 80 low-income programs, each with its own earnings cap.

The Argument

In Switzerland, backers of the basic-income plan said it would have ensured that all citizens had a decent existence and were able to participate in civic life. The government responded that it would have forced a tax increase and caused a shortage of skilled workers, sending jobs abroad. Elsewhere, some progressives have cast the idea as the ultimate expression of what a developed economy can do to lessen poverty and inequality and ease the pain of economic stagnation. But in the U.S., many liberals see it as a distraction from more practical priorities, such as a $15 minimum wage and paid family leave. For conservatives, the attraction is smaller government. Dozens of social welfare programs now costing U.S. taxpayers about $1 trillion a year could be folded into a basic-income program, they argue. The fear that people with a guaranteed basic income would become slackers may be unfounded. One economist who studied trials conducted in the 1970s in Canada reported that recipients were healthier and finished high school at higher rates. Adults with full-time jobs worked the same number of hours, with one exception: Women took off more time after having a baby.

Total social spending as a share of GDP, 2016



SOURCE: ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT

Dangers of Sitting

By Mary Duenwald

Many health experts think the most dangerous thing most of us do every day is sit down. Like smoking, they believe, prolonged sitting is deleterious, and not something that can be balanced out by vigorous exercise when sitting time is done. Dozens of studies have drawn connections between sitting too long and diabetes, hypertension, some forms of cancer (especially in women), anxiety and a generally greater probability of early death. There's also the risk of a weak, flat backside. It's no wonder then that more and more people are raising their computer monitors to work standing up. But anyone with a dusty big blue ball in the attic knows that unconventional desk trends don't necessarily last. Already, all the reports about the dangers of sitting have been answered with contradictory findings that it's not so bad. And whether standing desks help is a subject of some dispute.

The Situation

Desks that can be adjusted to rise and fall as workers get up and sit down again are the fastest-growing office perk in the U.S. They are offered, according to one survey, by 44 percent of companies, a tripling since 2013. Sit-to-stand desks are already common in Scandinavia, and about 16 percent of German workers have them. Soon enough, some of these desks will be fitted with sensors that monitor sitting time and vibrate softly to nudge users who have been on their behinds too long. One aficionado – James Levine, the Mayo Clinic doctor who coined the admonition "Sitting is the new smoking" – pushed the trend further by inventing the treadmill desk, which like the standing desk has been embraced by some users and abandoned by others.

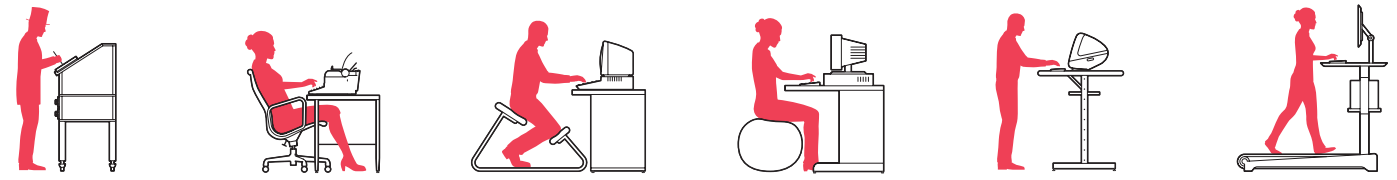
The Background

The many people now toiling on their feet may not realize it, but they're standing in the footsteps of their 19th-century office-worker forebears, who used high desks that didn't adjust downward for sitting. In modern times, British Prime Minister Winston Churchill, American author Ernest Hemingway and U.S. Defense Secretary Donald Rumsfeld all worked on their feet. But the trend toward sitting picked up steam in the 20th century, as fewer and fewer people made their living by physical labor. Public health experts have been sounding alarms practically ever since. A study conducted in London from 1949 to 1952 comparing the drivers with the conductors of public buses, trams and trolleys found that the more active conductors had a much lower risk of heart disease. That just stands to reason: When the body sits for an extended time, blood pools in the legs and the arteries there lose some of their ability to dilate. Metabolism slows, and with it the healthy functioning of various biochemical operations. That in turn leaves the body more vulnerable to the physical and psychological effects of sedentary living. Standing desks are meant to help office workers dodge this fate, but avoiding so much sitting isn't the same thing as moving around.

The Argument

Cut sitting time to less than three hours a day, one group of researchers concluded, and you could lengthen your life expectancy by two years. Some researchers have identified connections between sitting too long and disease even in runners and other active people. But contradictory research – also well-conducted – has found that sitting is bad only for total couch potatoes, that vigorous exercise, even if it's only for a couple of hours on the weekend, actually can eliminate the risk of death associated with sitting. Researchers also disagree on whether standing desks do anything to help workers burn more calories or boost their productivity. Some point out that standing too long creates problems of its own: swollen ankles, leg cramps, varicose veins, posture problems and back pain. Also, it turns out that some people who use standing desks at work compensate for their efforts by exercising less in their free time. The best way for desk jockeys to avoid the sitting trap, research shows, is to not just stand but also walk around – for a couple of minutes once an hour, or for five or 10 minutes a few times a day. This gets the blood and breath flowing moderately. Toe tapping and other kinds of fidgeting help, as well, whether sitting or standing.

The Evolution of Office Comportment



19th century
Standing desks are fairly common

1950s
Ergonomic chairs are introduced

1980s
Kneeling chairs have a brief heyday

1990s
Exercise balls double as office chairs

2000s
Sit-to-stand desks gain popularity

2010s
Treadmill desks win over some users

ILLUSTRATION BY CHRIS PHILPOT

Chapter 2

ECONOMY & FINANCE

Buzzwords

The language of economics and finance is constantly shifting. Here's your guide to the lingo.

Volatility

By Garfield Reynolds

A mystery throughout most of 2017 was why stock markets exhibited such modest up-and-down swings, known as low volatility, despite a run of global news that hardly calmed the nerves. Worry is supposed to drive price fluctuations, which is why two widely followed indexes of so-called implied volatility – the VIX, for the S&P 500 index, and MOVE, for the U.S. Treasury bond market – are known as "fear gauges." The concern after a long period of low (or "compressed") volatility is that investors, in the absence of worry, are getting too complacent. Implied volatility measures expected price moves relative to average ones. That's calculated based on traders' use of options, which are contracts that give the holder the right to buy or sell securities (such as the S&P 500, Treasury bonds and currencies) at a given price before a set date. Options get more valuable when markets get more turbulent, and traders often use options to hedge against unexpected market moves. Historically, periods of low volatility have been followed by sudden turmoil, including a rush to buy the insurance that investors realize they should have taken out.

Volcker Rule

By Jesse Hamilton

Banning banks from engaging in proprietary trading – speculating with their own money – could be the single most contentious provision in the U.S.'s Dodd-Frank banking overhaul law. Named after its chief proponent, former Federal Reserve Chairman Paul Volcker, the Volcker Rule is meant to stop banks with taxpayer-protected deposits from taking on big risks that can lead to large losses and the need for bailouts, as in the 2008 financial crisis. Bankers say the prohibition stifles the essence of Wall Street – trading stocks, bonds and other instruments. It's also complicated: The rule ran to 272 pages when published in the U.S. Federal Register, and it's overseen by five different agencies. While Republicans in Congress hope to repeal the rule – a tough task, given the need for at least some Democratic support in the Senate – President Donald Trump asked regulators to evaluate and perhaps rewrite the guidance on what activities are barred. Though Treasury Secretary Steven Mnuchin has been critical of the rule, he's also said proprietary trading "does not belong" in banks that have a government backstop. And many banks have adjusted to life under Volcker.

MiFID II

By Dick Schumacher

When the rules of the game get rewritten, they beget new winners and losers. So it is with banks and brokerages in the European Union, which are absorbing a vast new set of regulations upending the continent's securities markets. The revised Markets in Financial Instruments Directive, or MiFID II, marks a sea change in how firms share information, sniff out the best prices and pay one another. In place from Jan. 3, 2018, it aims to force unprecedented transparency on traders and curb conflicts of interest. There's a scramble to survive an expected shrinking of commissions. While the shakeout will take years, some early guesses on how it will pan out began to emerge in late 2017. Among the losers: research analysts, whose ranks will be culled now that their insight can't be offered for free as part of a bundle of services. Likely winners include data specialists who can find ways to make money from the flood of new information, plus operators of certain types of "dark" trading platforms that will retain flexibility in pricing stocks. Firms outside Europe can't bury their heads in the sand: MiFID II's impact will reach beyond London and Frankfurt to traders of stocks and bonds around the world.

Quantamental

By Ivan Levingston

Fundamental and quantitative investing used to be the hedge-fund versions of oil and water. Those in the fundamental camp do analysis the old-fashioned way, based on human research and instinct; quantitative money managers deploy computer algorithms that search mountains of data for hidden signals and make rapid-fire investment decisions. Now some firms are embracing "quantamental" strategies, a mix of human and computer decision-making. BlackRock, Point72 Asset Management, Third Point and Tudor Investment are among the historically fundamental firms exploring or adapting the data-driven "quant" approach. One way to do so is by hiring data scientists to develop machine-learning techniques, which can be used to scour massive data sets for trends that human stock-pickers can exploit. The success of firms such as Two Sigma and Renaissance Technologies made quant strategies too alluring to ignore: Renaissance's fabled Medallion Fund has managed to pump out annualized returns of almost 80 percent a year, before fees. Can quantamentalists repeat that success? Some of the firms experimenting with the new investing style, such as Tudor and Point72, had disappointing returns in the first half of 2017. But those results corresponded with rallies in most major stock markets, when hedge funds generally have a tough time beating the benchmarks. The proliferation of trend-seeking strategies could produce diminishing returns if the occasional market anomaly, sussed out by computers, is exploited by many firms at once.

HUNGER BONDS

By Christine Jenkins

His nation short on cash due to depressed oil prices, Venezuelan President Nicolas Maduro chose to maintain payments on the country's overseas debt while curtailing imports of food and medicine. Jorge Botti, a former president of Venezuela's national federation of chambers of commerce and one of Maduro's many critics, came up with the term "hunger bonds" to describe financial transactions that put political survival ahead of public need. That phrase was a theme of criticism aimed at Goldman Sachs Asset Management, which provided the regime with desperately needed dollars by purchasing bonds originally worth $2.8 billion issued by the state oil company. Venezuela's opposition-led Congress had urged Wall Street banks to refrain from making such investments. Goldman rejected moral culpability, saying its use of a broker meant it didn't provide cash directly to the government. Goldman said it made the investment "in part because we believe" life in Venezuela will get better. Facing hard-currency reserves of just $10 billion and $143 billion in total debt, Maduro warned creditors in November that future payments would require new terms. But U.S. sanctions now generally bar American investors from buying new Venezuelan debt, or even swapping out old bonds for new ones. Two weeks after Maduro's notice, ratings companies declared the country in default following missed payments.

GREEN-WASHING

By Luca Morreale

Green bonds, which raise money for environmentally friendly purposes, are on the rise. So are concerns about the sellers of bonds "greenwashing," or making misleading claims about just how environmentally responsible they are. Chinese entities propelled a doubling of issuance in 2016, when $95 billion in green bonds were sold, or about 0.6 percent of global bond sales. Green bonds are sold by corporations and banks, governments and supranational institutions such as the World Bank. They're bought mainly by institutional investors, including pension funds and insurance companies that promote their "responsible" or "sustainable" investments. So far, there are no rules on what green means – only voluntary standards. The European Union has signaled that it may step in to oversee the market, using tools such as mandatory product labels to bring greater clarity to investors.

Tech's New Monopolies

By David McLaughlin

The rise of global technology superstars such as Amazon, Apple, Facebook and Google is creating new challenges for competition watchdogs. In 2017 they joined Microsoft Corp. to become the five most valuable companies in the U.S., a ranking that included only the software company 10 years ago. They dominate their markets, from e-books and smartphones to search advertising and social media traffic on mobile devices. New research connects the market power of these high-tech behemoths — part of a trend toward greater concentration in many industries — with chronic economic problems, including the decline in workers' share of national income and slower economic expansions. Their dominance is fueling a global debate over whether it's time to rein in such winner-take-all companies.

The Situation

As the U.S., the home of the tech titans, takes a hands-off approach, other countries are aggressively pursuing them. The European Union fined Alphabet Inc.'s Google $2.7 billion in mid-2017 for abusing its search-engine dominance by favoring its own shopping service in search results. In response, Google said it would create a standalone unit for the business, which would have to use its own revenue to bid for ads against rivals. The U.S. Federal Trade Commission in 2013 declined to bring a case against Google for the same conduct the EU sanctioned. The EU says it's also investigating whether Google pressures mobile-phone makers to install Google apps if they use its free Android software. Germany is examining whether Facebook Inc. abuses its market dominance – it now has 2 billion regular monthly users – by requiring new members to give up privacy rights when agreeing to complex terms. Japanese and South Korean watchdogs are looking at the exclusive control Google and Facebook have over vast amounts of user data. China's tech giants – Alibaba, Baidu and Tencent, which are roughly similar to Amazon, Google and Facebook, respectively – have large market shares, too. China not only hasn't pursued antitrust actions against them, but also protects them from competition by restricting foreign companies.

The Background

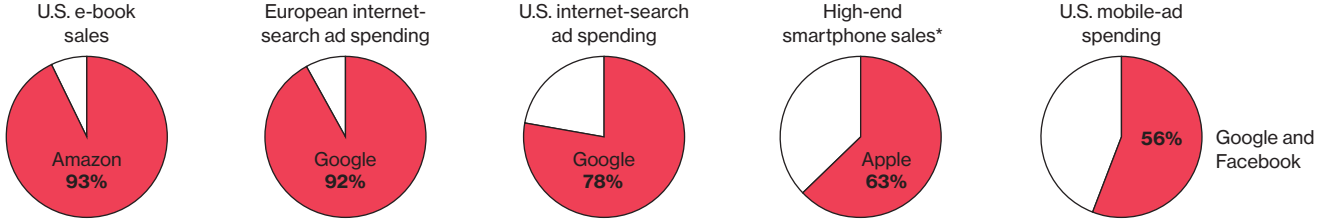
Amazon, Apple, Facebook and Google have monopoly-size market shares, but being a monopoly isn't illegal in the U.S. and most other countries, as regulators long ago stopped equating big with bad. They focus instead on whether a company abuses its market power to thwart competitors who might offer lower-priced products. The number of monopoly cases brought by the U.S. dropped from an average of 15.7 a year from 1970 to 1999 to just 2.8 a year between 2000 and 2014. The last big case was in 1998, when the Justice Department successfully challenged Microsoft's dominance of computer operating systems. U.S. watchdogs have also said little as the tech juggernauts used their profits and big-data advantages to gobble up smaller rivals or enter new markets. Bloomberg data show they've made close to 500 acquisitions worth about $140 billion over the past decade. The ability to easily raise prices, a traditional concern of regulators, often isn't an issue in such deals. In the case of internet search and social media, the services are free. And as Amazon's August 2017 purchase of grocery chain Whole Foods Market Inc. showed, the acquired companies often aren't direct competitors.

The Argument

The tech goliaths say their dominance is hardly durable because barriers to entry are low for new players. Google often says competition is just "one click away." The companies also say they're successful because of the quality of their products, so why punish them? But the 20-year dry spell in monopoly cases has led economists, lawmakers and tech experts to conclude that enforcement has been too timid, with negative economic effects. Some would go beyond the narrow focus on prices to consider the effects of concentration on innovation, jobs and inequality. With some exceptions, tech giants reap big profits from small labor forces, leading to more income going to fewer workers and stagnant median wages overall. The decline of successful startups, attributed in some studies to the dominance of existing companies, has dampened innovation and job creation, the critics say. They cite "network effects" – the idea that a platform becomes more valuable when more people use it, giving giant incumbents giant advantages – and call for better policing of competition.

Where Tech Giants Dominate

Amazon, Apple, Facebook and Google have eye-popping market shares



NOTE: HIGH-END GENERALLY DEFINED AS PHONES COSTING $400 OR MORE; DATA ARE FOR 2016 (E-BOOKS, EU INTERNET SEARCH); MARCH 2017 (U.S. INTERNET SEARCH, MOBILE ADS); AND MAY 2017 (SMARTPHONES); SOURCES: COMPANY REPORTS, STATCOUNTER, EMARKETER, IDC, SLICE INTELLIGENCE

PHOTO: IMAGO/ZUMA PRESS

Active vs. Passive Investing

By Charles Stein

Are you good enough at picking stocks to beat the market? Not too many people would claim that. Is your asset manager good enough? The $10 trillion invested in active-management funds is a bet that the answer is yes. But more and more people are saying no. So is the world's largest asset manager, BlackRock Inc., which is paring back its active-equities group. BlackRock is responding to a surge of money into what's known as passive investing. It's an approach endorsed by legendary investor Warren Buffett, who thinks the smartest thing your money can do is climb into a hammock and take the rest of the day off.

The Situation

A little more than a third of all invested assets in the U.S. are in passive funds, up from about a fifth a decade ago. In the first half of 2017, flows out of active and into passive funds reached nearly $500 billion. Vanguard Group Inc., whose founder, John C. Bogle, created the first index fund for retail investors, has been a big winner from the shift, as has BlackRock. Some companies that specialize in active management, like Fidelity Investments and Franklin Resources Inc., both of which have seen investors leave, are slimming down. Others are merging or even closing. The trend toward passive has put pressure on all sorts of fees and reduced trading commissions. Passive investments are also threatening hedge funds, which have drawn fire for poor performance and high fees. Buffett has estimated that investors wasted more than $100 billion on high-fee Wall Street money managers over the past 10 years. Not all active managers are pulling back, however: T. Rowe Price Group Inc. is adding data scientists to supplement the fundamental research it has relied on since 1937. In Europe, passive investing's market share has doubled over the past decade, but to only 15 percent, with the rise primarily driven by institutional investors, according to Morningstar Inc.

90%

Share of active stock managers who missed their index targets between 2006 and 2016

The Background

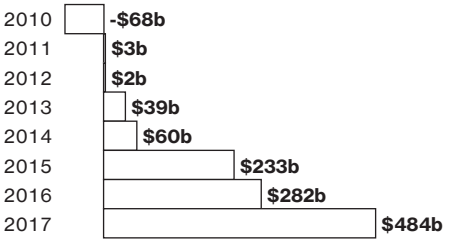
Active investing is what used to be called just investing – buying or selling individual stocks or bonds. More commonly these days, it means putting money into mutual funds whose managers make those case-by-case decisions for you. Passive investments track indexes, which are groups of securities that are alike in some way. Buying an index fund or an exchange-traded fund that owns every stock in the S&P 500, for instance, is a passive investment. As an investor you will do as well as that overall market, no better or worse. In a 1973 book, economist Burton Malkiel, a Princeton University professor, claimed that "a blindfolded monkey throwing darts at the stock listings" could do as well as a professional money manager. Malkiel didn't dispute the idea that some managers could outperform. But as a group, he argued, they would produce the same results as the market, minus the higher fees they charge. Bogle created Vanguard's first index fund after concluding that because active mutual funds charge higher fees, their actual performance would generally be worse than their index counterparts. A typical active stock fund at Fidelity might charge around 70 cents for every $100 invested. Fidelity's 500 Index Fund charges 5 cents. Over time, that gap may be tough to overcome.

The Argument

A 2016 study by S&P Dow Jones Indices showed that about 90 percent of active stock managers failed to beat their index targets over the previous one-year, five-year and 10-year periods; fees explain a significant part of that underperformance. In their defense, active managers say that the period since the financial crisis of 2008 has been an abnormal one, with many stocks moving in lockstep, rather than trading on their individual earning prospects. Active managers also say that all the money pouring into indexes that treat good and bad companies alike will distort prices, creating more opportunities for those who can spot bargains and avoid overpriced securities, and pitfalls for those who rely on the wisdom of the crowd. Billionaire Paul Singer went further, calling passive investing a "blob" that's "in danger of devouring capitalism." Then there's the question of whether active and passive investing are becoming more alike: As the number and complexity of exchange-traded funds and index funds grow, passive investors may end up with almost as many decisions to make as active investors used to face.

A Shift Picks Up Speed

Net flows into U.S.-based passively managed funds and out of active funds in the first half of each year



SOURCES: BLOOMBERG, INVESTMENT COMPANY INSTITUTE

Dual-Class Shares

By Benjamin Robertson and Andrea Tan

It's an investing principle: One share means one vote, right? Not always. For companies including Ford Motor Co. and Google parent Alphabet Inc., the stock is split into different categories to give owners of one class greater voting rights than owners of the other. So-called dual-class or multiple-class shares allow minority shareholders — typically a company's founders or leaders — to retain control of a business. Investors have been grumbling about the undemocratic nature of multiple-class stock for years, while still buying the shares. Stock exchanges, along with regulators, decide on the ground rules, and some bourses that forbid dual-class shares are starting to rethink their position as competition intensifies. In particular, they covet listings by the huge technology firms that increasingly opt for such structures. The compilers of equity indexes, which often include the dual-class shares in their lists, are leading a backlash.

The Situation

Photo-sharing app company Snap Inc. took the notion of dual-class shares to its extreme by handing zero voting rights to investors in its $3.4 billion initial public offering in 2017. Facebook Inc.'s model gives company founder Mark Zuckerberg less than 1 percent of the social media giant's publicly traded stock and 60 percent of its voting power. But the tide may be turning. In September 2017, Facebook scrapped a plan to create a new class of shares following legal action by shareholders. Months earlier, the U.S.-based Council of Institutional Investors, whose members include public pension funds, called for equity indexes to remove multiple-class listings. Several of the biggest index compilers took note: S&P Dow Jones Indices and FTSE Russell decided to exclude some dual-class shares going forward. Snap, for example, is now ineligible for the S&P 500, meaning passive funds – whose investments track that index and are worth trillions of dollars – aren't obliged to buy its stock. At the same time, cities that prohibit or limit dual-class shares are considering loosening restrictions, fearing for their status as financial hubs. Those include London, Singapore and Hong Kong, which lost out to New York for Alibaba Group Holding Ltd.'s world record $25 billion listing in 2014.

The Background

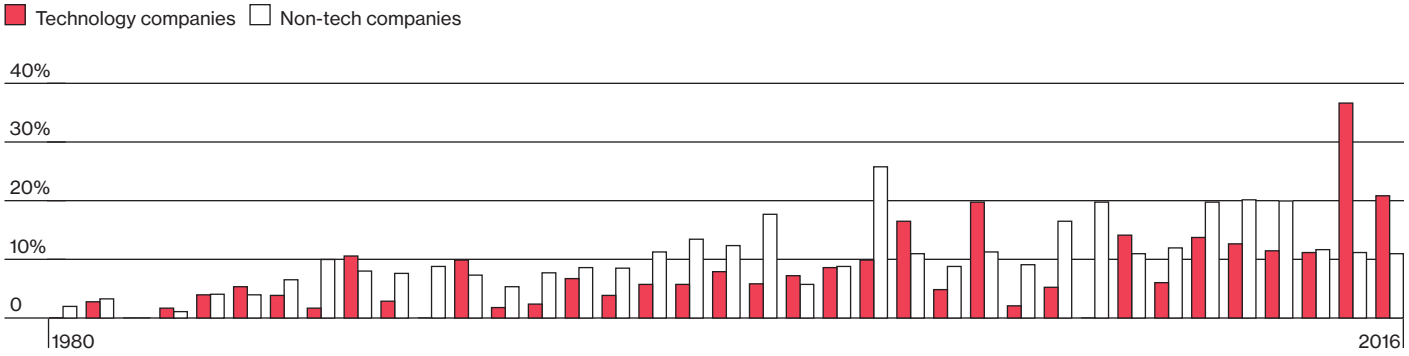
In 1925, Dodge Brothers caused a stir among U.S. investors when it became apparent the automaker's owners had total voting control with only 1.7 percent of equity. That eventually led to a 1940 rule limiting multiple-class stock, which was overturned by the New York Stock Exchange 46 years later when companies threatened to list on another exchange. While dual-class shares once were used mostly by family-owned firms (such as Volkswagen AG and Ford) and media companies (for example, The New York Times Co.), the floodgates opened in 2004 with Google's dual-class IPO. LinkedIn, Groupon, Zynga, Facebook and Fitbit quickly adopted the model. Multiple-class shares are allowed in many parts of continental Europe, Canada and Brazil. The U.S. has attracted $34 billion of such listings by Chinese firms alone in the past decade.

The Argument

Supporters say dual-class shares enable executives to focus on the long term and resist expectations by major investors that each quarter's earnings will be better than the previous one's. Proponents also argue that it's a mistake to keep firms with dual-class listings out of indexes because it may discourage tech entrepreneurs from taking their businesses public, depriving investors of access to some of the most innovative companies. Detractors say dual-class shares subvert the traditional system, which was designed to give equal treatment to all shareholders. Such shares challenge the bedrock notion that those who provide the capital should get a say in how the company is run, by conceding that some investors matter more than others. There's no clear proof that the shares of such firms fare better or worse. Despite their resistance, many institutional investors end up buying stakes in these companies, some of which are too big to ignore. Norway's sovereign wealth fund, the world's biggest, has spoken out against dual-class structures but is among the largest investors in Facebook and Alphabet.

Class Warfare

Share of initial public offerings with a dual-class structure, by year



SOURCE: JAY RITTER, WARRINGTON COLLEGE OF BUSINESS, UNIVERSITY OF FLORIDA

Measuring Inflation

By Jeanna Smialek

Something's funky with inflation. Economists studying the statistics that measure how fast prices increase were puzzled when inflation slowed in 2017, both in the U.S. and in Europe. That's because as global economic growth recovered and unemployment fell, gains should have been climbing toward the 2 percent level that most major economies target. But that pickup proved elusive, prompting a deeper look at what's reining in the inflation gauges.

What was puzzling about the figures?
They weren't following the playbook. Economists have long believed in a relationship between unemployment and inflation called the Phillips Curve. The basic idea is that as joblessness drops, employers have to offer better wages to attract workers. Then prices should tick higher as businesses pass the extra costs on to consumers and as households spend their higher wages, ramping up demand. Despite falling unemployment across the developed world in 2017, a variety of wage and inflation measures showed next to no pickup.

Why was inflation so weak?
No one knows. U.S. Federal Reserve Chair Janet Yellen labeled the slowdown a "mystery." There are a few possible suspects: Amazon's low prices could be keeping other prices down; there might have been more unemployed people looking for work than had been counted; and threats to move jobs to countries with cheaper labor could be keeping pay down in industrialized nations.

Where did policy makers look for clues?
It's what's driving the figures that really counts. While it's impossible to tell for sure whether a swing in overall prices will turn into a trend, the detailed breakdown of the subindexes can offer hints. If the measure tracking mobile phone plan costs shows a big decline, as it did during a price war early in 2017, this might not persist in the data. By contrast, tepid price gains across a swath of categories, like health care and housing, might be the sign of a weaker economy. Such declines could be signs that a slowdown in inflation is more than just temporary. That could have implications for interest rates, which were on the rise in some parts of the world for the first time since the 2008 financial crisis.

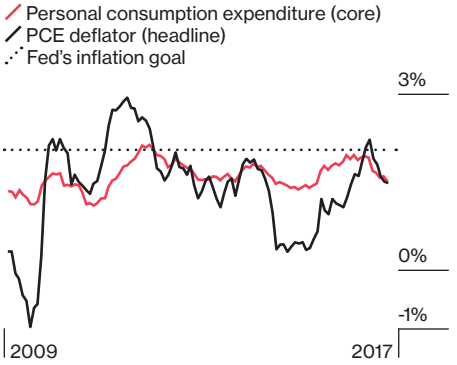
Why are there multiple inflation gauges?
They measure different things. Let's start with the U.S. Federal Reserve's go-to numbers. The Fed officially favors a gauge of personal consumption expenditures reported by the Commerce Department. The figure tracks things consumed by Americans, including those they don't directly pay for, like Medicare, the government-funded health care plan for the elderly. The consumer price index – a Labor Department measure – tracks the prices of goods and services bought by people living in urban areas. Fed watchers follow that number closely because the data come out earlier and about 70 percent of the categories included in the personal consumption index are adjusted using CPI data.

Does every country watch the same measures?
No. The European Central Bank targets year-on-year increases in the Harmonized Index of Consumer Prices ("harmonized" because all European Union countries calculate it the same way). The Bank of Japan closely watches its own CPI data excluding fresh food. Interest-rate setters say that they look at various gauges to get a broad feel for price momentum.

And what about inflation "flavors"?
There's "headline" inflation, which includes changes in food and energy prices, while "core" inflation leaves those items out because they're prone to short-term spikes. The Fed officially looks for headline data, though its governors often rely on core and generally watch it more closely. The reason for the discrepancy? Core gives a better sense of the trend, but it's a political nonstarter for policy makers to act as if people neither eat nor drive.

Headline and Core

Monthly U.S. inflation measures



NOTE: DATA THROUGH JULY 2017; SOURCE: U.S. COMMERCE DEPARTMENT

Do consumers think of inflation differently?
In Germany, you hear talk of "perceived inflation," an idea promoted by an economics professor, Hans Wolfgang Brachinger, who said people are more sensitive to price changes on goods they buy frequently. In the U.S. and Europe, consumers consistently overestimate price gains in surveys.

Do policy makers care what consumers think?
Oh yes. When it comes to inflation, expectation leads reality. Policy makers watch market bets on where inflation is headed by examining break-evens – the difference between the yield of a plain-vanilla government bond and an inflation-indexed bond of the same maturity. The Fed also pays attention to surveys of consumer outlook from the University of Michigan and the New York Fed.

Bail-In

By Boris Groendahl

Governments dished out $1 trillion in taxpayer money to bail out banks during the financial crisis that erupted in 2008. Their voters were furious. Since then, regulators have come to a broad agreement on a better approach: Instead of bailing out a faltering bank, force the creditors to bail in — to share the burden of losses. The idea is to sell debt to investors with the understanding that in the event of a failure the earmarked bonds might quickly lose their value or be swapped into equity. Few people would argue with the principle that investors in banks should lose money when the bets they make go belly-up. Yet in practice, bail-ins have proved politically tricky, as regulators must make tough choices about which creditors are wiped out and which are saved. Plus, loopholes abound.

The Situation

Recent bank failures in Europe have sparked debate about whether bail-ins are working as designed. The theory appeared to work when Spain's fourth-biggest lender, Banco Popular Español SA, was forcibly sold to a bigger competitor in June 2017, wiping out shareholders and about 2 billion euros ($2.3 billion) owed to bondholders. It was heralded as a victory for European Union regulators, since no taxpayer funds were used. But investors are suing, saying the deal was arbitrary and could have been avoided. By contrast, Italy is using public funds to prop up its oldest bank, Banca Monte dei Paschi di Siena SpA. It's spending up to 20 billion euros and rescuing most – though not all – bondholders of that institution and two failed regional banks. Because those bailouts happened in one of Europe's most indebted countries and spared ordinary citizens who owned the bank's debt, they rekindled fears that weak banks and poor countries would get caught in a vicious debt spiral. Some policy-watchers brushed off the controversy as a transition problem, since many banks have yet to build up enough of the "loss-absorbing" debt they're now required to sell to make bail-ins easier. More than $500 billion of such securities have been sold in the U.S. and Europe in the last two years.

The Background

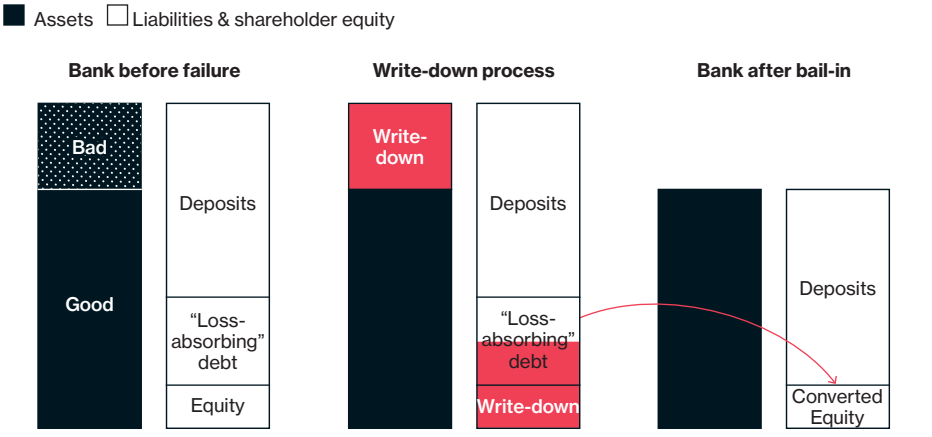
Sick banks pose a dilemma for policy makers: Lean back and a collapse can snowball into economic disaster, pushing an entire country to the brink. Mount a rescue and public debt soars and recklessness gets rewarded. The fundamental idea behind a bail-in is to prepackage and accelerate the insolvency process so that it can take place over a weekend to prevent financial shocks. By Monday morning, a wobbly bank should again be a viable institution, now owned by former creditors. ATMs should be well-stocked, with plenty of funds available to satisfy counterparties. The bail-in process protects depositors whenever possible and identifies ahead of time which investors will lose money in the process. Equity is wiped out first to mop up losses. Junior debt and some senior claims are next in line to be written down or converted into new equity. Credit Suisse Group AG executives coined the term "bail-in" in 2010, and it's now enshrined in banking laws around the world. It's since been used to cover wider cases of creditor loss-sharing for troubled banks.

The Argument

Regulators say bail-ins are an increasingly accepted way to manage troubled banks, part of a post-crisis arsenal of tools that defuse the problem of lenders that are "too big to fail." They create an incentive for creditors to keep an eye on banks' risk management. They could also help gradually dissolve the chummy bonds between national governments and their banks by removing the implicit guarantee that the bailout practice provides. Critics say the cases in Italy show there are too many ways to skirt the rules, and that the option to bail in creditors won't stop governments from tapping the public purse again. Republicans in the U.S. Congress are trying to repeal the new bail-in provisions in the U.S. banking law because they say the rules don't do enough to prevent regulators from using taxpayer money. Some policy makers argue that the only way to prevent bailouts is to require banks to hold much larger capital buffers. The true test of the bail-in idea, they say, won't come until a large global bank goes under and politicians don't blink.

How Bail-In Saves Banks

Depositors are protected, while some bonds are wiped out or converted to equity



SOURCE: BLOOMBERG

Chapter 3

WORLD AFFAIRS

Buzzwords

A globalized world is a big place to follow. Here's how to understand the shorthand on international affairs.

Emoluments

By Ben Brody and Bob Van Voris

America's Founding Fathers probably didn't envision Donald Trump. They did, however, include a clause in the U.S. Constitution that could cause headaches for a president with a raft of foreign business interests. The clause prohibits the president from accepting "any present, Emolument, Office, or Title" from "any King, Prince, or foreign State," unless approved by Congress. The dictionary defines emoluments as "returns arising from office or employment, usually in the form of compensation or perquisites." Trump's critics within and outside government say he accepted emoluments as president when foreign governments granted trademarks to his company, paid rent at Trump Tower in New York or steered business to Trump International Hotel in Washington, just blocks from the White House. (The hotel is in a building that Trump's company leases from the U.S. government, which raises similar questions under another constitutional provision that covers domestic emoluments.) Though he stepped away from day-to-day operations of his businesses upon becoming president in 2017, Trump rejected calls to divest or place his holdings in a blind trust. His lawyers have said that fair-market transactions, like when a foreign delegation pays the market rate to stay at a Trump hotel, aren't emoluments.

OPERATION Carwash

By Bruce Douglas and Raymond Colitt

Operation Carwash, the name of the sprawling corruption case that's ensnared many of Brazil's business and political elite, is a reference to a service station in the capital, Brasilia. Money was laundered there, but that crime hardly reflects the scope of an investigation that's mushroomed since 2014 and muddied Brazil's image as a rising global power. Brazil's last three presidents have faced accusations of wrongdoing connected to the probe; one wound up impeached, another convicted of corruption and money laundering. Mayors, governors and lawmakers, including the former head of the legislature's lower house, have been convicted of taking bribes. The case centers around the state oil company, Petroleo Brasileiro SA, or Petrobras. Prosecutors say construction companies including Odebrecht SA, the largest in Latin America, formed cartels to win inflated contracts at Petrobras, giving kickbacks to executives and politicians. Marcelo Odebrecht, former chief executive officer of his family's company, was convicted of paying $30 million in bribes to Petrobras officials and sentenced to 19 years in prison. Brazilians – who by now might be inured to malfeasance – have shown strong support for the presiding judge, prosecutors and federal police in the case and expressed dwindling trust in the country's biggest political parties.

THAAD

By David Tweed

U.S. President Ronald Reagan drew mockery during the Cold War for the fanciful elements in his plan to develop a defense against Soviet ballistic missiles. Three decades later, missile defense is part of U.S.-led efforts to prepare for an attack by North Korea. The Terminal High Altitude Area Defense system, or Thaad, launches interceptors to destroy enemy ballistic missiles during their descent. Truck-mounted Thaad units have been deployed in South Korea as well as in the U.S. Pacific territory of Guam, which was specifically threatened by North Korea's Kim Jong Un. (A different type of missile interceptor would be relied upon to protect the U.S.) According to its manufacturer, Lockheed Martin Corp., Thaad has had "100 percent mission success in flight testing since 2005," but it's an open question how effective a single Thaad battery, such as the one installed in 2017 on a former golf course in South Korea, would be against a flurry of missiles. As in Reagan's time, missile defense is a touchy topic because it can upend the balance of power. China objected to South Korea's Thaad deployment, saying it gave the U.S. an advantage in the region.

Mexico's Troubles

By Nacha Cattan

For Mexico, the challenges mount. Poverty is rife. Corruption is the norm in daily life. Drug gangs have murdered more than 100,000 people in the past decade. And U.S. President Donald Trump is threatening to rip up the free-trade agreement that's shaped the country's modern economy. Frustration over the state of affairs has led to growing signs that Mexicans are ready for change, a spirit that's shaping the 2018 presidential election campaign.

The Situation

Polls indicate an early favorite for the July 1 vote: Andres Manuel Lopez Obrador, the populist founder of the Morena party who's run for president twice before. The 64-year-old former Mexico City mayor calls the political establishment a "mafia of power" and vows to use money lost to corruption to boost social welfare spending. Voters overwhelmingly disapprove of the current president, Enrique Peña Nieto of the Institutional Revolutionary Party, or PRI, who's barred by the constitution from running again. Peña Nieto has been dogged by corruption charges and allegations of human rights violations by his government. And he's struggled to deal with Trump, who's stepped up efforts to deport unauthorized Mexican immigrants and launched a renegotiation of the North American Free Trade Agreement, or Nafta. Trump's demands include higher wages for workers in Mexico, so cheap labor ceases to draw U.S. manufacturers there. Mexico is trying to retain unimpeded access to U.S. and Canadian markets for its goods and services. Meanwhile, the homicide rate reached a record high in 2017. Drug violence began to spread into tourist spots like Cancun and Los Cabos.

The Background

The PRI has held almost unbroken power since its formation in the aftermath of the 1910 Mexican Revolution. The party's early moves included land reforms and nationalizing the oil industry in 1938, using the profits to buttress the largely agrarian economy. The PRI began to lose support after an inept government response to the 1985 earthquake in Mexico City that killed some 10,000 people. Foreign investment flowed in ahead of the start of the Nafta agreement on Jan. 1, 1994. But when a presidential candidate was assassinated the following March, skittish investors fled, a financial crisis ensued and the U.S. and International Monetary Fund provided Mexico with a $50 billion bailout. In 2000, voters ended 71 years of PRI rule by electing opposition businessman Vicente Fox president. Between 1970 and 2007, roughly 11 million Mexicans headed to the U.S. to look for work. They were fleeing deprivation – about half of Mexico's 124 million people live in poverty – and, more recently, gang wars. Domestic drug production rose steadily after Colombia began to crack down on its narcotics industry in the mid-1980s. In 2007, Mexico began to deploy the military to hunt down drug kingpins, but broken gangs re-formed into scores of smaller ones, prompting turf battles that sent the murder rate soaring.

The Argument

Angry citizens have begun to take action. Some villages have formed militias to battle criminal gangs. And in September 2017, civil rights groups and opposition politicians managed to stop the attorney general, a longtime PRI lawmaker, from automatically becoming the nation's independent prosecutor, a new nine-year post. Voters are increasingly questioning Nafta. Average incomes have barely risen under the trade deal; only a third of Mexicans now say it has been good for the country. Lopez Obrador wants Mexico to grow all its own food and protect farmers from cheaper U.S. imports. He also says he'll work to reverse legislation that opened up the oil sector to private and foreign investment, since it didn't lower energy costs as promised. Some middle-class voters fear that Lopez Obrador could undermine businesses and political freedoms. His first presidential campaign faltered after an opponent's ads linked him to the late Hugo Chavez, the populist president of Venezuela who nationalized companies, expanded social spending and steered his country into authoritarianism. Lopez Obrador's supporters say he was a pragmatic mayor who built freeways and worked with business leaders to restore the city's historic center.

Southern Struggles

Mexico's Social Backwardness Index in 2015, which rates states based on a range of measures, including access to education, sanitation and health services

Degree of deprivation: Very high, High, Medium, Low, Very low

SOURCE: MEXICO'S NATIONAL COUNCIL FOR THE EVALUATION OF SOCIAL DEVELOPMENT POLICY

Xi Jinping

By Ting Shi

There are many faces to Xi Jinping, the most powerful Chinese leader in decades. There's tough-guy Xi, cracking down on corruption and overhauling the world's biggest military. There's statesman Xi, speaking out for free trade and measures to fight climate change following Donald Trump's election as U.S. president. There's nationalist Xi, brushing aside international condemnation of China's territorial claims, and there's ruthless Xi, coming down hard on dissent. There's Communist Xi, expanding the party's reach over work and society. And there's reformist Xi, advocating a decisive role for free markets in the world's No. 2 economy. Now the question is which of the faces will dominate — and whether Xi will succeed in making China a genuine rival to the U.S. as the world's No. 1 power.

The Situation

As well as being confirmed for a second five-year term as party chief at a twice-a-decade congress in October, Xi had his name enshrined in the party's charter, a rare honor that eluded his two predecessors. Analysts speculate that he may defy convention in 2022 and seek a third term; there was no clear potential heir in the leadership lineup revealed at the congress. Xi, 64, has been steadily building his influence since coming to power in 2012. Challenging years of collective leadership in top Chinese politics, he has taken charge of numerous policy committees, some beyond a president's usual remit. Internationally, his pet project, the Belt and Road Initiative, envisions a web of trade and infrastructure links along and beyond the ancient Silk Road routes, with China at its center. As commander-in-chief, Xi has demanded a force that's "ready to win wars." He has toughened China's stance on Hong Kong, an autonomous territory, and Taiwan, over which it claims sovereignty. He has also expanded the country's presence – and assertiveness – in Asia's disputed waters. At home, Xi is pushing to transform a slowing, debt-ridden economy through pledges to tackle bloated state-owned companies and a slew of other reforms. His anti-corruption drive has snared more than 1 million officials (including a star party leader who was seen as a possible future chief). Trump has criticized Xi for being soft on North Korea and unfair on trade while also describing him as "a very good man."

2x

Xi's target for per capita income growth from 2010 to 2020

The Background

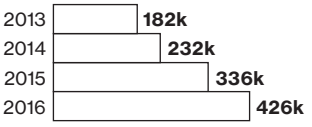
Xi's revolutionary parents helped establish Communist China, with his father serving as vice premier from 1959 to 1962. Like millions of young Chinese, Xi was dispatched to a rural village during Mao Zedong's Cultural Revolution. The seven years he spent feeding pigs, clearing sewage and devouring books (from Victor Hugo to Ernest Hemingway) in China's northwest was, he has recalled, humbling and transformational. In comparison with his predecessors, Xi is a charismatic speaker who cuts a relaxed and confident figure in public. His wife, singer Peng Liyuan, was more famous than him when they married and has helped establish China's first "First Couple." Xi's vision for the masses – dubbed the "Chinese Dream" – includes doubling incomes by 2020 and establishing China as "fully developed, rich and powerful" by 2049. As his star rises, so does the Chinese media's adulation. "There's only one Mount Everest in the Himalayas," the party-run Study Times wrote.

The Argument

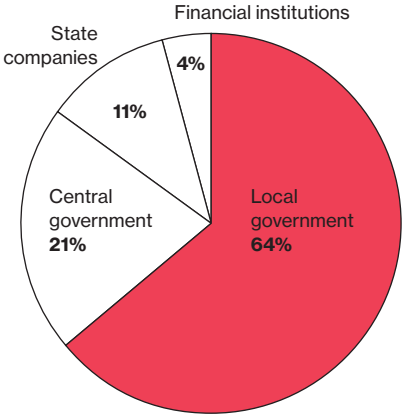
Supporters say China needs a strong leader like Xi to overcome vested interests resisting much-needed reform and to glue together a diverse and restive society. Detractors question whether Xi is committed to forcing through difficult measures that would, for example, tackle the country's debt and liberalize financial markets. For all his talk of free trade, they say China remains one of the most protectionist countries, even with the move in late 2017 to open the financial industry to overseas investors. Xi's strength, critics add, has come at considerable cost, including heightened censorship of the media, internet and arts – as well as the jailing of thousands of political and religious dissidents. Under Xi, China has been accused of heightening tensions in the South China Sea with what the U.S. calls "low-intensity coercion" tactics. In a 2017 poll carried out in 37 nations, most people surveyed had a favorable view of China but didn't trust Xi when it came to world affairs. Still, they trusted him more than Trump.

Xi's Anti-Graft Campaign Grinds On

China has punished more than 1 million officials



Share of investigations by sector*



NOTE: AS OF SEPT. 30, 2016;
SOURCE: CENTRAL COMMISSION FOR DISCIPLINE INSPECTION

PHOTO: LINTAO ZHANG/GETTY IMAGES

Terrorism Today

By Marc Champion

The nature of terrorism and how to fight it have become defining global security questions since the end of the Cold War, especially after the attacks on New York and Washington on Sept. 11, 2001. Now, U.S. President Donald Trump and some of his advisers see Islamist terrorism as the sharp edge of a threat to Judeo-Christian civilization, in some ways equivalent to the ideological and military struggles against Nazi Germany and the former Soviet Union. That's a view with potentially broad implications for government policies and foreign relations. It's also hotly debated.

The Situation

The issue of who is or might be a terrorist is driving divisions within and between countries. Battles over who can get asylum in the U.S. and the European Union are being fought between those who emphasize the risk that terrorists will hide among refugees and those who focus on welcoming families fleeing terrorized lands. In 2017, Saudi Arabia and three other Arab countries cut ties with Qatar in part because of its support for the Muslim Brotherhood, which the Saudi bloc considers a terrorist group. The EU and U.S. do not, although the Trump administration has considered giving it that designation. For Trump, the threat of terrorism is so great he's pushed to have the North Atlantic Treaty Organization focus on it. That's exacerbated worries among the European states in the alliance that the U.S. president is insufficiently committed to NATO's original mission – the joint territorial defense of its members – at a time when the increasing assertiveness of Russia is their bigger concern.

The Background

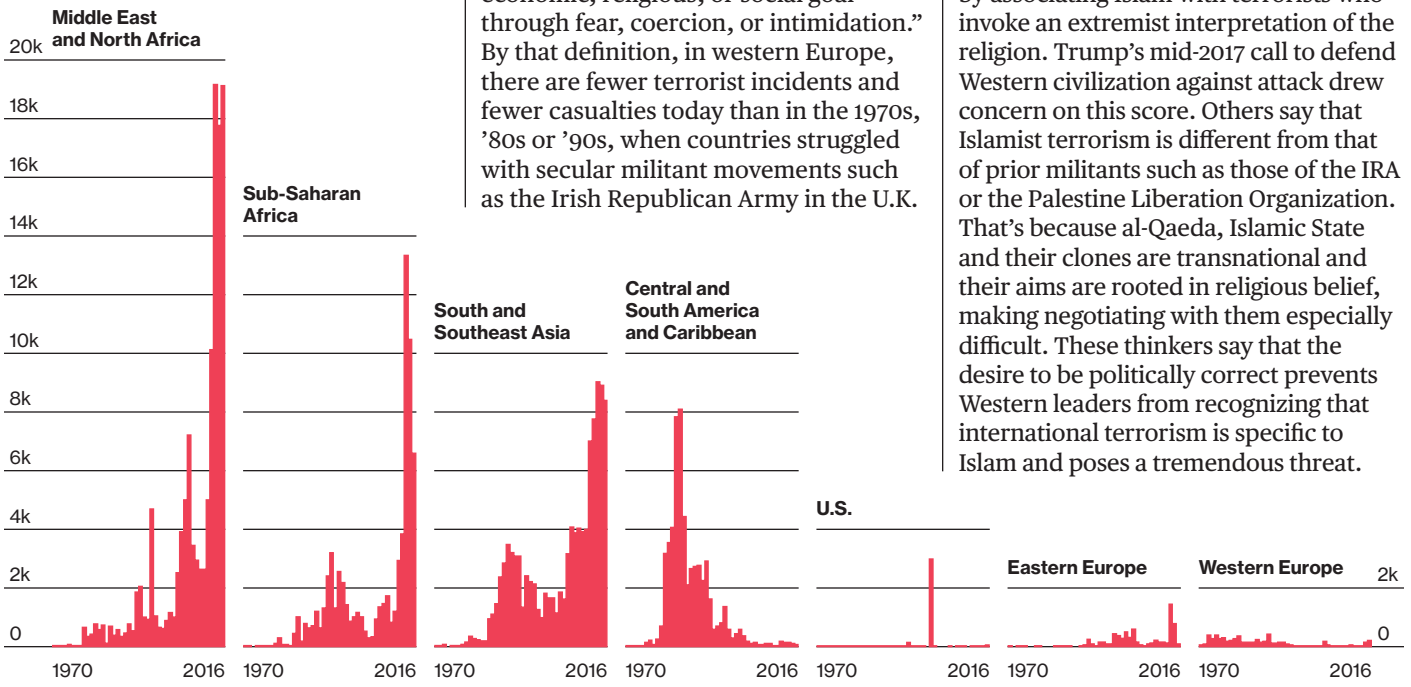
Ever since the Sept. 11 attacks by the jihadis of al-Qaeda, there's been a perception that terrorism is on the rise everywhere. In fact, it's gone way up in some places and down in others. Terrorism fatalities worldwide have increased almost ninefold since 2000, as measured by the authoritative Global Terrorism Database, a project led by the University of Maryland. But the surge has been almost entirely in the Middle East and South Asia. The database defines terrorism as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation." By that definition, in western Europe, there are fewer terrorist incidents and fewer casualties today than in the 1970s, '80s or '90s, when countries struggled with secular militant movements such as the Irish Republican Army in the U.K. and the Red Army Faction in Germany. More Americans were killed by terrorists in the 15 years before Sept. 11 than in the 15 since, with the vast majority of the earlier attacks carried out by animal rights, environmental, anti-abortion, white supremacist and domestic anti-government groups.

The Argument

Some commentators think the "war on terrorism" is a misnomer that inflates the threat and distorts responses. Terrorists, they say, should be treated as criminals and combated primarily by intelligence agencies, police and targeted drone strikes. They see the Sept. 11-inspired, U.S.-led invasion of Iraq as a strategic error that spawned new terrorist threats, notably the al-Qaeda spinoff Islamic State. Excessive responses, they argue, have damaged Western values, in particular the rule of law. They warn, too, against alienating moderate Muslims by associating Islam with terrorists who invoke an extremist interpretation of the religion. Trump's mid-2017 call to defend Western civilization against attack drew concern on this score. Others say that Islamist terrorism is different from that of prior militants such as those of the IRA or the Palestine Liberation Organization. That's because al-Qaeda, Islamic State and their clones are transnational and their aims are rooted in religious belief, making negotiating with them especially difficult. These thinkers say that the desire to be politically correct prevents Western leaders from recognizing that international terrorism is specific to Islam and poses a tremendous threat.

Terrorism's Toll Through the Decades

Deaths in attacks, by regions with highest numbers



SOURCE: NATIONAL CONSORTIUM FOR THE STUDY OF TERRORISM AND RESPONSES TO TERRORISM (START), UNIVERSITY OF MARYLAND (2017). GLOBAL TERRORISM DATABASE (GTD) [DATA FILE]. RETRIEVED FROM HTTP://WWW.START.UMD.EDU/GTD

Mohammed bin Salman

By Glen Carey

Customarily, when Saudi royals consider who their next king should be, they put a priority on continuity and power-sharing among the many princes. If Crown Prince Mohammed bin Salman succeeds his father, King Salman, to the throne, he'll have bucked that tradition. Just 32 years old, the prince has leapfrogged a generation of more experienced uncles and cousins to the brink of the top position in Saudi Arabia, one of the last remaining absolute monarchies. Not since the reign of the country's founder, Abdulaziz ibn Saud, has so much power been in one man's hands. The prince vows to deliver revolutionary change, moderating religious strictures in the land that gave birth to Islam and weening the largest crude exporter off its dependence on oil. His supporters say his boldness is just what's needed to push one of the world's most conservative societies into the modern age. His critics say he veers into recklessness.

The Situation

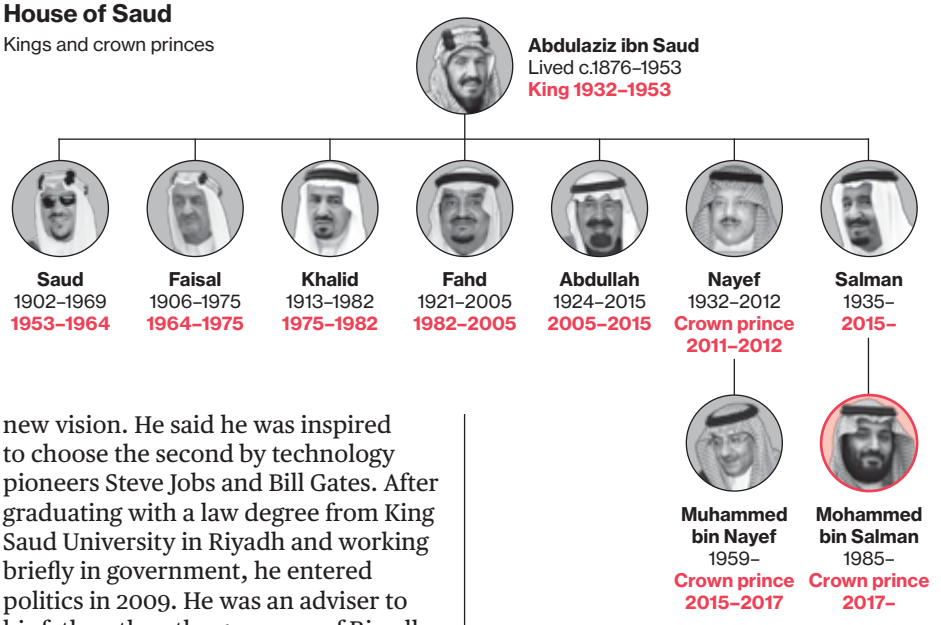
An unprecedented string of arrests in late 2017, officially part of an anti-corruption drive, appeared to strengthen the prince's position. Security forces detained princes, ministers, former top officials and billionaire Prince Alwaleed bin Talal, a major shareholder in Citigroup Inc. Prince Mohammed was already running the country, essentially. He controls the defense ministry, the central bank, the Council of Economic and Development Affairs, the state-owned oil producer Saudi Aramco and a rejuvenated sovereign wealth fund. He's the leading force behind the government's transformative plan for the future, Vision 2030, which foresees a more open society and diversified economy. He's won some popular support, especially among the young, with reforms like lifting a prohibition on women drivers, introducing public entertainment such as concerts and stripping the religious police of their arrest powers. On the other hand, his announcement that Aramco would be partially privatized shocked Saudis who regard the company as a sacred national patrimony. Prince Mohammed is aggressive on national security matters, especially regarding Iran, Saudi Arabia's rival for power in the region. He's been a driver of the country's bombing campaign in Yemen since 2015 on behalf of a government ousted by Iran-backed rebels. And he was behind a cutoff of ties with neighboring Qatar in 2017 in part over its friendliness to Iran.

The Background

Prince Mohammed, who has one wife and four children, told Bloomberg Businessweek in a rare interview that growing up in the royal court he saw two options for himself: adapting to the monarchy as it was or pursuing a new vision. He said he was inspired to choose the second by technology pioneers Steve Jobs and Bill Gates. After graduating with a law degree from King Saud University in Riyadh and working briefly in government, he entered politics in 2009. He was an adviser to his father, then the governor of Riyadh province. Early on, the prince gained a reputation for working hard, like his father, and for being demanding, like his mother, who he says never overlooked his mistakes. After then-King Abdullah named Prince Mohammed's father defense minister, the monarch initially barred the prince from entering the ministry because of rumors he was disruptive and power-hungry. King Salman ascended to the throne in 2015 and named his favorite son crown prince in June 2017. He stripped the title from Prince Muhammed bin Nayef, the country's prominent anti-terrorism czar, who was fired as interior minister and, according to some reports, placed under house arrest. The events unsettled a country accustomed to cohesion within the royal family.

House of Saud

Kings and crown princes



SOURCES: GOVERNMENT OF SAUDI ARABIA, BLOOMBERG

The Argument

Prince Mohammed's raw ambition and monopolization of power have antagonized some members of the royal family, stirring speculation that they will resist his policies as their stake in the government dwindles. Skeptics worry that Prince Mohammed is too inexperienced, and that no one will remain to check his power when many of the state's seasoned leaders have been moved aside to make way for him and less powerful princes of his generation. Critics of his policies note that the campaign in Yemen failed to dislodge the rebels while contributing to what United Nations officials call the world's worst humanitarian crisis. Breaking ties with Qatar, they say, drove that country into a closer relationship with Iran. The prince's supporters see his youth as an advantage in a country in which 70 percent of the population is under age 30. It could give him multiple decades to achieve his ambitious agenda; the seven Saudi kings so far have come to power on average at 64.

Chapter 4

TECHNOLOGY

Buzzwords

No field spits out new jargon like technology. Here are some terms in the news.

Initial Coin Offerings

By Julie Verhage, Camila Russo and Lily Katz

The ICO, or initial coin offering, provides risk-takers a chance to make money by getting in on the next money. Startups looking to follow in the footsteps of digital currency pioneers bitcoin and ether raised more than $2 billion in the first nine months of 2017, along with cautions from the U.S. Securities and Exchange Commission. Investors sometimes have just minutes to snatch up shares amid a frenzy of demand. They generally get a virtual credit or token, which might have value inside a game or some other online application, or simply be held in the hope that it becomes the next bitcoin. (By the beginning of November, bitcoin's price had rocketed 600 percent in 2017.) The long list of projects offering new currencies include ones endorsed by socialite Paris Hilton and boxing champion Floyd Mayweather, plus one that bet on demand for synthetic rhino horn used in aphrodisiac pills. The proliferation of ICOs, and confusion over which type of offer is a token and which is a security, prompted the SEC to act. In an investor bulletin, the regulator warned of the potential for fraud, scams and hacking. It said it would start treating some ICOs as IPOs, or initial public offerings, when companies sell shares for the first time, with all the registration requirements that entails. China and South Korea banned ICOs entirely.

RANSOMWARE

By Adam Satariano and Nate Lanxon

Ransomware is an increasingly common and disruptive form of cybercrime, rendering files stored on computers inaccessible unless money is paid. It's a type of malicious software, or malware, often spread via email attachments, that essentially holds a device hostage until money is sent. The motivations aren't always clear, but attacks have crippled government agencies and some of the world's biggest corporations. In the case of the WannaCry worm that spread in May 2017, the ransom was $300 in bitcoin, payable within 72 hours. (The use of digital currencies helps hackers stay anonymous, and the small amount may be designed to make victims just give in and pay.) The largest known ransomware payout was $1 million, paid by a South Korean web hosting company to get its servers unlocked. Ransomware victims who refuse to pay might lose their files forever, unless they've backed them up. Most vulnerable are computers running older versions of Microsoft Corp.'s Windows operating system. Although the company issued a fix, many users never updated their computers.

HYPERLOOP

By Sarah McBride

At a top speed of 760 miles per hour (more than 1,200 kilometers per hour), the so-called hyperloop proposed by entrepreneur Elon Musk could whisk travelers from New York to Washington in just 29 minutes, one-fifth the time needed by the fastest existing U.S. passenger train. Through his tunnel-building company, Musk is pursuing a concept he pitched in 2013: a wheel-less passenger pod that floats on puffs of air through a low-pressure tube to minimize friction. It's a twist on magnetic levitation, or maglev, the technology behind some of the world's fastest trains. The pods would travel through enclosed tubes running underground or aboveground on a series of pylons. While engineers say the technology isn't implausible, an intercity hyperloop route would be expensive and require complicated permitting and government approvals. Musk originally proposed a hyperloop connecting Los Angeles and San Francisco, but that route has myriad challenges, among them right-of-way conflicts and the threat of earthquakes. Musk's company isn't the only player. Hyperloop One, co-founded by Silicon Valley venture capitalist Shervin Pishevar, ran a test pod at almost 200 mph in July 2017 using a version of magnetic levitation.

5G

By Jenna M. Dagenhart and Ian King

The world's next mobile network, 5G, promises that it will be blazing fast and make room for many more connected devices. Don't go shopping for a 5G-compatible phone just yet, though, since the technical standards are still being hammered out. But providers that rely on wireless connectivity are already dreaming of how they could put 5G to work.

What's 5G?

5G simply stands for fifth-generation mobile networks or fifth-generation wireless systems. It will be the successor to 4G, the current top-of-the-line network technology first introduced commercially in 2009. 5G could end up being 100 times faster than 4G, with speeds that could reach 10 gigabits per second. This would allow a full-length, high-definition movie to be downloaded in seconds. 5G will also increase total bandwidth, which is needed for the growth of the "internet of things" – objects ranging from refrigerators to traffic lights sending and receiving data.

How will it work?

5G likely will use the existing mobile spectrum space and extend it by also tapping higher frequencies, called millimeter waves. Millimeter waves can carry more data but travel only short distances. So they'll require many small base stations to receive signals and send data. Small base stations will relay signals among themselves, and to and from 5G towers, using technology called Massive MIMO, or multiple-input, multiple-output. 5G towers will have perhaps 100 antenna ports. Instead of broadcasting signals in every direction, as current antennae do, 5G would transmit focused signals with a technology known as beamforming. Transceivers would send and receive data simultaneously thanks to so-called full duplex technology.

That makes it faster?

Yes. Spectrum that carries more data; lots of base stations to cut down transmission time; antennae that transmit and receive at the same time; some devices avoiding the network altogether – all this could allow for more connections with almost no delay, known as "low latency" in networking lingo. And 5G should be able to pick up lower-powered radio signals from devices, which could save battery life.

What could be done with all this?

Speedy 5G networks could send commands to a driverless car faster than a human could react. Vehicle-to-vehicle communications could allow cars to keep a safe distance from one another, preventing accidents. In telemedicine, near-instantaneous transmission of video and data would allow surgeons to operate remotely using a robotic scalpel.

When will we see it in action?

AT&T Inc. and Verizon Communications Inc. conducted trials of 5G fixed broadband in U.S. homes and businesses in 2017. (Some cable companies now offer a so-called 5G Wi-Fi service that has nothing to do with fifth-generation service.) South Korea hopes to have a 5G mobile network in place for the 2018 Winter Olympics in PyeongChang. Carriers around the world expect to start 5G mobile services in 2020.

So what's next?

Figuring out the industry standards. Companies will put forward their proposals to industry groups working on different technical aspects of the standards, including the 3rd Generation Partnership Project, Institute of Electrical and Electronics Engineers and International Telecommunication Union. Each proposal will be put to a vote; the winning technologies and practices will make up the standards.

What are companies doing?

Even before the standards are finalized, investors are snatching up patents for features likely to be used. Companies such as Nokia, Ericsson and ZTE are staking their claim to technologies in areas from radio access to modifying signals.

How much will this cost?

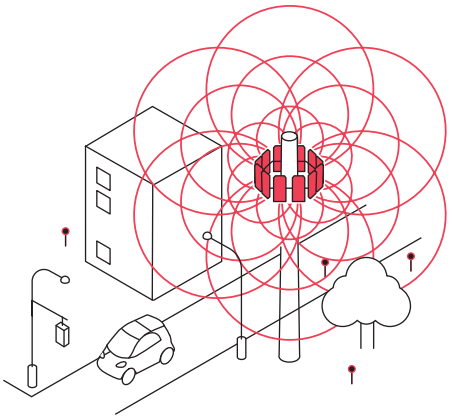
Accenture Plc estimates that the 5G system upgrade will cost $275 billion over seven years in the U.S. It's too soon to guess how this might translate into a monthly price for 5G service. But the average monthly mobile phone bill in the U.S. rose from $51 a month in 2007 to $80 in 2014.

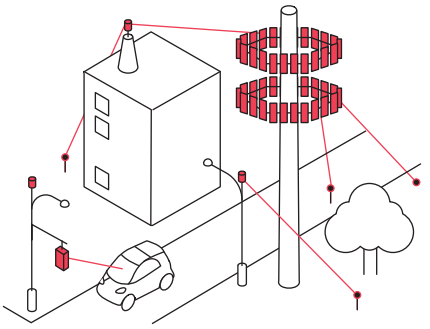
How 5G Could Work

While the final specifications for 5G, or fifth-generation mobile service, are still being finalized, here are technologies likely to play a role:

4G
- Signals broadcast in all directions
- All data sent to and from the network

5G
- Focused signals
- Small base stations extend reach and handle some exchanges directly
- Device-to-device communication





SOURCE: INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

Women in Tech

By Laura Colby

Silicon Valley takes pride in its progressive views on climate change, same-sex marriage and transgender rights. So why does it have such trouble with gender equality? Women are underrepresented in the technology industry throughout the developed world. Bias allegations have pushed some companies to promise improvements, and several high-profile male executives have been shown the door. Progress has been slow, though: Women held about 26 percent of computer and mathematical jobs in the U.S. in 2016, slightly below the level in 1960.

The Situation

Women increasingly are speaking out about what they see as a hostile culture in tech. Some complain that managers don't view them as leadership material or that the informal "buddy networks" that benefit male peers often exclude them. Others say discrimination is more overt and that they're subject to demeaning comments and unwanted sexual advances. A former software engineer at Uber Technologies Inc. claimed in a 2017 blog post that her boss had propositioned her and higher-ups ignored her complaints. Investigations resulted in the resignation of the co-founder and chief executive officer, Travis Kalanick, and many policy changes. Venture capitalist Ellen Pao sparked a national debate when her sex-discrimination lawsuit against a former employer, Kleiner Perkins Caufield & Byers, went to trial in 2015. (She lost.) Some of Silicon Valley's biggest companies have acknowledged a gender-disparity problem and announced steps to improve family-leave, hiring and pay policies. Google parent Alphabet Inc. and Apple Inc. have committed to hiring more women and tracking the changes. Apple's results: Women held 23 percent of technical jobs globally in 2016, up from 20 percent in 2014. Google, which is fending off a U.S. Department of Labor lawsuit alleging it discriminates against women in pay, fired a male engineer who criticized its diversity policies in mid-2017.

The Background

Gender disparity in tech is wide and deep. It exists at U.S., European and Asian companies; it's seen at the rank-and-file, executive and board levels. Larry Summers, as president of Harvard University, suggested in 2005 that innate differences between boys and girls might explain the lack of female scientists and mathematicians. He later apologized, but the incident exposed a grim reality: After decades of effort, the U.S. education system isn't fixing the problem. Even though high school girls outperform boys in math and science, boys are more likely to take the standardized tests that lead to a college major in STEM (science, technology, engineering and math) subjects. One study showed college-age women, unlike their male peers, tended to steer clear of STEM majors because they think they must be brilliant, not just hardworking, to succeed. Women also leave high-tech jobs at twice the rate of men – for reasons unrelated to pregnancy – putting a spotlight on the culture of tech workplaces.

The Argument

One theory is that tech startups begin with a core of male employees who recruit from their social circles. They are so focused on expanding the business that employment policies are an afterthought. By the time they add a human resources department, the "bro culture" is hard to dislodge. Some tech executives cite studies showing the more diverse a company, the better its financial performance. Intel Corp. is investing $300 million in hopes it will employ women in the same proportion as the U.S. workforce by 2020. Girls Who Code teaches middle school and high school girls to write computer code at after-school and summer programs. The Girl Scouts of America is adding video game development and digital art to the merit badges girls can earn.

U.S. Women Rarely Reach Pay Parity

In top U.S. STEM jobs, women were paid an average of 89 cents for every dollar a man made in 2015. Here's where women made the most, compared with men

Rank	Occupation	Total workers	Percentage women	Men's median earnings	Women's earnings as % of men's earnings
1	Architectural and engineering managers	142,692	8.5%	$125,849	104.7%
2	Chemical engineers	56,266	15.1%	$100,944	100.1%
3	Mechanical engineers	225,549	8.5%	$83,340	96.9%
4	Computer network architects	103,813	8.6%	$95,720	96.5%
5	Environmental engineers	25,754	25%	$82,150	92.3%
6	Statisticians	33,912	49%	$87,300	91.9%
7	Industrial engineers, including health and safety	179,731	19.2%	$77,713	91.8%
8	Computer programmers	381,192	21.1%	$85,773	90.3%
9	Aerospace engineers	104,657	11.6%	$102,004	89%
10	Computer and information systems managers	550,033	27.1%	$104,424	88.4%

SOURCES: U.S. CENSUS BUREAU, U.S. BUREAU OF LABOR STATISTICS

PHOTO: GABRIELLE LURIE/AFP/GETTY IMAGES

The End of Cash

By Srinivasan Sivabalan

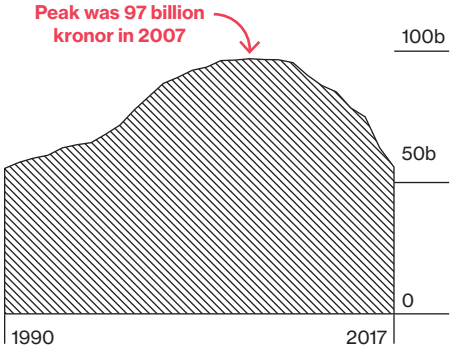
Do we need cash? Humans have used all sorts of things to exchange items of economic value — rare metals, strings of shells and even jugs of whiskey. Those objects have gotten more ephemeral, with paper money replacing most coins and digital forms increasingly supplanting paper. Could physical cash go away entirely? Economists see great benefits in a cashless society: lower transaction costs, new tools to manage economic growth and an end to tax evasion and money laundering. Critics see an erosion of privacy, frightening new powers for tyrants and an increase in inequality.

The Situation

Sweden is the most cashless society on the planet, with bank notes and coins accounting for just 1.7 percent of its gross domestic product. (The average in major economies is about 9 percent.) Its churches were early adopters of donations via mobile phone, while its central bank is considering whether to issue a cryptocurrency. China's city dwellers are rapidly going cashless, thanks to a system that uses encrypted codes on phones for transactions. A credit card consortium is working to extend it globally. In India, 255 million people use Paytm, a seven-year-old startup backed by China's Alibaba Group Holding Ltd., to make payments through a virtual wallet. India was rattled by the government's decision in November 2016 to suddenly replace the larger bills that made up 86 percent of the currency in circulation to counter tax dodgers and counterfeiters. A shortage of replacement bills meant that companies struggled to pay salaries and millions of poor people couldn't buy food. The government retreated in June 2017 after the fiasco cut into economic growth. In Australia, Citibank stopped accepting cash at its branches after most of its customers embraced digital transactions. And the European Central Bank has decided to stop producing the 500-euro note in 2018 to counter terrorist financing.

Fewer Kronor Rattling Around

Average value of Sweden's notes and coins in circulation each year



NOTE: FIGURE FOR 2017 IS THROUGH AUGUST
SOURCE: STATISTICS SWEDEN

The Background

Since Roman times, people have tried many alternatives to carrying loads of cash. The earliest known example of a modern check was written by hand and drawn on an account at Clayton and Morris, a goldsmiths' bank in London, on Feb. 16, 1659. The next revolution started with a forgotten wallet. In 1949, U.S. entrepreneur Frank McNamara visited the Majors Cabin Grill restaurant in New York and had an embarrassing moment before his wife paid the tab. But it gave him an idea, and months later he returned to the same restaurant, this time paying with a small cardboard card. Thus was born the credit card industry. Shortly thereafter, banks began adopting computing systems that made it easier to keep track of money digitally. Then came the first automated teller machine, in London in 1967. Debit cards had been first tested the year before but only began to be issued in large numbers in the 1980s as ATM networks grew. Online banking took off in the following decade, ending the dominance of cash once and for all.

The Argument

For governments, getting rid of cash would make it easier to crack down on tax evasion and drug trafficking. Businesses wouldn't only save money on transaction costs but also could benefit if friction-free payments led consumers to buy more. Some economists say that without cash, central banks could fight recessions more effectively by imposing negative interest rates – effectively a tax on savings meant to spur spending – if hoarding cash weren't available as a way to sidestep the penalty. Critics say that in a digital-only economy, governments and banks could take control of your financial life; with a flick of a switch, they could leave you without a penny. Networks can fail. And everybody could be vulnerable to a cyberattack or power outage, as residents of Puerto Rico found after Hurricane Maria destroyed much of the island's electrical grid in September. For the world's poor, arguments about going cashless cut both ways. Billions of poor people in the developing world depend on cash to buy goods for very small amounts, often mere cents. Not all of them can afford phones or other means of interacting with a digital cash network. That could create a second-class citizenry of people who don't have equal access to banking services. On the other hand, services such as Paytm in India and mobile phone networks such as Kenya's M-Pesa have let people in remote villages try out newer services like microbusiness loans.

1.7%

Value of Sweden's physical cash as share of GDP

The Great Firewall Of China

By David Ramli

China's online population of 731 million gets a highly restricted internet, one that doesn't include access to Google, Facebook, YouTube or the New York Times. There's little of the coverage of the 1989 student protests in Tiananmen Square. Even Winnie the Pooh got temporarily banned. China is able to control such a vast ocean of content through the largest system of censorship in the world, aptly known as the Great Firewall of China. It's a joint effort between government monitors and the technology and telecommunications companies that are compelled to enforce the state's rules. The stakes go beyond China, which is setting an example that other authoritarian countries can imitate.

The Situation

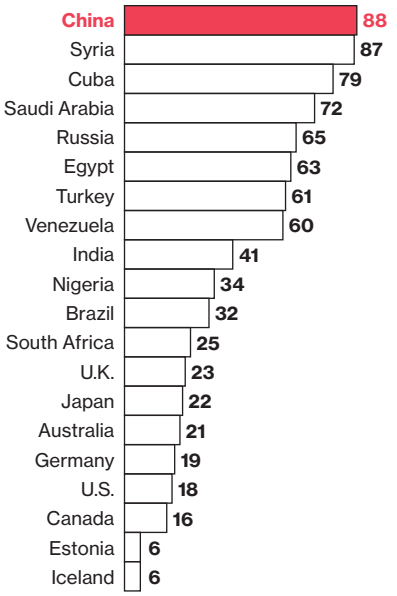
While strict censorship is nothing new in one-party China, under President Xi Jinping online restraints have grown tighter, particularly around the time of politically sensitive events like the death of Nobel Peace Prize winner Liu Xiaobo in 2017. Ahead of the Communist Party Congress that year, China began blocking the WhatsApp messaging service and extended a clampdown on virtual private networks, a commonly used method to circumvent the Great Firewall. Securing China's "cyber sovereignty," or protecting the country's internet from undue foreign influence, is one of Xi's avowed goals. Recent moves to restrict online freedoms include measures that all but eliminate the ability to post social media anonymously, make app store owners responsible for how customers use their purchases and require online portals to stop news reporting. Pooh's temporary banishment came after bloggers depicted Xi as the cartoon bear. Meanwhile, foreign companies that want to operate on the mainland are forced to adopt practices often seen as invasive elsewhere. Apple Inc., which publicly fought requests by the U.S. government to create backdoors into its password-protected products, has quietly deleted apps and built local data centers in line with Chinese government requirements. All this contributes to China having the least online freedom on the planet, according to Freedom House, a civil liberties group.

The Background

China hasn't always tightly restricted the web. When it formally arrived in 1994, it was relatively free and seen as an extension of the Open Door Policy of tapping Western knowledge to reform the economy. As its popularity grew, the government yielded to a sentiment expressed by former leader Deng Xiaoping: When you open the window, the flies come in. From 2000, the foundations of the Great Firewall were laid with the introduction of the Golden Shield Project, a database-driven surveillance system capable of accessing every citizen's record and connecting China's security organizations. Now the government employs at least 50,000 people to enforce censorship, barring websites it disapproves of and forcing search engines to filter out content considered harmful. There's also an army of social media influencers who, by one estimate, post 500 million pro-government comments a year. Crucially, the authorities make companies responsible for the content they show, even that generated by users, a practice that encourages self-censorship in a country where the state licenses all media. With an almost captive local market, China's tech giants – Tencent Holdings Ltd. and Alibaba Group Holding Ltd. – have flourished, in the process becoming important taxpayers in China. At the other extreme, Greatfire.org, a nonprofit group that opposes censorship, has created mirror sites and a browser to get around the controls.

World's Worst for Online Freedom? China Edges Syria.

Iceland and Estonia come out best in Freedom House's rankings



NOTE: SELECTION OF COUNTRIES RANKED IN 2016; SCORE OF 0 IS MOST FREE, 100 LEAST FREE; SOURCE: FREEDOM HOUSE

The Argument

Most countries impose some sort of cyber control, like banning websites that promote hate. With more than half its 1.4 billion people online, China argues that the restrictions are mostly about maintaining social order and safeguarding national security. Proponents cite the worrying influence on the flow of news exerted by the likes of Google and Facebook as a reason for the state to adopt an active role. Critics say China's Great Firewall reflects its paranoia over the internet's potential to spread opposition to one-party rule. As well as impeding freedom of speech, China's approach constrains it economically, they say, by stifling innovation, preventing the exchange of important ideas and cutting access to services used by businesses like Google Cloud. Academics cannot tap Google Scholar, used globally by students and professors to share work. More broadly, critics fear if Russia and other like-minded countries follow China's example and succeed in imposing restrictions on their citizens and global online companies, the vision behind the founding of the internet – an unfettered global exchange of information – could be seriously compromised.

Chapter 5

ENERGY & ENVIRONMENT

Overfishing

By James Greiff

More and more, around the globe, fish is what's for dinner. The average person eats more than 20 kilograms (44 pounds) a year, double the level of the 1960s. With rising incomes in developing nations — China especially — driving demand, fish and seafood now account for almost a fifth of the animal protein people consume. But all those fish dinners are taking a heavy toll on ocean populations. Even though about half the fish humans eat are farm-raised today, we're still pulling too many fish from the sea. Dwindling stocks risk triggering clashes among fishing nations, job losses in an industry that supports 1 in 10 of the world's people, and in some places even hunger.

The Situation

About 90 percent of the world's fishing grounds are being harvested at or beyond their sustainable limits. Some varieties, such as the southern bluefin tuna, are threatened with extinction. Shrinking supplies off the coast of western and central Africa have raised concerns about future food shortages there. In the Mediterranean and Black seas, catches have fallen by a third since 2007. Fishing rights have been a source of friction in the South China Sea, where China and Southeast Asian nations have overlapping territorial claims. Indonesia has taken to blowing up foreign trawlers it's seized for fishing illegally in its waters. And fishing could prove to be a flashpoint in the U.K.'s talks to leave the European Union, as British fishers aim to cut competition from foreign fleets and unwind quotas that limit catches.

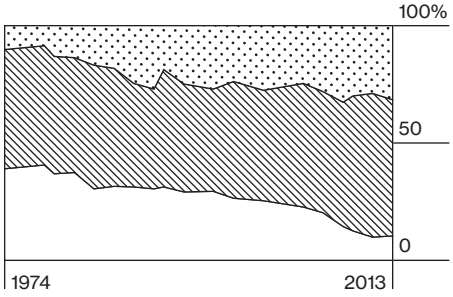
The Background

Nineteenth-century sailing vessels outfitted with nets sometimes decimated local species, including halibut off the northeastern coast of the U.S. But an expanding human population and more advanced technology turned overfishing into a global crisis. Starting in the 1950s, large industrial trawlers equipped with gear such as sonar were able to find and catch many more fish in deeper water. Later, airplanes and satellites were used to locate fish. Commercial fleets embraced destructive techniques, such as using trawling nets to scour the ocean floor. This scoops up and kills large numbers of unwanted fish and creatures such as turtles, dolphins and whales, and leaves behind pockets of undersea desert. Today, some countries have limited or banned bottom trawling in their so-called exclusive economic zones, the seas they control within 200 nautical miles of their shores. The high seas beyond those zones, which make up 64 percent of the ocean, are unregulated and open to plunder. Fishing nations, led by China, have subsidized and overinvested in their fleets; by some estimates, there are two to four times more fishing boats than needed to sustainably harvest the world's oceans.

Steady Decline of World Fisheries

Share of ocean fish stocks, by status

Overfished · Fully Fished · Underfished



SOURCE: FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2017

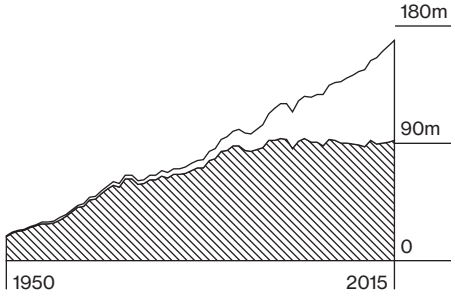
The Argument

Of the various means of regulating fishing within national waters, so-called catch-shares programs have proved the most successful. These systems grant a portion of the total allowable harvest to individual fishers, communities or companies. They can sell the rights or use them to catch fish. This gives fishers incentives to work when demand is highest and slow down during spawning season, maximizing the value of their catch and increasing the value of their shares. Such programs sometimes generate opposition in fishing communities for fear they will reduce income, at least temporarily. Still, the U.S., Belize, Chile, Denmark and Namibia have used them to restore overharvested fisheries. Diplomats at the United Nations agreed in mid-2017 to begin negotiations to create protected areas in the high seas, where fishing would be limited or banned so stocks could recover. Reaching agreement on locations and enforcement mechanisms is a challenge, especially because the top harvesters of the high seas include some of the most politically powerful countries, including the U.S., China and Japan. Some advocates argue that increasing aquaculture is the best way to take pressure off wild fish, but the practice has its own critics. Fish farms can release pests and pathogens that harm ocean fish. Plus, farmed fish eat feed largely made from wild fish, further stressing that population. Experiments are underway to treat waste from fish farms, although the ultimate answer may be moving farms far offshore or inland and using systems similar to those in sewage treatment to remove contaminants.

Ocean Catch Maxes Out While Fish Farms Boom

Global fish production, in metric tons

Captured in the wild · Farmed using aquaculture



NOTE: INCLUDES FISH NOT CONSUMED BY PEOPLE; SOURCE: FAO 2017

PHOTO: GILLES SABRIE

Peak Oil

By Jessica Shankleman and Hayley Warren

The world is turning its back on oil. But how quickly? Technological advances driven by the threat of climate change could mean the world's thirst for petroleum tops out sooner than companies such as Exxon Mobil Corp. or giant producers like Saudi Arabia are banking on. "Peak oil" has been debated for decades, but today it means something very different.

Why is oil's future in doubt?
About 60 percent of oil is used in transportation, which is also where the biggest technological changes are emerging. The impact of electric carmakers such as Tesla Inc. could be turbocharged by advances in related fields such as self-driving vehicles and ride-hailing apps, which make it possible for people to switch from owning cars to relying on rides from more efficient fleets. The culmination of these trends could transform how people travel and prompt more revisions to forecasts for when oil consumption will peak.

Is the world running out of oil?
No. The peak oil that's talked about today is quite different from the concept that emerged in the 1950s, when M. King Hubbert, a Royal Dutch Shell Plc geologist, predicted that U.S. oil production would crest in the 1970s and the world would physically run out of oil. That never happened, and new discoveries and efficiency gains at existing fields mean oil supplies will abound for a long time to come. So the discussion has shifted to peak demand – whether people will simply use less petroleum and reserves that are considered valuable assets today will wind up being left in the ground.

What do experts say about that?
Forecasts for long-term oil demand have been coming down. The International Energy Agency, which advises rich countries on policies, has been steadily revising its predictions lower over the past 20 years as renewable energy has taken off and more power utilities have switched to cleaner natural gas. Solar power, for example, has picked up steam as its cost tumbled much faster than expected, with prices falling 50 percent since 2009. That's already upending the business model of utilities, which were designed to deliver fossil-fuel energy from large power plants to homes and businesses.

Is oil usage still a threat to global warming?
Yes. To limit global warming to "well below" 2 degrees Celsius (3.6 degrees Fahrenheit) – the target set by the United Nations-sponsored climate change treaty – the IEA predicted in 2016 that demand for oil would need to peak in the next few years. That's unlikely to happen: The agency's main demand scenario still sees oil use expanding for the next two decades.

So when will demand for oil peak?
There's a range of about 25 years between the earliest and latest predictions. The most aggressive ones are based on the rapid expansion of electric vehicles, energy efficiency improvements and policy changes to curb greenhouse gas pollution. That scenario leads Statoil ASA and some forecasters to predict that oil demand could peak as soon as the late 2020s. Ben van Beurden, Shell's chief executive, has said that if electric cars become really popular, the zenith could arrive in the next 15 years.

Do all oil companies have the same view?
No. Most oil companies see a peak around 2040. Others say their industry will enjoy decades of growth as it feeds the energy needs of the world's expanding middle class. Saudi Arabia and Russia, the world's two largest exporters, don't foresee a top until 2050 at the earliest. Even when production does peak, it's likely to lead to a plateau rather than a steep fall.

Why such differences in forecasting?
There's a lively debate about how rapidly electric vehicles will catch on. Falling costs for batteries could make them as affordable as internal-combustion engine cars over the next 10 years, according to Bloomberg New Energy Finance. Meanwhile, some of the world's largest auto markets plan to phase out vehicles powered by fossil fuels to clean up dirty air. By 2030, India wants all new vehicles sold to be electric; the U.K. and France will ban the sale of diesel- and gasoline-fueled cars by 2040. The impact of the U.S. is a wild card because President Donald Trump is disrupting efforts to tackle global warming.

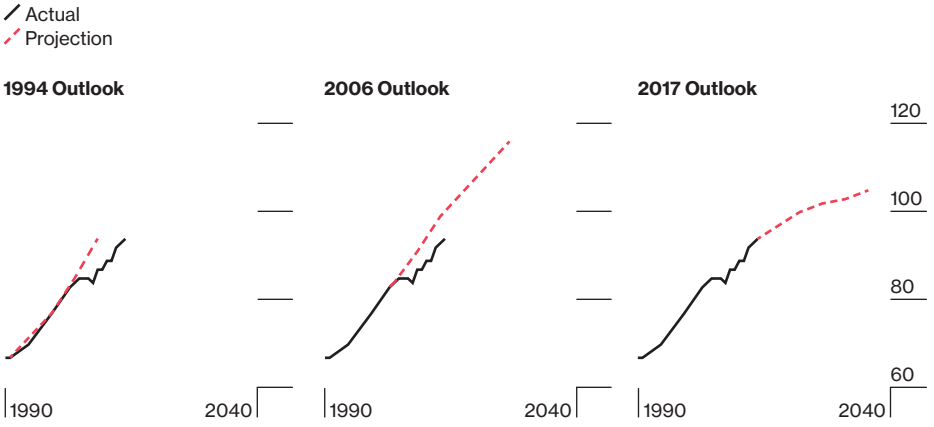
What will become of oil companies?
Many are speeding up efforts to diversify, investing more in natural gas and cleaner technologies like hydrogen fuel cells. Even now these companies are doing huge business turning crude into chemicals used for everything from plastics to fertilizer. Still, peak oil has to be a concern, since it can take a decade or more for multibillion-dollar oil exploration projects to come to fruition.

What will happen to car companies?
They are furiously preparing for the shift. Volvo said all its new models will include electric drive by 2019, while Volkswagen wants 25 percent of its sales to be electric by 2025. Daimler and BMW are aiming for 15 percent to 25 percent by 2025.

What happens to countries that depend on oil revenue?
That's a big unknown. Peak oil could cause political turmoil in so-called petro-states, which rely on oil revenue to keep government finances afloat. Saudi Arabia plans a partial privatization of its state oil company, Aramco, to raise funds to diversify its economy for the post-hydrocarbon age. Other petro-states, such as Russia, Venezuela and Nigeria, have yet to lay out plans for the future.

Oil Demand Forecasts Have Been Coming Down

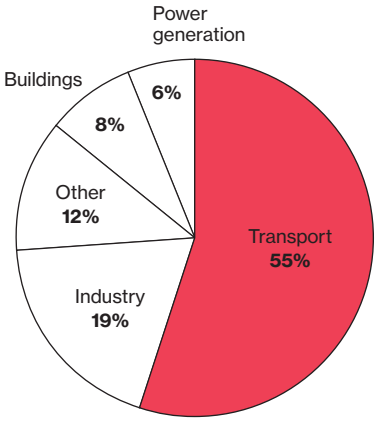
IEA forecasts published at various dates, millions of barrels per day of production



SOURCE: INTERNATIONAL ENERGY AGENCY

Who Uses Oil

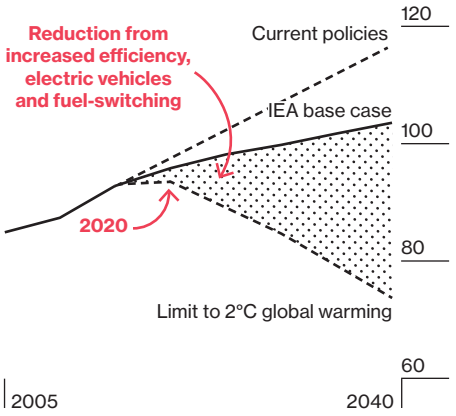
Oil demand by sector in 2016



SOURCE: INTERNATIONAL ENERGY AGENCY

Different Views of the Future

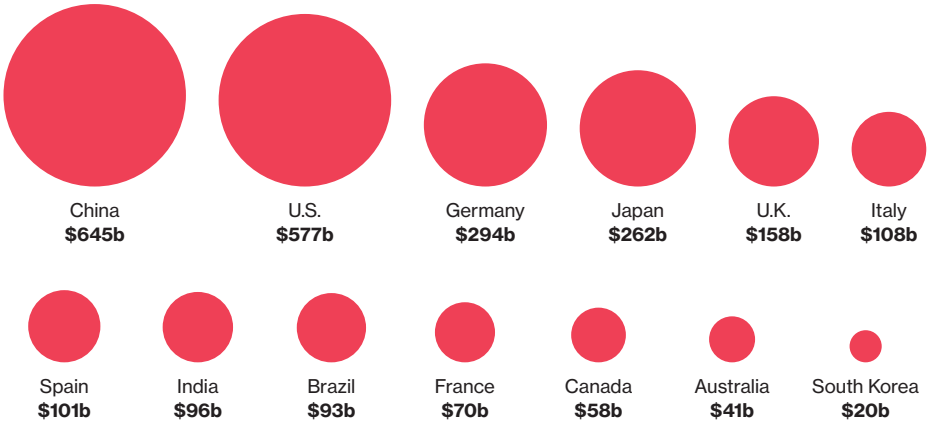
IEA scenarios for oil demand, millions of barrels per day



NOTE: 2016 ESTIMATE, SCENARIO WAS NOT UPDATED IN 2017 REPORT.
SOURCE: INTERNATIONAL ENERGY AGENCY

The Future Is Clean

New clean energy investment from 2004 to first quarter of 2017



SOURCE: BLOOMBERG NEW ENERGY FINANCE

Future Milestones

Planned and predicted turning points on the road to peak oil

- **2019** — Volvo's new models will no longer include gas engines
- **2020** — Oil use must peak by this date to limit gain to 2°C
- **2025** — Electric cars forecast to cost the same as gas (BNEF)
- **2025** — Volkswagen aims for 25% of sales to be electric
- **Late 2020s** — Statoil's prediction for peak oil
- **2030** — India's target for all new cars sold to be electric
- **Early 2030s** — Shell's prediction for peak oil
- **2038** — Electric cars forecast to outsell gas (BNEF)
- **2040** — U.K., France to ban sale of new gas-only cars
- **2040** — BP, other oil companies see peak oil around 2040
- **2045** — California lawmakers are pushing for state's power to be 100% renewable
- **2050** — Saudi Arabia, Russia predict peak after 2050

Electric Cars

By John Lippert

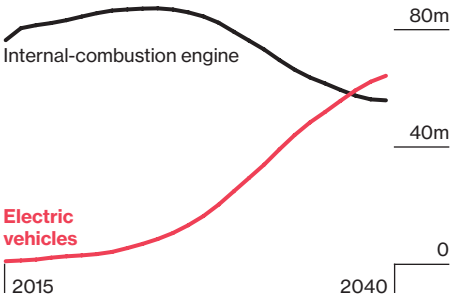
Around the globe, automakers and governments are betting big on electric cars. Plans to limit climate change count on getting more carbon-burning vehicles off the road. The projected transformation is enormous: Bloomberg New Energy Finance estimates that by 2040 there will be 530 million electric vehicles in use. There's only one problem: So far, electric cars have been anything but popular. In 2017 they made up about 1 percent of global sales. The good news? They're getting cheaper fast and able to go farther between charges. Still, it's not clear how soon the trip from the gasoline present to an electric future will be driven by consumer desire rather than government muscle.

The Situation

To speed the process, a growing number of countries are setting goals for ending sales of new vehicles with internal-combustion engines. Norway's timetable is 2025; France and the U.K. have set deadlines of 2040; and Germany, China and India say they'll take similar measures. China's intervention will start in 2019, when automakers there will have to meet steadily rising production targets for electric vehicles or buy credits from rivals. Automakers are getting the message. Volkswagen AG announced plans to invest 70 billion euros ($82 billion) to produce electric versions of all its models by 2030 and their batteries. General Motors Co. plans 20 all-electric models by 2023. Volvo AB will begin phasing out cars that run just on fossil fuels in 2019. Tesla Inc., Elon Musk's electric-car company, took a step toward mass production in mid-2017 when it delivered the first of its midmarket Model 3 sedans. The extended-range version of the Model 3 offers 310 miles between charges, the first time a non-luxury electric vehicle comes with a range comparable to that of a gas-powered car.

Forecasting a Time When Electric Outsells Gas

Annual global light-duty vehicle sales, projected



SOURCE: BLOOMBERG NEW ENERGY FINANCE

The Background

The first practical electric car made in the U.S. made its debut in 1891; in 1900 about a third of the country's cars were electric. But cheap oil and Henry Ford's Model T, which cost about a third of the price of a comparable electric car, established the dominance of internal-combustion engines. Interest in electric cars stalled until the California Air Resources Board began phasing in requirements for automakers to offer low-emission vehicles to fight smog in the 1990s. GM tested electric cars but dropped the experiment after Toyota Motor Corp. brought the Prius, a gas-electric hybrid, to the U.S. in 2000. Tesla helped revive interest by aiming to replace electric's granola-eating image with one of speed and luxury. Early worries about "the long tailpipe" – the idea that electric cars are no cleaner than the fuel burned to generate their power – have eased as power sources have become cleaner. By one estimate, a battery-powered car in the U.S. produces only about a third of the carbon dioxide as a car that runs on gas, a figure expected to fall as solar and wind power more of the grid.

The Argument

There's little disagreement that in the long run, electric vehicles will be seen as better than their internal-combustion counterparts – more reliable as well as cleaner. And plunging battery prices mean it won't be too long till they're cheaper – that could happen as soon as 2025, according to BNEF. Still, car companies worry about mandates like China's production targets putting them ahead of "raw consumer acceptance," as GM Chief Executive Officer Mary Barra said in a speech in Shanghai in September. They also want what she called a "continued joint effort" with governments. That means subsidies. They can be substantial: In the San Diego area, utility-sponsored manufacturer discounts and state and federal incentives can cut the price of a Nissan Leaf by almost two-thirds. Still, GM is losing $9,000 on every Chevrolet Bolt electric car it sells in the U.S. Even in green-minded Denmark, sales of electric vehicles fell 60 percent in early 2017 after the government said it would phase out their tax exemptions. Consumer reluctance may reflect low gas prices as well as anxiety over scarce charging stations. But there are other factors pushing in favor of electric. California utilities that see the cars as a new source of revenue have asked for more than $1 billion in rate hikes to pay for installing charging infrastructure. The self-driving cars that automakers plan to introduce in large numbers in the next decade work better with electric engines. And China sees its dependence on oil as a significant national-security risk.

530m

Electric vehicles expected in use by 2040

Better Batteries

By Chris Martin

Hopes that renewable energy could blunt the worst of climate change used to face a seemingly insurmountable hurdle: the need for better batteries. After all, the wind doesn't always blow and the sun doesn't always shine. But those better batteries are on their way, thanks to a myriad of small improvements that will add life to the phone in your pocket and speed the day when electric cars overtake gasoline vehicles. Now there's a different worry: Can we turn batteries out fast enough? Ramping up production of the batteries needed for a clean-energy future — where wind turbines and solar panels are knit into a new kind of power grid — means creating an almost entirely new industry. That's a process that isn't guaranteed to go smoothly.

The Situation

In 2017, a bottleneck at Tesla Inc.'s giant Gigafactory battery plant in the Nevada desert put the company behind production targets for its first mass-market electric car, the Model 3. Tesla plans to build as many as four more big battery factories in the U.S. The industry is set to grow even faster in China, where companies have announced plans for factories that could produce 120 gigawatt-hours of storage capacity annually, enough to put battery packs in 9 million homes or power Italy for an hour. Giant battery plants are also planned in Sweden and Germany.

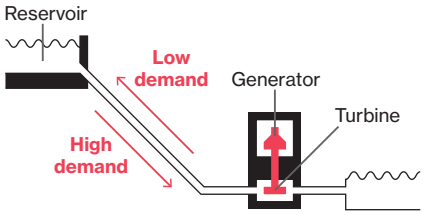
The price of a battery pack holding a kilowatt hour of electricity has already plunged and is expected to fall by more than 90 percent from 2010 to 2030. Many of the new batteries will power the electric cars projected to start flooding onto roads globally. Utilities are also boosting battery installation. California is requiring power companies to install close to 2 gigawatt-hours of storage by 2024 – more than twice what existed in the U.S. at the end of 2017. Not counting car batteries, global storage capacity is expected to rise from 7 gigawatt-hours now to 305 gigawatt-hours in 2030.

The Background

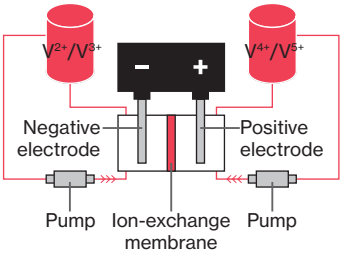
Benjamin Franklin and other inventors experimented with Leyden jars, now known as capacitors, which hold and release an electric charge. Alessandro Volta of Italy is credited with inventing the first electric battery in 1799, a stack of zinc and copper disks in brine. Thomas Edison created a nickel-iron battery for the earliest electric cars. The oil shocks of the 1970s spurred new research that led to Exxon Mobil Corp.'s creation of the rechargeable lithium ion battery. Sony Corp. brought the technology to market in the early 1990s, and lithium ion batteries have underpinned the digital revolution ever since. They're durable, energy-dense and easy to recharge, even if manufacturing glitches have led to high-profile cases of fires in new products, such as Samsung Electronics Co.'s Galaxy Note 7 mobile phone and the Boeing Co.'s Dreamliner jet. Utilities that need large-scale storage are pursuing a variety of technologies, from pumps and reservoirs to solid-state lithium ion batteries to flywheels that store energy as momentum.

Utilities Try New Ways To Keep Power Handy

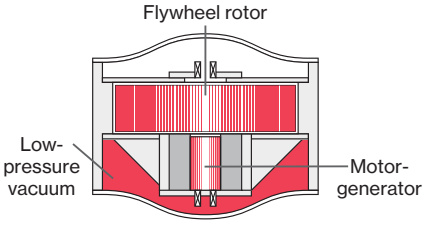
Pumped hydropower
Gravity at work. Water is **pumped up** into a reservoir at times of low energy demand and poured **back down** to spin **turbines** when power is needed.



Flow batteries
Vats of an electrolyte like vanadium in sulfuric acid are charged; one is positive, one negative. To generate power, fluid is pumped over electrodes separated by a **membrane** as ions are exchanged.



Flywheels
A **flywheel** is set spinning on a magnetic bearing inside a **vacuum chamber**, where friction is minimized. Its momentum can briefly turn a **generator** to cover a dip in power.



SOURCE: BLOOMBERG NEW ENERGY FINANCE

The Argument

Some countries, such as Germany and Japan, offer subsidies for batteries integrated into renewable energy systems. More often, demand for batteries has been indirectly fed by subsidies for wind and solar production. Those payments are now being phased out in the U.S. For homeowners, adding batteries to solar panels saves on electricity costs at night and provides security during blackouts. For power companies, adding batteries to solar panels or wind turbines may let them sell their electricity at a higher price by qualifying as a reliable energy source. Some new ventures are using batteries to create what's known as a virtual power plant, tying rooftop solar panels together and selling their output. It's an approach gaining popularity in Europe and being tried in new developments in the U.S. It's also creating conflict with utilities that say solar and wind producers are piggybacking on the billions of dollars spent to maintain and upgrade power grids. Proponents say the spread of household battery packs will lead to a decentralized network of microgrids that will be more resilient and efficient.

Logan Goldie-Scot contributed to this article.

Chapter 6

HEALTH & SOCIETY

Buzzwords

Social issues often gain their own vocabulary. Here's a cheat sheet to keep you current.

ALT-LEFT ALT-RIGHT

By Laurence Arnold

The political spectrum is commonly described as running from the liberal left to the conservative right, a construct generally attributed to the seating arrangements of France's Revolution-era National Assembly. The 20th century saw the emergence of left-wing and right-wing as derogatory adjectives to dismiss fringe ideas. U.S. President Donald Trump's political ascendency introduced a new pair of descriptors. His 2016 presidential campaign drew support from anti-establishment conservatives, including Richard Spencer, who heads a group advocating for the "dispossessed white race" and named his website AlternativeRight.com. Stephen Bannon, as executive chairman of Trump-friendly Breitbart Media, called his online news outlet "the platform for the alt-right" shortly before he became Trump's campaign manager. In Bannon's telling, alt-right meant America-first nationalism, not racism. But Trump's opponent, Hillary Clinton, called Trump the candidate of "an emerging racist ideology known as the alt-right." Trump then embraced "alt-left," a retaliatory term developed by conservative media. After clashes between demonstrators and counterdemonstrators at an August 2017 march by white nationalists in Charlottesville, Virginia, Trump said to reporters, "What about the alt-left that came charging at the, as you say, the alt-right? Do they have any semblance of guilt?"

Naloxone

By Laurence Arnold

A surge in opioid abuse by Americans has focused attention on naloxone, an antidote to heroin, morphine and OxyContin overdosing. There are movements to make naloxone widely available in schools and workplaces, alongside fire extinguishers and defibrillators. A commission appointed by President Donald Trump called naloxone "a lifesaver" and said every police officer should carry a dose. Efforts to place naloxone kits in the hands of drug users and people close to them resulted in more than 26,000 overdose reversals between 1996 and 2014, according to one study. It's available without a prescription in almost every state, and is sold as an injectable and as a nasal spray (Narcan), available to emergency responders as a two-pack for $75. Some local government officials have balked at paying to equip law enforcement. They say money would be better spent on prevention or treatment.

CAR-T

By Caroline Chen

New cancer cases diagnosed annually are expected to reach 22 million by the 2030s. That gives extra urgency to scientists' hopes for immunotherapies – drugs that harness the body's defenses to attack cancer cells. CAR-T (short for chimeric antigen receptor T cell) is one immunotherapy that's already made a dramatic difference in patients' lives. In advanced blood cancer patients, CAR-Ts have helped shrink cancers that failed to respond to multiple prior treatments. The first two CAR-T therapies to win approval from the U.S. Food and Drug Administration were made by Novartis AG, to treat children with aggressive acute lymphoblastic leukemia, and by Gilead Sciences Inc., to fight advanced non-Hodgkin lymphoma. Researchers are working to reduce sometimes dangerous side effects, while health insurers grapple with the costs. CAR-Ts, which are one-time treatments, are among the priciest drugs; Novartis's Kymriah is $475,000.

The World Cup

By James Ludden

No sporting event is more popular than the World Cup. Almost half of humanity — more than 3.2 billion people — tuned in to the monthlong competition in Brazil in 2014. But long before nations compete on the field, they vie for the prestige of hosting the tournament that generates billions of dollars in television and sponsorship rights for FIFA, soccer's ruling body. That competition can spell trouble. Graft scandals have dogged previous tournaments as well as upcoming events in Russia and especially Qatar, raising the question: Is corruption indelibly staining the beautiful game?

The Situation

It's been a challenging three years for the Fédération Internationale de Football Association. Its longtime president, Sepp Blatter, was banned from soccer for six years, five top officials pleaded guilty to corruption-related charges in the U.S. and its vice president was arrested by Spanish police investigating graft claims. Yet Russia and Qatar, the 2018 and 2022 World Cup hosts, were cleared by a FIFA probe into questions surrounding their bids, clearing the way for the next tournament to begin in Moscow on June 14. The wider scandal erupted in 2015 when dozens of soccer executives were arrested in Swiss police raids on a luxury Zurich hotel and the U.S. Justice Department filed multiple charges relating to bribery allegations involving hundreds of millions of dollars. The U.S. probe has led to more than 20 convictions, including that of the deceased American Chuck Blazer whose whistleblowing revelations spurred the inquiry. Blatter's successor as FIFA president, Gianni Infantino, has pledged to restore the ruling body's reputation, but multiple graft investigations continue, including FIFA's own inquiry into the awarding of the 2006 World Cup to Germany and a French state probe into the Russian and Qatari winning bids. FIFA may be feeling the pinch: In the two years after the scandal broke, it failed to attract new major sponsors from Europe or the U.S., striking deals with partners from only Qatar and China, an aspiring World Cup host. Added to that, its legal bills are mounting.

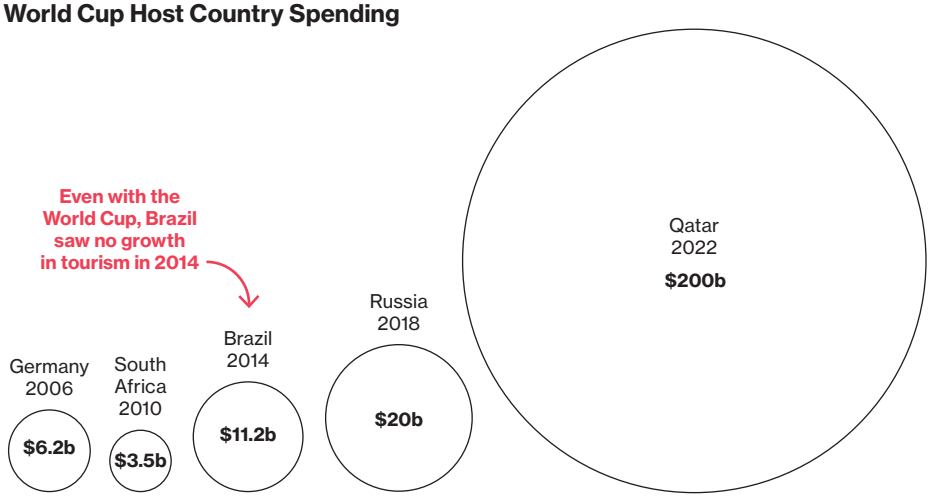
The Background

Disputes over where to hold the event have afflicted the World Cup since it began in 1930. Then, the selection of Uruguay resulted in only four European teams taking part. Uruguay and Argentina boycotted the 1938 competition because Europe was hosting it for the second straight time. FIFA experimented with a rotation system; now it will take bids from only those continents that haven't staged either of the last two tournaments. Recent history shows there is little, if any, financial benefit to holding the World Cup. South Africa recouped just a 10th of its outlay on stadiums and infrastructure for the 2010 event, the first in Africa. Recent World Cup hosts were chosen in a secret vote by the two dozen members of FIFA's executive committee (now called the FIFA Council). Blazer alleged that he and other committee members accepted bribes in connection with the selection of South Africa. For the 2026 tournament, all of FIFA's 200-plus member countries will get to choose the winner in a vote in May 2020. There are two bids: one from Morocco and a joint bid by the U.S., Canada and Mexico.

The Argument

Blatter said FIFA deliberately pushed the tournament into "new lands" to spread soccer's popularity and give countries a chance to showcase their culture. Critics highlight the money-losing proposition for developing nations, such as Brazil, that spend billions of dollars on facilities which might be better invested in other ways. Others say the selection process is made a farce by a voting system that has bred foul play, from horse-trading votes to straight up paying for them. While FIFA says it wants to root out its problems and has made changes to its corporate governance, as well as the World Cup selection process, critics say the moves haven't gone far enough and the ruling body remains resistant to scrutiny and transparency. They question whether appropriate reforms can be carried out by officials long part of the system and argue that FIFA's one-country, one-vote system opens the door to skullduggery by giving disproportionate sway to smaller nations. Detractors note that it took pressure from the big corporate sponsors, which each pay about $1.6 billion per World Cup, rather than from FIFA itself to push for Blatter's removal and press for Qatar's bid to be investigated. In a 2017 poll of 25,000 soccer fans from 50 countries, 98 percent said they were concerned about corruption at FIFA, with more than half having no confidence in the organization.

World Cup Host Country Spending



SOURCES FIFA, HOST COUNTRIES, BLOOMBERG

War on Smoking

By Sam Chambers

In the 20th century, tobacco use killed an estimated 100 million people — more than both world wars combined. Most of those smokers had no idea what they were doing to themselves. Tobacco's deadliness was exposed more than 50 years ago, and a war on smoking has been raging for decades in the wealthiest countries. The fight has begun to expand to low- and middle-income nations where 80 percent of smokers live. Smoking rates are declining in every part of the world, with the exception of Africa and the Middle East. Still, 1 in 5 adults smokes globally. Tobacco is thought to kill 6 million people a year and is projected to take 8 million lives annually by 2030 as the population expands. A study in the British Medical Journal called cigarettes "the deadliest artefact in the history of human civilisation."

The Situation

In July 2017, the U.S. Food and Drug Administration said it intended to cut the level of nicotine allowed in cigarettes to nonaddictive amounts. Such a radical step could encourage millions of American smokers to quit, and tobacco company shares plummeted after the announcement. Already the companies have been losing legal challenges around the world to rules requiring that cigarettes be sold in a brown wrapper largely covered by graphic health warnings. The so-called plain packaging requirements threaten the profits of cigarette makers by impairing their ability to earn a premium on upmarket brands. The U.K., Ireland, France, New Zealand and Norway have followed Australia's lead in passing these laws. The high cost of defending strong tobacco-control regulations against legal challenges had long discouraged poorer nations from enacting such initiatives, according to public health groups. But there are signs the tide is turning. China, where 44 percent of all cigarettes are smoked, banned smoking in public places in 2015. Uruguay defeated a challenge to its cigarette regulations by Philip Morris International Inc. in 2016. And India hiked cigarette taxes in 2017. To preserve their revenues, tobacco companies have invested heavily in the development of "vaping" devices, such as e-cigarettes, which deliver a hit of stimulating nicotine without resorting to a stick of burning tobacco.

The Background

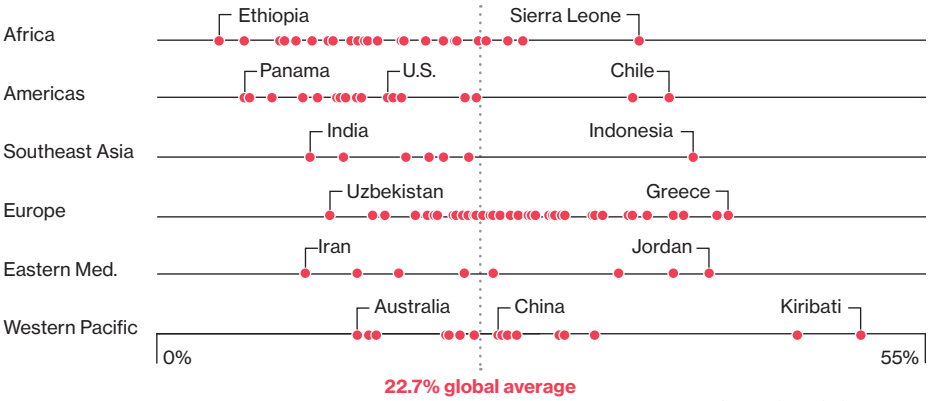
Tobacco was chewed and smoked by Native Americans for centuries before Italian explorer Christopher Columbus brought it to Europe in the 1400s. Smoking became widespread after the invention of a cigarette-rolling machine in 1881. In 1964, the first report on smoking by a U.S. surgeon general, the country's chief public health officer, warned of links to cancer and heart disease. Bans on tobacco advertising followed on both sides of the Atlantic. Anti-tobacco sentiment surged in the U.S. after tobacco company executives told Congress in 1994 that they didn't believe cigarettes were addictive and that evidence linking them to deadly disease was inconclusive. Just a few years later, the companies agreed to pay a total of about $206 billion over 25 years to compensate governments for smoking-related health expenses and to fund programs to reduce youth smoking. An increasing awareness of the hazards of secondhand smoke has led to bans on smoking in enclosed spaces in cities and countries around the world. Tobacco taxes, long a means of raising government revenue, increasingly have been used to discourage smoking.

The Argument

When it comes to arguments about smoking, there are two main camps: those who prioritize personal liberty and those who prioritize health. Libertarians argue that tobacco-control measures violate smokers' rights. They consider cigarette taxes overly burdensome, especially for the poor. They say jury awards against tobacco companies are misguided because smokers know the risks but light up anyway. And they maintain that government has no business trying to stop individuals from harming themselves. Public health advocates see high taxes as one of a number of effective ways to reduce tobacco use, especially among the poor, who are most sensitive to price increases. They say tobacco companies surreptitiously market cigarettes to impressionable teenagers to get them hooked early. They argue that tobacco rarely affects just the smoker, given the dangers of secondhand smoke and the cost to health care systems of smoking-related disease. Anti-smoking advocates include Michael R. Bloomberg, the founder and majority shareholder of Bloomberg LP, the parent company of Bloomberg News.

Smoking Around the World

Share of people who smoked, age 15 and older, in 2015



NOTE: RATES ARE AGE-STANDARDIZED
SOURCE: WORLD HEALTH ORGANIZATION

Gay Rights

By Flavia Krause-Jackson

There's never been a better time to be gay, except in a handful of places where it's become worse. Gay rights activists have made historic gains in a fraction of the time it took the movements for civil rights and women's rights. Two generations ago, the idea that homosexuals could marry was unthinkable. Today, same-sex marriage exists in 22 countries. Until 1970, same-sex acts were legal in about 60 countries. Today, the number is roughly double that, leaving 79 nations where they are criminalized. On the other side of the ledger, Nigeria and Russia have raised penalties facing homosexuals in recent years, and in 2017 Russia's Chechen Republic targeted gay men for persecution. In any case, it's clear that change is more than passing when the leader of 1.2 billion Roman Catholics is asked about homosexuality and responds, as Pope Francis did in 2013, "Who am I to judge?"

The Situation

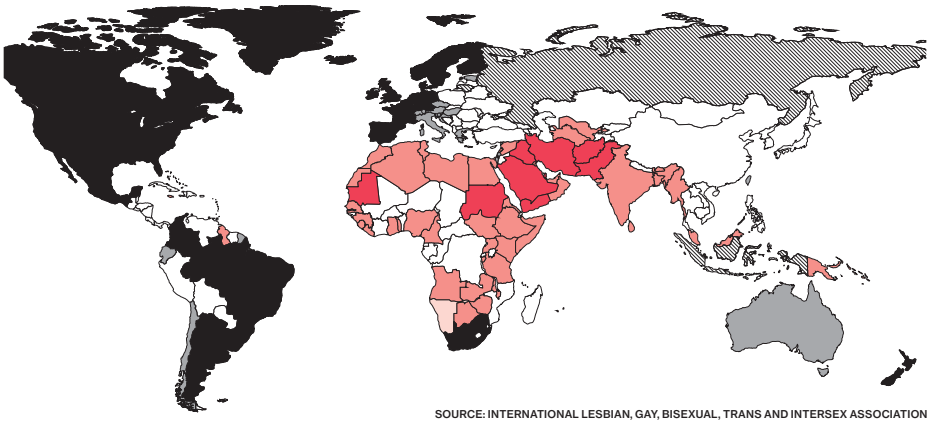
Opposition to gay rights on religious grounds has dwindled in societies that have become more secular and urbanized. In Serbia, a patriarchal and conservative country, a lesbian became prime minister in 2017, and in Ireland a gay man won the same post. Also, Germany's parliament approved gay marriage and Australians voted in favor of it, pressuring lawmakers there to act. The U.S. Supreme Court ruled in 2015 that same-sex couples have a right to marry, bringing gay marriage to the 14 states where it was still banned. South America is shedding its machismo to emerge as a gay-friendly haven. The situation in Asia is varied. A court ruling in 2017 put Taiwan on course to become the first Asian country to legalize same-sex marriage. Buddhist Vietnam and Thailand are more tolerant than super-modern Singapore, which has kept a colonial-era sodomy law. Intolerance is the norm in former Soviet satellites, and persecution abounds in the Middle East and other places where Islam is dominant. In Chechnya in early 2017, more than 100 men suspected of being gay were abducted and tortured by authorities and at least three were killed, according to the independent Russian newspaper Novaya Gazeta. Where treatment is worsening, gay bashing often is a political tool. Russia's law against gay "propaganda" is part of President Vladimir Putin's war on U.S. and western European values. Laws or proposed laws targeting homosexuals in Africa can divert attention from corruption and economic malaise.

The Background

Throughout history, being gay has meant keeping a secret or paying a price. Even the ancient Greeks, widely thought to have embraced homosexuality, in fact accepted only pederasty – sex between a man and a male teenager. Homosexuals were massacred in the Holocaust. Until 1973, the American Psychiatric Association classified homosexuality as a mental disorder; it was sometimes treated using electric shocks. The 1969 police raid of a New York gay bar triggered the Stonewall riots, which gave birth to the modern gay rights movement. Two decades later, a backlash against urban gay males in the early days of the AIDS pandemic gave the movement a sense of urgency. The increasing number of homosexuals, including celebrities, who "came out of the closet" drove a sea change in public opinion in North America, Europe and much of Latin America. Gains by gay activists paved the way for the growth of the transgender rights movement.

Gay Rights Worldwide

- Gays can legally marry
- Gays can have civil unions
- No specific laws against gays
- Laws limiting gays' freedom of expression
- Homosexual acts criminalized with no penalty specified
- Imprisonment for homosexual acts
- Death penalty for homosexual acts



SOURCE: INTERNATIONAL LESBIAN, GAY, BISEXUAL, TRANS AND INTERSEX ASSOCIATION

The Argument

The United Nations, through its Human Rights Council, in 2014 committed to overcoming discrimination based on sexual orientation everywhere. The question is how to influence governments where attitudes toward homosexuality are steeped in cultural and religious beliefs. The World Bank and several countries suspended or cut aid to Uganda after it increased jail terms for homosexual acts in 2014. After the law was voided on a technicality, the country's president dropped his support for it, citing potential economic consequences. Uganda relies on foreign aid, however, and thus may be a special case. Some policy specialists argue that donors who condition foreign aid on protecting gay rights can come across as bullies promoting a foreign agenda. They suggest instead supporting pro-rights grass-roots groups. Another route is to highlight the economic costs of isolating a segment of society. Anti-gay discrimination costs India 1.7 percent of its gross domestic product, according to a 2014 World Bank study.

Esports

By Eben Novy-Williams

The players compete in leagues with team franchises and media deals. They display their skills in sold-out arenas in places like New York and London, with millions more fans watching online. There are superstars and big-name sponsors. No, it's not the National Football League in the U.S. or the Premier League in the U.K. It's competitive video gaming, or what's become known as esports. Once a niche world of small online communities, esports is now a global industry. Advertisers clamor for a shot at the lucrative young, male demographic drawn to the games. Investors are snapping up teams. Competitive video gaming is now looking to shed a "Wild West" reputation by adopting a more stable industry model and attracting even more financial backing.

People really watch other people play video games?
Yes, by the hundreds of millions. Instead of testing physical strength and stamina, video gaming tests how fast players – they prefer "gamers" – can click buttons and think strategically. In the past few years, competitive video gaming has exploded and is expected to exceed $1 billion annually in advertising, media rights, merchandising, sponsorship and ticket sales by the end of the decade. Ad revenue comes from pop-up videos and banners on streaming websites as well as traditional commercials on cable TV channels.

Who's investing?
Major companies (Amazon, Coca-Cola, Walt Disney), entertainment-industry executives and owners of traditional sports teams. One example: Ted Leonsis, formerly an America Online Inc. executive and now an owner of professional hockey and basketball teams in Washington, D.C., last year teamed up with film producer and Golden State Warriors co-owner Peter Guber to buy control of an esports franchise, Team Liquid. It has more than 50 players competing in 10 different games.

What kinds of video games become esports?
There's a wide variety. Some games are one-on-one; others feature teams of five. The most popular are fantasy titles like "League of Legends," developed by Riot Games, a unit of Chinese gaming giant Tencent Holdings Ltd. It features characters seeking to destroy their enemy's base while defending their own. Then there are popular shoot'em-up games like Valve Corp.'s "Counter-Strike: Global Offensive." Sports video games such as Electronic Arts Inc.'s "Madden," based on American football, are also prevalent.

How do people watch matches?
Online websites such as Alphabet Inc.-owned YouTube and Amazon.com Inc.'s Twitch are the most popular places. Leagues, teams and gamers often have dedicated channels for tutorials, commentary and live play from arenas in major cities around the globe. Social-media sites and traditional cable networks are also starting to broadcast matches, some of which have "casters," or commentators providing play-by-play and analysis.

How many fans are out there?
There are 191 million avid esports consumers and another 194 million occasional viewers, according to Newzoo, a market-research company. The 2016 world championship for "League of Legends" was broadcast in 18 languages and drew 43 million unique viewers. The fan base is 71 percent male, the majority between the ages of 21 and 35, according to one estimate. The biggest markets are China, South Korea and the U.S. While esports has more of a global following than most traditional sports leagues, the market is divided into three main ecosystems – North America, Europe and Asia. Cultural differences also prevail: Fantasy games are huge in Asia but shooting games are not.

How does that compare with traditional sports?
Hard to say precisely, but the number of esports followers doesn't yet rival those of leagues like the National Basketball Association, which claimed more than 1 billion global viewers in the season that ended in June 2017. That said, esports viewership is on the rise; contests occasionally sell out NBA-size arenas.

Are there superstars?
Definitely. Consider South Korean Lee Sang-hyeok, better known by his esports handle "Faker." In 2017, at age 21, he was widely considered the best "League of Legends" player in the world, having won three world championship titles. A South Korean newspaper reported that a team sponsored by SK Telecom, South Korea's largest mobile phone company, pays him $2.5 million a year to compete, a figure that doesn't include endorsements or prize money.

Is there betting?
Lots of it. Most traditional sports leagues oppose gambling, but esports embraces it. Bets exceeded $5 billion globally in 2016, according to Narus Advisors, a gaming industry consulting firm, and are projected to hit $12 billion by 2020. Gambling on esports is illegal everywhere in the U.S. except the state of Nevada (even there it's limited), but that doesn't stop fans from placing bets on gambling websites willing to take their money. Outside the U.S., sports wagering's legality varies by country. Most European countries and Australia allow it. In Asia, China allows it, some states in India have prohibited it and Singapore limits online sports gambling to two local websites.

What are the leagues like?
They've been relatively unstructured. Some share prize money and revenue. Poorly performing teams can lose their spots in leagues, so player turnover is high. Two game developers, Riot Games Inc. and Activision Blizzard Inc. (owner of the popular "World of Warcraft" games), are seeking to launch leagues that look more like the NBA or Major League Baseball, with a fixed number of franchises, revenue sharing from media deals, a players' union and farm teams to groom less experienced players. They hope the increased stability will drive a new round of investment from sponsors and prospective owners.

PHOTO: ROB TRINGALI

Organic Food

By Leslie Patton

There's a growing hunger for organic food. It's no wonder. It's widely believed that organic foods are more nutritious and safer than non-organic — they're even said to fight cancer — though the evidence is far from clear. Consumers have been paying a lot to eat organic; foods with the certification sometimes cost twice as much as conventional products. The premium prices may not be buying everything that's promised.

The Situation

Worldwide, land farmed organically expanded almost fivefold in six years to 51 million hectares in 2015. Australia farms almost half that total, but Liechtenstein's organic farms claim the highest share of total agricultural land, at 30 percent. (The global average is 1.1 percent.) The demand for organics is driven in part by rising interest in locally grown food – two-thirds of U.S. farmers markets have at least one certified organic producer. About three-quarters of American grocers sell organic food, including mass-market retailers like Wal-Mart and big supermarket chains like Kroger. The increased competition has cut into the bottom lines of traditional organic and natural-foods markets like Whole Foods. In 2017, Amazon.com Inc. acquired Whole Foods and reduced prices at the chain, once nicknamed "Whole Paycheck." While organic products make up just 5 percent of all food sales in the U.S., in Denmark it's almost 10 percent.

The Background

Until the invention of chemical fertilizers and pesticides, all agriculture was organic. Sulfuric acid was first used to extract phosphate from bones and rock for use as fertilizer in the mid-1800s. Poison-gas research in World War I led to bug-killing nerve gases, including sarin and DDT, which was so effective at killing malaria-carrying mosquitoes it won its inventor a Nobel Prize. After Rachel Carson's book "Silent Spring" documented the dangers of DDT, the chemical was banned for use as a pesticide in the U.S. in 1972. In the 1970s, industrial-scale animal farms began popping up in the U.S., first for egg production, later for pigs and cattle. Yields increased, but so did worries about these farms' high use of antibiotics in animals, which has contributed to more drug-resistant infections in humans. The term "organic farming" dates to a 1940 book by Walter James, the 4th Baron Northbourne, "Look to the Land," which promoted the use of a wide variety of crops and natural fertilizers. Health-food stores began appearing in the 1960s. After the U.S. passed the Organic Foods Production Act in 1990 establishing national standards, organic products became more common. In China, demand for organic food skyrocketed after a series of scandals over tainted food made headlines starting in 2004. To be labeled organic, the U.S. Department of Agriculture says food must be grown without synthetic fertilizers and most chemical pesticides, and must be free of genetically modified organisms. Meat must be raised without antibiotics and growth hormones, and the animals must have access to the outdoors. The European Union and Japan have similar standards.

75%

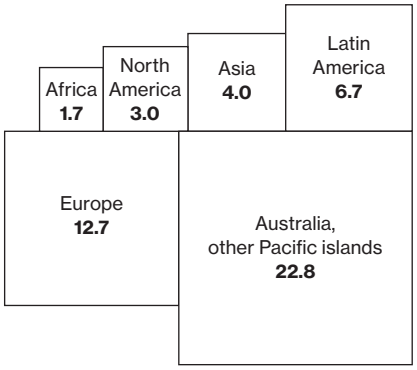
Share of U.S. grocery stores selling organic products

The Argument

Proponents say that organic produce has more nutrients than conventionally grown fruits and vegetables. A 2016 study found that organic milk and meat have more essential fatty acids and other key nutrients, which can help prevent disease. Other researchers say that eating organic food doesn't, in fact, provide extra nutrition. Fans of eating organic produce and meat say it reduces exposure to chemicals in pesticides and fertilizers that may increase the risks of certain types of cancer. But the American Cancer Society can't say whether organic foods carry a lower risk of cancer and suggests that vegetables, fruits and whole grains should be the central part of people's diets regardless of how they're grown. Organic consumers say they help the environment by supporting farms that send less toxic runoff into water and soil. Yet just because food is organic doesn't mean that it won't make people sick – fertilizing crops with improperly composted manure can result in E. coli contamination. Then there's the fact that plenty of foods labeled organic aren't inherently healthy. (Exhibit A: organic gummy bear candies.) Non-organic makers have piggybacked on the commercial appeal of organic food by using labels like "all-natural" or "local," though these products can be made with ingredients grown using pesticides and other chemicals. And there's some evidence that pro-organic marketing is fueling a fear of pesticides, which drives some people away from eating enough fruits and vegetables.

Organic Planting Worldwide

Agricultural land farmed using organic methods, by continent, in millions of hectares in 2015



SOURCES: RESEARCH INSTITUTE OF ORGANIC AGRICULTURE; INTERNATIONAL FEDERATION OF ORGANIC AGRICULTURE MOVEMENTS AND SUSTAINABLE, ORGANIC, ETHICAL, LUXURY, LTD. SURVEYS

The U.S. Health Spending Paradox

By Laurie Meisler

Typically, the more a developed country spends on health care, the longer its people live. The U.S., which spends the most, bucks that trend. A life expectancy of 78.8 years puts it in 27th place out of the 35 well-to-do countries in the Organization for Economic Cooperation and Development. The U.S. has the fourth-highest infant mortality rate, ranking behind Slovakia, and the sixth-highest maternal mortality rate, making pregnancy there twice as dangerous as in Canada. An American is 1.5 times more likely to die prematurely from chronic illnesses such as heart disease and cancer than an Australian.

Why does the U.S. get such poor returns on its health care dollars? OECD data comparing member countries suggest a few factors:

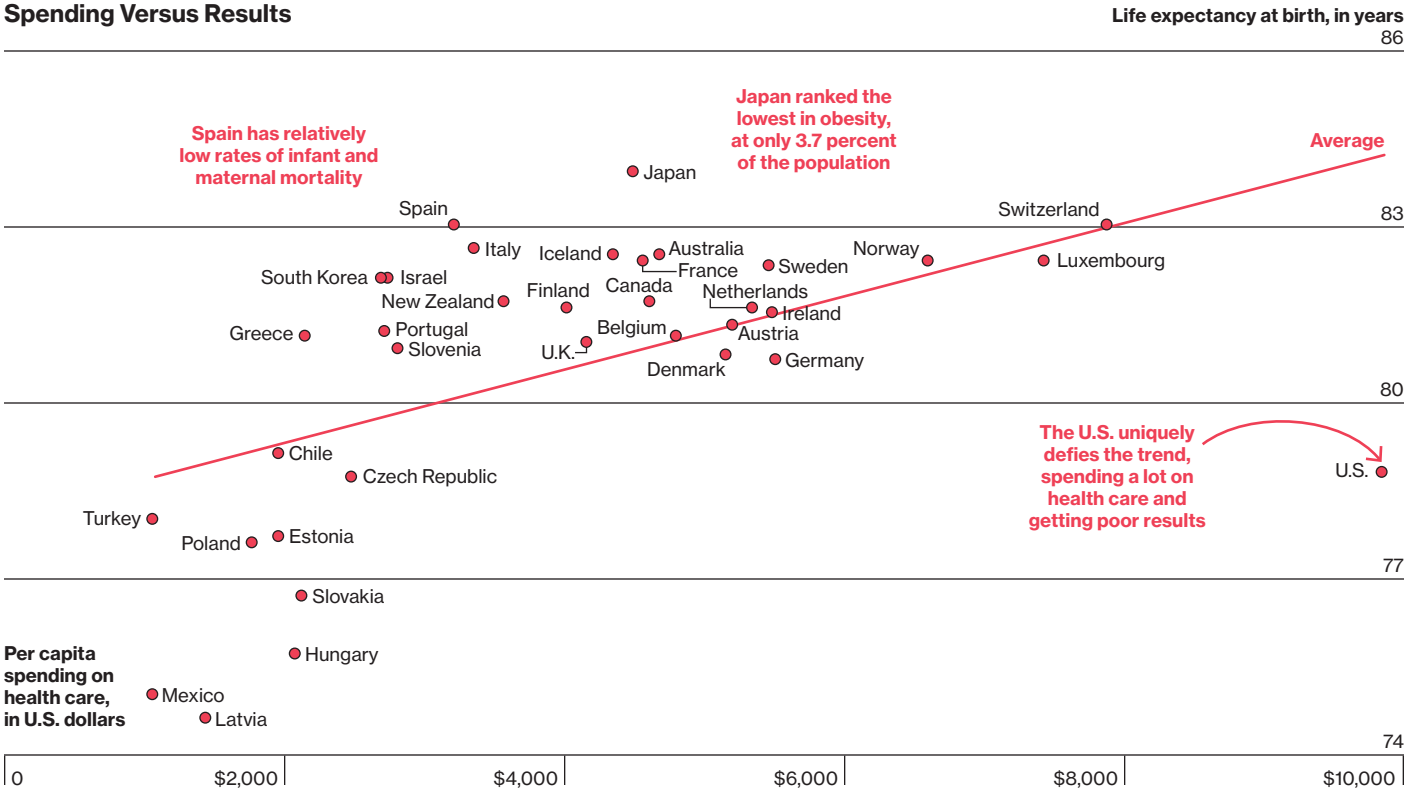
The U.S. is the most obese country in the group and ranks third-highest in prevalence of diabetes. So-called deaths of despair from drugs, alcohol and suicide have produced rising mortality among middle-aged whites in the working class; some researchers have identified distress born of globalization and technological change as a cause.

Then there's the fact that private, for-profit insurance pays for almost 40 percent of U.S. health expenditures. Private insurance covers just 5 percent of the cost in the 10 OECD countries with the highest life expectancy. Also, an unusually large share (10 percent) of the U.S. population has no insurance and is less healthy as a result.

Certainly one reason U.S. health care costs are so high is the price of drugs. Unlike other nations, the U.S. doesn't directly regulate medicine prices. Its $1,162 price tag for prescription medicines and over-the-counter products per person per year is more than twice the OECD average.

Americans seem blissfully ignorant of the reality that, despite all the money they spend on health care, they're in relatively bad condition. In an OECD survey, 88 percent said they were in good or very good health. Only 35 percent of Japanese, who have the highest life expectancy in the world, regarded themselves as that robust.

Spending Versus Results



NOTE: SPENDING FIGURES PROVISIONAL OR ESTIMATED FOR 2016, LIFE EXPECTANCY FIGURES FOR 2015 OR MOST RECENT; SOURCES: ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, WORLD BANK

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