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# Bloomberg Businessweek

October 7, 2019

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# In Search of Excellence

China's largest steel producer attests to the nation's industrial transformation  
By Wang Hairong

Thirty-seven years have flown by for Lu Jiangxin, as he remembers his first days at the China Baowu Steel Group, then known as Baoshan Iron and Steel Co. Ltd. (Baosteel).

As a fresh graduate of a technology university, Lu joined the company in Shanghai in 1982. "Construction was going full steam. The site was surrounded by orchards and rice paddies," he recalls.

He was assigned to a research office to study steel for petroleum pipelines. "There was no office building yet. We worked in dormitories. Two years later, office buildings sprouted up on previous farmland," he told *Beijing Review*, speaking from inside a stylish building.

Over nearly four decades, Lu has grown from a rookie technician into an accomplished scientist heading the State Key Laboratory of Development and Application Technology of Automotive Steels.

Baowu has developed into a behemoth in the steel industry, and is now the largest steel producer in China and the second-largest in the world. The group ranks 149th on the Fortune Global 500 and 40th on the list of the top 500 enterprises in China.

In 2018, the group produced more than 67 million tons of steel and made a profit of 33.8 billion yuan (\$4.75 billion), according to its financial report.

"Baowu's contribution is more than profit. The company's products have effectively supported large national science and technology projects such as nuclear power plants, large aircraft, manned spaceflights and lunar probes," Sun Jipeng, Senior Manager at the Strategy Planning Department of Baowu, said.

## Great expectations

Baowu was formed in 2016 through a marriage of two large iron and steel conglomerates. One, Wugang Iron and Steel Co. Ltd. (WISCO), located in Wuhan, the capital of central China's

Hubei Province, was the first large-scale iron and steel plant built after the founding of the People's Republic of China in 1949; construction of the plant began in 1955 and it went into operation in 1958.

Back then, China was eager to transform from an agrarian country into an industrialized one, and in desperate need of steel. "The iron and steel industry is the foundation of the national economy," Sun said. "At that time, it was especially important for China. Without iron and steel, industrial modernization, national defense and modern agriculture would all be out of the question."

"In 1949, China's steel output was only 158,000 tons, a very insignificant amount. That output was hardly enough to equip everyone in the country with a hoe, let alone meet economic development needs," he explained.

In 1957, China set the goal for its steel production to overtake that of the U.K. in 15 years. In the quest for rapid industrialization, during the country's Great Leap Forward (1958–60), small backyard steel furnaces were built in virtually every village and urban neighborhood to expand steel production. But the quality of steel produced by backyard furnaces did not meet standards; thus the experiment failed.

Nevertheless, official statistics show that from the 1950s to the 1970s, steel output grew rapidly in China, in most years hitting double digits.

At the time, the world's steel industry was also quickly expanding. In 1978, China's total steel output reached 31.78 million tons, close to that of West Germany, and surpassing that of the U.K. and France. However, this was only about one-fifth the output of the Soviet Union, then the largest steel producer in the world; one-fourth that of the United States, the second-largest; and one-third that of Japan, the third-largest.

Baowu's other predecessor, Baosteel, estab-



lished in 1978, is the offspring of China's reform and opening up: It broke ground right after the conclusion of the Third Plenary Session of the 11th Central Committee of the Communist Party of China, the meeting that launched these national policies. In 1985, its first blast furnace went into operation.

"At that time, the product mix and production technology of China's iron and steel products were still far behind some developed countries, at least 20 years behind Japan," according to *Li Ming and the Path of Baosteel*, a book on Baosteel's first director published in 2017. Steel production facilities in China were outdated, only producing steel for industrial equipment and buildings, but not for vehicles and household electrical appliances.



A smart workshop of the China Baowu Steel Group in Shanghai.

Under these circumstances, Baosteel was established with a large government investment. From its inception, the company was committed to producing quality steel. Li made a famous remark: "Baosteel was not set up to produce mediocre products, otherwise it would not have needed an investment of 30 billion yuan [\$17.4 billion at 1978 exchange rate]."

## Seizing opportunities

In the 1980s, expansion of industrial production and rising demand for automobiles and household electrical appliances such as refrigerators fueled surging demand for quality steel.

Baosteel set its sights on producing sheet

metal for automobiles, which was technically challenging for Chinese companies at the time, Lu said, because auto sheets needed to be flaw-free and of high strength and adequate plasticity, which were hard to achieve at the same time, and the carbon content in steel had to be lowered from 0.1% to below 0.01%.

Lu started research into auto sheets in 1989, after receiving a master's degree from what is now the University of Science and Technology Beijing.

In 1990, the first high-grade automobile sheet was rolled out of Baosteel. Today, one out of every two automobiles produced in China is made with Baowu's steel, which is high-strength and lightweight, making vehicles more energy-efficient.

Baowu describes itself as a hi-tech enterprise with the iron and steel business as its main value carrier. The group has approximately 1,300 research and development personnel. In addition to its research centers and innovation incubator platforms, it also partners with universities and research institutes.

By the end of 2018, Baowu owned 12,921 patents, including 5,105 invention patents, Lu Kebin, Senior Manager at the Scientific and Technological Innovation Department at Baowu, said. Since 2000, the group has won scores of national science and technology awards.

"Today, steelmaking is no longer sweaty and smoky," said Baowu Chairman Chen Derong. "Baowu pursues green, quality and smart development."

On July 22, Chen amazed an audience by demonstrating how to smelt steel remotely simply by pushing a button. When he pressed a key on an iPad screen, an oxygen furnace located 3,000 meters away was put into motion, an oxygen lance slowly dropped and the molten steel in the furnace began to flow. With the help of 5G technology, the work of the furnace can be monitored on-screen in real time.

Today, a lot of the hard work is done by robots. According to Baowu's 2018 corporate social responsibility (CSR) report, it has an arsenal of more than 480 robots and over 100 self-driving vehicles, along with some unmanned workshops and a huge unmanned warehouse.

Automation has slashed costs and improved work efficiency. Citing a smart hot-rolling workshop as an example, Lu Kebin said smart production has cut energy consumption there by 5% and costs by 20%, while increasing productivity by 20%.

The internet, Big Data and artificial intelligence are used to build Baowu's online sales and service platform, Ouyeel. Baowu's management

model has been adjusted to better suit smart production, with the hierarchical organizational structure becoming more leveled.

In addition to making production safer and more efficient, pollutant emissions and waste discharge have been reduced. In 2018, Baowu's per-unit energy consumption decreased by 2.3 percent from the previous year, carbon dioxide emissions were down by 3.5 percent and nitrogen oxides were down by 2.9 percent, according to its CSR report.

## Future-oriented

Baowu has grown stronger and smarter, banking on opportunities availed by China's development, but its voyage has not been all smooth sailing. The biggest bump came in 2015, when the international steel industry suffered from severe overcapacity.

In 1996, the country's total steel output exceeded 100 million tons, making it the biggest producer in the world. Since then, both its steel production and consumption have remained the largest in the world, said Sun, adding that the country currently produces about 50% of the world's total steel.

China's steel industry expanded at a rate of around 20% annually during the period from 2001–07. In 2015, sluggish demand in major steel consumption regions resulted in a glut in the world market. That year, WISCO suffered the biggest losses among Chinese steel enterprises, and Baosteel saw the largest dent in profit in its history.

In 2015, China launched supply-side reform—readjusting its industrial structure, optimizing production factor allocation and improving the quality of economic growth—and the steel industry began to cut its overcapacity.

Against this backdrop, WISCO was merged into Baosteel to form Baowu. Since the 2016 merger, the group has reduced its steelmaking capacity and workforce and optimized its business structure, Sun said.

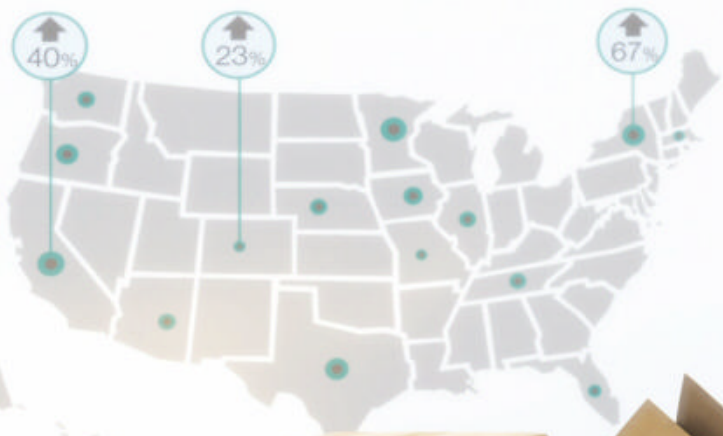
The group's business portfolio was diversified to feature steel manufacturing as the base along with the coordinated development of five other business modules: new materials, logistics, industrial services, urban services and industrial financing.

Envisioning the future, Sun said Baowu will produce more quality products, promote greener and smarter development, further lower costs through technology innovation and become bigger and more profitable. ■

(Reporting from  
Shanghai)



## Looking ahead



### Growth Opportunities



### Projected Spending



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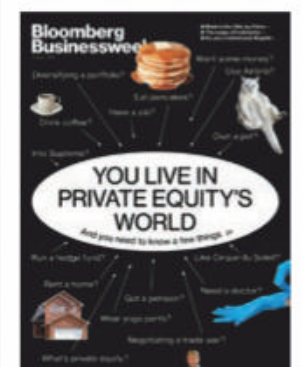
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# I'M TURNING WAREHOUSES INTO SYMPHONIES.

**Eric Rice** is part of the Honeywell team developing systems and software for connected distribution centers, orchestrating predictive analytics and system performance optimization efforts to ship billions of packages as fast as the orders come in.

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● Rudy Giuliani, Donald Trump's personal lawyer, was subpoenaed by three House committees.

Congress wants records of his dealings with Ukraine on the president's behalf, part of the impeachment inquiry probing possible foreign interference in the 2020 elections. Giuliani has until Oct. 15 to turn over the documents. > 40

● In the largest such judgment in its history, the World Trade Organization allowed the U.S. to impose tariffs on as much as **\$7.5b** of European annual exports—of everything from plane parts to wine to leather goods—in retaliation for illegal subsidies to Airbus, the main rival of America's Boeing.



● A massive military parade marked the 70th anniversary of the founding of the People's Republic of China. President Xi Jinping declared that no force could stop the country's rise. Meanwhile, violent protests continued in Hong Kong.

● Credit Suisse CEO Tidjane Thiam lost a key ally when Chief Operating Officer Pierre Olivier Bouee resigned after a spying scandal. Bouee took the fall for the surveillance of a former executive, which Credit Suisse said caused severe reputational damage to the bank.



● Harvard defeated a lawsuit that sought to stop it from using race as a factor in admissions.

The suit, brought by an anti-affirmative action group, alleged that the school artificially limited Asian Americans' numbers and favored black, Latino, and white applicants. The decision will be appealed.

● Norway said it had dipped into its \$1 trillion piggy bank in August, taking almost **\$400m** out of its sovereign wealth fund. It's a rare withdrawal for the oil-rich country, which has used its natural resources to build the world's single biggest financial reservoir.

● Escalating a Wall Street price war, Charles Schwab said it will eliminate commissions on trades for all U.S. stocks, ETFs, and options. The announcement—which was quickly matched by rival TD Ameritrade—intensifies pressure on BlackRock, E\*Trade, Fidelity, and other rivals. Schwab's share price tumbled almost 10%.

● A key measure of U.S. manufacturing, the Institute for Supply Management's factory index, slipped to 47.8. That's its weakest reading since the end of the Great Recession. A global economic slowdown and the U.S.-China trade war are increasingly depressing the sector.

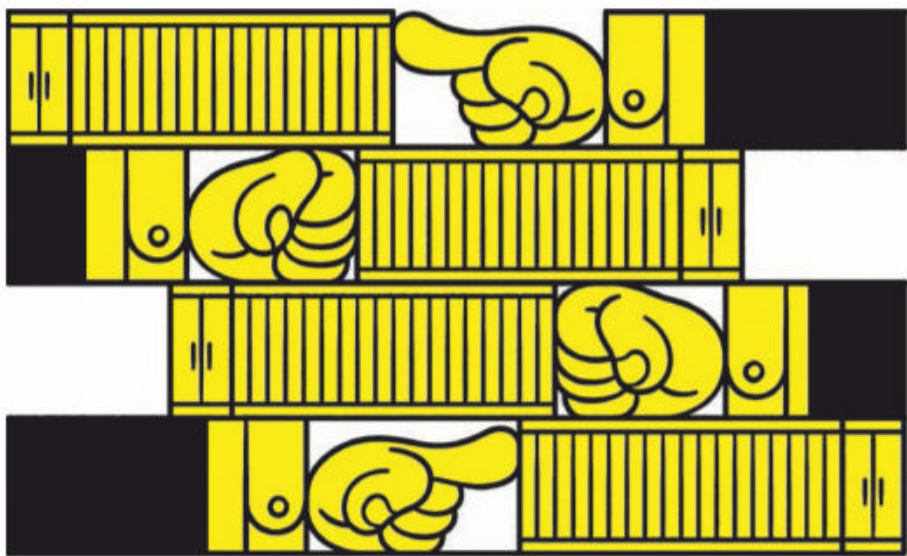
● Ecuador announced it will depart from the 14-member OPEC in January, so it can boost output beyond the prescribed limit. The country, one of the smallest members of OPEC, produces about **530k** barrels a day.

● “Complaints based on secondhand information should not be rejected out of hand, but they do require additional legwork.”

Senator Chuck Grassley of Iowa, a vocal defender of whistleblowers, came out in support of the practice after President Trump sought to discredit the informant at the heart of the impeachment inquiry as inaccurate and fraudulent. > 38



- Eike Batista, once Brazil's richest man, serving 30 years for bribery, was sentenced to 8½ more years for insider trading.
- U.S. Senator and presidential candidate Bernie Sanders had two stents inserted to relieve an arterial blockage.
- Renowned American opera singer Jessye Norman died at 74 of complications from a 2015 spinal cord injury.
- Hurricane Lorenzo, the largest storm ever to roam the eastern Atlantic, was forecast to strike Ireland's west coast.



## ▶ Trade War Opponents Meet Again

The Trump administration plans to host Vice Premier Liu He and other senior Chinese officials for trade talks on Oct. 10 and 11, just days before another threatened increase in U.S. tariffs on imports from China is due to take effect.

▶ The Federal Open Market Committee will release the minutes from its last meeting on Oct. 9, shedding light on the logic behind the latest quarter-point rate cut.

▶ Portugal goes to the polls on Oct. 6. Surveys give current Prime Minister Antonio Costa's Socialist Party a comfortable lead.

▶ The inaugural ANOC World Beach Games begin in Doha on Oct. 12. They'll feature 1,200 athletes from 97 nations competing in 12 sports.

▶ The 40th annual Oil & Money conference, in London Oct. 8-10, will focus on climate change and energy transition strategies.

▶ Finance Minister Lim Guan Eng presents Malaysia's 2020 budget on Oct. 11, as he tries to insulate the country from the trade war's impact.

▶ The annual RM Auctions sale of classic cars at Pennsylvania's Hershey Lodge starts on Oct. 9. One of this year's 337 lots is a 1931 Marmon Sixteen.

## ■ BLOOMBERG OPINION

10

# Proceed With Caution

● Trump behaves abominably, but impeachment is a serious process and shouldn't be politics as usual

House Speaker Nancy Pelosi's decision to open a formal impeachment inquiry is a momentous step. Without some caution, it could also be a perilous one for American democracy. The impetus was a whistleblower complaint by a U.S. intelligence official that alleges misconduct by the president. Trump's administration tried its best to prevent the full complaint from being shared with Congress, which Pelosi said was the last straw. As the details of the case have emerged, it's become evident why the president wanted to suppress them: They show a flagrant abuse of power.

In July, Trump had a phone call with Ukraine President Volodymyr Zelenskyy. According to the complaint, Trump attempted to cajole his newly elected counterpart into digging up dirt on former Vice President Joe Biden, Trump's chief rival in the 2020 election, in an effort to help his reelection bid.

In fact, the whistleblower described the call as part of a pattern and even detailed efforts within the White House to "lock down" records of the conversation, suggesting that officials knew full well it was improper. The inspector general for the intelligence community agreed: He thought such conduct could amount to a "serious or flagrant" abuse under the applicable statute and might even expose the president "to

serious national security and counterintelligence risks."


More facts are still needed. Unfortunately, though, this incident isn't all that surprising. It's of a piece with how Trump has conducted himself throughout his presidency. He has abused his power, degraded his office, obstructed justice, undermined the Constitution, impeded legitimate oversight, defied court rulings, enriched his family on the public dime, ignored inconvenient laws, asserted non-existent privileges, and declared spurious emergencies to justify his whims. At times, it's as if he's begging to be impeached.

As Democrats go down this road, they must focus on legitimate grievances and proceed with caution. They shouldn't let their inquiry devolve into a partisan circus. That means they must avoid grandstanding, resist delving into unrelated controversies, and establish evidence of clear wrongdoing that both parties will be able to oppose. Democrats on the campaign trail should show restraint and let Congress do its work. The Biden end of the story, too, shouldn't remain immune from scrutiny.

Republicans, for their part, should be willing to follow procedural norms, accept facts, and uphold their principles of executive restraint and rule of law. If they oppose impeachment, they should be able to defend the president's actions on the merits, not resort to conspiracy theories.

All this may sound like a tall order. But the framers of the Constitution never intended impeachment to be a tool for scoring partisan points or sending a message to the president. It's a grave measure meant to secure his ouster. Much more is at stake than politics. **B**

Written by the Bloomberg Opinion editorial board

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# Time For the Unicorn Talk

● Is it an endangered species? Not yet. But vigilantes are thinning the herd

● By Michael P. Regan

You could call them the unicorn vigilantes. And they have a message for the big startups looking to make the move from private investment havens to public markets: Stay away from Wall Street until you get your act together.

Much like the so-called bond vigilantes of the 1980s and '90s—they started selling when they saw signs of inflation, pushing up interest rates even before the Federal Reserve could act—analysts, fund managers, and other investors are showing signs of increased vigilance about all the new equity being pushed onto the stock market. They're casting suspicious looks at the unicorns (the nickname used for startups with private valuations of \$1 billion or more) that are losing large amounts of money. And at those with convoluted corporate ownership schemes and plans for multi-class share structures that water down the voting power of ordinary investors. And at those that present themselves as tech companies, deserving of Silicon Valley valuations, when in fact their businesses are more mundane.



Sometimes the companies' founders don't even survive the transition from private to public; Uber's Travis Kalanick and WeWork's Adam Neumann were bounced from the top job at their startups amid heightened scrutiny of their management skills.

The result is unicorn blood in the streets. Office-sharing behemoth WeWork's parent, We Co., canceled its planned initial public offering. So did Hollywood talent agency Endeavor Group Holdings Inc. Airbnb Inc. may try a different route, allowing its investors to cash in by directly listing shares on the market rather than attempting to raise fresh capital through a conventional IPO, Bloomberg News reports.

We Co. has turned into the poster child for wounded unicorns that come to Wall Street offering promises of disruption, with visions of stock market capital in their heads. "WeWork's planned IPO turned into a highly publicized debacle that suggested public investors may finally be done overpaying for blazing-fast growth," IPO

specialist Renaissance Capital wrote in a note summing up the third quarter.

It's far from the only disappointment. Companies such as Uber Technologies, Lyft, and Peloton Interactive were able to get their IPOs off the ground, but the shares are trading well below their initial offering prices. The FTSE Renaissance US IPO Index of companies that went public in the past two years started off 2019 with a bang, outperforming the broader stock market, but it's lost 15% from its high in July.

Among the biggest unicorn vigilantes are the people who control the membership of benchmark stock indexes. Because of a change in rules in recent years, companies with multiple share classes can't be added to indexes maintained by S&P Dow Jones Indices LLC and face restrictions at FTSE Russell. Among the companies affected are 7 of the 10 biggest IPOs in 2019, including Chewy, Lyft, and Pinterest, according to Goldman Sachs. Not being in an important index means those stocks will be ignored by most passive investors, who

represent more than half the money in U.S. mutual funds and exchange-traded funds. "Multi-class voting to insulate management from its own shareholders comes at a significant long-term cost," write Goldman's equities strategists, led by David Kostin.

Recent market and economic trends are also having an impact. President Trump's trade war and impeachment inquiry, upside-down portions of the Treasury yield curve, and reports showing that global manufacturing industries are shrinking have led to increasingly nervous speculation about a recession. That's not the ideal environment in which to ask investors to take on a lot of risk by buying into an IPO, especially from an unprofitable company. The best-performing sectors in the S&P 500 in the third quarter were utilities, real estate, and consumer-staples companies—famous for their high dividend yields and/or relatively safe, steady businesses, rather than blockbuster growth and disruption.

Some investors also point to a ▶





## Money Raised in IPOs



◀ disconnect between private markets, where unicorns feasted on a seemingly endless supply of cash and valuations were starting to look bubblelike, and public markets, where scrutiny of business models is more robust.

Where did all this private market cash come from? One theory can be found in a recent paper by Michael Ewens of the California Institute of Technology and Joan Farre-Mensa of the University of Illinois at Chicago. They point to deregulation efforts in the investing industry in the 1990s, particularly the National Securities Markets Improvement Act of 1996. That law made it easier for startups to raise funds by reducing some disclosure requirements. It also increased the number of investors allowed in a fund before it was required to register under the Investment Company Act. The result, according to the authors, is that the spigots of private equity and venture capital were opened wide, allowing companies to stay private much longer and grow much larger without needing to raise money via an IPO.

Of course, the stock market is often the ultimate destination for venture capital and private equity investors looking to cash in. Why so many of them rode unicorns in that direction this year is open for debate. Perhaps it was partly coincidence, though more cynical folks will argue that it was because the business cycle was growing old, and the window to cash in on a buoyant stock market looked like it was closing.

Regardless, what we have now is a herd of unicorns with inflated

valuations trying to sell themselves in a stock market where investors are in the mood to play defense. They'd rather not place risky bets on companies that are long on ambition but, in many cases, short on profit. "We've had a delayed feedback loop between public investors and private investors, because there was so much private capital chasing these venture-stage companies," says Jennifer Foster, co-chief investment officer of equities at Chilton Trust. While there's also a lot of money chasing investments in public markets, she says, there are a lot more decision-makers analyzing securities. "The scrutiny on the business models—it's a healthy dynamic for a vibrant equity market to have those kinds of dialogues and questions."

Some are looking at We Co. as more than just a quirky company with a quirky founder and an IPO prospectus full of red flags. Morgan Stanley strategist Michael Wilson views its failure to launch onto public markets as a major turning point—the way the failed leverage buyout of United Airlines in 1989 marked the end of the junk-bond-fueled LBO craze of that decade; the way the AOL-Time Warner merger signaled the end of the dot-com bubble; and how JPMorgan Chase & Co.'s takeover of a collapsed Bear Stearns in 2008 marked the end of the financial excesses that followed the turn of the century. "So if this is *the* event, what are we ending?" Wilson asks. "In our view, the days of generous capital for unprofitable businesses is over." **B** —*With Vildana Hajric and Sarah Ponczek*

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C Total Paid and/or Requested Circulation (Sum of 15B)(1), (2), (3), and (4))	443,173	487,163
D Free or Nominal Rate Distribution (By Mail and Outside the Mail)		
1 Free or Nominal Rate Outside-County Copies included on PS Form 3541	155,437	98,927
2 Free or Nominal Rate In-County Copies included on PS Form 3541	0	0
3 Free or Nominal Rate Copies Mailed at Other Classes Through the USPS (e.g., First-Class Mail)	0	0
4 Free or Nominal Rate Distribution Outside the Mail (Carriers or other means)	23,008	39,953
E Total Free or Nominal Rate Distribution (Sum of 15D (1)(2) (3) and (4))	178,445	138,881
F Total Distribution (Sum of 15C and 15E)	621,618	626,044
G Copies Not Distributed	21,844	23,609
H Total (Sum of 15F and G)	643,462	649,653
I Percent Paid (15c divided by 15f times 100)	71.3%	77.8%
16 Electronic Copy Circulation:		
A Paid Electronic Copies	7,962	1,900
B Total Paid Print Copies (Line 15c) + Paid Electronic Copies (Line 16a)	480,728	445,073
C Total Print Distribution (Line 15f) + Paid Electronic Copies (Line 16a)	616,547	623,518
D Percent Paid (Both Print & Electronic Copies) (16b divided by 16c x 100)	78.0%	71.4%
17 Publication of Statement of Ownership: Publication required. Will be printed in the October 7, 2019 issue of this publication.		
18 Signature and Title of Editor, Publisher, Business Manager or Owner		
Joel Weber, Editor		9/30/2019
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1

BUSINESS

16



# Maybe AT&T Isn't Ready for Its Close-Up

● It's amassed a huge media business, but an entertainment brain drain worries a big investor

Not long ago, an AT&T Inc. executive named Brad Bentley had a novel idea for HBO. Over the years the premium TV network had explored just about every edgy storytelling topic, whether it was the suburban mob bosses of *The Sopranos* or the incestuous and dragon-riding public servants of *Game of Thrones*. But Bentley, according to a person familiar with the matter, told network executives in a meeting that the moment had finally come

for HBO to expose its millions of subscribers to the one thing that had remained taboo during its 46-year history: commercials.

The suggestion didn't go over well. HBO executives were stunned at the idea of larding down the network's prestigious programming with ads, no matter how much money it could generate, and pushed back forcefully. "We will never carry ads on HBO," a company spokesman said.

Bentley, who didn't respond to a request for comment, left AT&T earlier this year. Yet it's the string of longtime Time Warner entertainment executives who've departed since AT&T acquired the media company for \$109 billion last year that has some investors concerned—especially as the

deal transformed AT&T into the most-indebted nonfinancial company in the world.

Among those are the heads of Time Warner's three divisions. In September activist investor Elliott Management Corp. called the high rate of leadership turnover "alarming" and a "particularly troubling pattern" given AT&T's lack of experience in Time Warner's business, which now represents almost 20% of its revenue. "This lack of continuity in leadership presents a real concern for investors and should be a key focus for the board," Elliott wrote in a letter to AT&T's board.

Historically, AT&T has focused on things such as spreadsheets and spectrum, whereas Time Warner, now called WarnerMedia, nurtured relationships with celebrities and sports leagues and made creative decisions about shows and movies. Melding those two worlds is a daunting undertaking, especially because AT&T simultaneously knocked down the internal ramparts between Time Warner's HBO, Turner, and Warner Bros. units to get the entire company working together on a new streaming service.

Elliott's criticism has raised the question of what's more important to running a media company: the physical assets that AT&T has acquired or the entertainment executives who left, taking with them decades of institutional knowledge and client relationships? AT&T has said its combination of media creation and distribution assets is crucial to its strategy of taking on Netflix Inc. and disrupting TV advertising, while suggesting that the executives who departed won't hinder those efforts.

AT&T has held on to many of the creative executives at Time Warner, including Casey Bloys at HBO; Toby Emmerich and Peter Roth at Warner Bros.; and Sarah Aubrey, Kevin Reilly, and Jeff Zucker at Turner. The telecom giant has also brought in executives with entertainment experience such as Bob Greenblatt, the former head of entertainment at NBC and Showtime, and struck deals with Hollywood talent such as filmmaker J.J. Abrams and prolific TV producer Greg Berlanti.

Still, in addition to the three division heads at Time Warner, several high-level executives with Turner's ad sales and HBO's distribution operations have departed. Of the top 20 employees at HBO, only a few are left. "There is no HBO anymore," one former executive says. "There's only a brand." A company spokesman said the departures happened partly because the combination of Time Warner's formerly separate divisions of HBO and Turner within AT&T created overlapping roles.

In the letter, Elliott called on AT&T to consider divesting DirecTV, which it bought for \$67 billion in 2015. The satellite-TV company is losing subscribers

at a rapid clip. But an AT&T spokesman said DirecTV remains an important strategic asset, particularly because it will help distribute HBO Max, the company's forthcoming streaming service.

DirecTV is also crucial to AT&T's strategy to use data from viewers within its huge base of cellular and pay-TV customers to serve up targeted advertising that can compete with Google and Facebook Inc. That bid to basically reinvent TV advertising has caused confusion both inside and outside the company, according to people familiar with the matter; one reason is that AT&T has approached ad buyers with two separate teams. Xandr, named after Alexander Graham Bell, the founding father of U.S. phone service, is a new advertising and analytics division that aims to use AT&T's customer data to sell targeted TV advertising. And WarnerMedia's ad sales team continues to sell TV and digital advertising on channels such as CNN, TBS, and TNT.

Until recently, Xandr Chief Executive Officer Brian Lesser reported to AT&T CEO Randall Stephenson, and WarnerMedia's ad sales team reported to WarnerMedia CEO John Stankey, making it harder for the two units to communicate, one person says. Xandr and WarnerMedia's sales team haven't worked closely with each other, preventing AT&T from unlocking their combined potential to serve more targeted TV ads, the people say. Donna Speciale, president of advertising sales at WarnerMedia, left the company in July, and AT&T hasn't yet named a permanent replacement.

A company spokesman disputed that Xandr and WarnerMedia don't work closely together, saying they've made progress in making commercials more relevant on WarnerMedia's cable channels with Xandr's data. Xandr is providing "additional resources and insights" into WarnerMedia's targeted advertising and has created ad products for other media companies, the spokesman said.

The next few months could be critical for AT&T. Xandr and WarnerMedia will be under pressure to present a coherent pitch during the spring Upfront market, where advertisers buy the bulk of their TV commercials for the year. And AT&T will soon introduce HBO Max into a crowded landscape for streaming services. Elliott's letter to AT&T's board has only raised the stakes. "An alarm went off inside AT&T," says John Butler, an analyst at Bloomberg Intelligence. "The urgency here to get this strategy in motion and prove it has legs is probably higher now than it was before the letter." —*Gerry Smith, with Anders Melin*



● Stankey

**THE BOTTOM LINE** Time Warner was supposed to give AT&T a stream of content to pump through its huge cellular and pay-TV pipeline, complete with targeted ads. Investors aren't so certain.

# New Alternatives for China's Students

● As the U.S. allows fewer in, education companies seek other English-speaking countries

In the heart of Sydney's financial district, sandwiched between the offices of law firms and fund managers, the smartly refurbished classrooms of King's Own Institute are ready for a major intake of students. There are banks of white desks and tables lined with Dell computers and Lenovo laptops. But there's barely an Australian anywhere on campus.

With more than 2,400 students—almost all of them from abroad—studying for bachelor's and master's degrees in subjects such as business, accounting, and information technology, KOI is at the forefront as schools worldwide pursue Chinese students who increasingly are seeking alternatives to studying in the U.S. China Education Group Holdings Ltd., an operator of nine postsecondary schools across six Chinese provinces, announced the A\$128 million (\$86 million) purchase of KOI on Sept. 23, a deal that should boost KOI's appeal in China, according to the school's chief executive officer, Douglas Hinchliffe.

Companies such as China Education are expanding to meet the needs of students and their parents who think overseas degrees provide an edge in China's competitive job market. The U.S. has long been the most popular destination, with many of the mainland's top political and business leaders sending their children to Ivy League institutions. But as President Trump's confrontation with Beijing over trade and security makes pursuing a U.S. education more difficult, Chinese students are increasingly considering schools in other English-speaking countries. China's for-profit education companies are following suit.

"There is a shift," says Jerry He, executive vice chairman of Bright Scholar Education Holdings Ltd., based in the southern Chinese city of Foshan. Bright Scholar in the past year has purchased more than a dozen boarding and language schools, with U.K. campuses in Cambridge, Canterbury, and London. "With the tensions between the two countries, things that have happened in the news made some Chinese parents hesitant, and they have had second thoughts about where they will send their kids."

The number of Chinese undergraduates accepted to British schools increased 10.4% last year, to 10,180, according to the Universities and Colleges Admissions Service, a nonprofit that

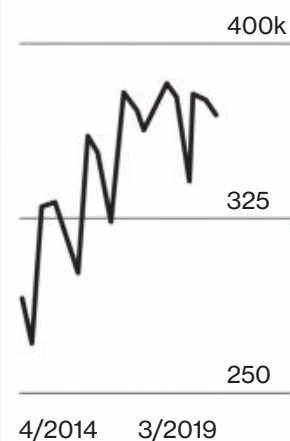
works with almost 400 schools in the U.K. The number of Chinese students applying jumped 30%, to more than 19,700.

Much is at stake for U.S. institutions, many of which have welcomed the influx of Chinese students, who typically pay full tuition. Chinese students in the U.S. generated \$22 billion in total economic impact last year, according to Rahul Choudaha, executive vice president of global engagement and research at consultant Studyportals.

China is still the largest source of international students in the U.S., accounting for about a third of the total. But the U.S. issued 101,000 student visas to Chinese applicants in the fiscal year ended September 2018, down from 152,000 in 2016, according to U.S. State Department data.

The Trump administration has fueled that decline, restricting access to student visas because

● Students from China studying in the U.S.



of worries about Chinese spies posing as students or researchers. The Justice Department on Sept. 16 announced the arrest of a Fort Lee, N.J., resident on charges of helping Chinese fraudulently obtain research scholar visas. In August nine Chinese students attempting to return to Arizona State University were denied entry by immigration officers at Los Angeles International Airport. The students were all in good academic standing but are still in China; the university hasn't received an

explanation, ASU President Michael Crow said in a Sept. 19 statement.

With China's education ministry in June warning students in the U.S. to be vigilant because of greater restrictions, more Chinese want to find alternatives to the U.S., says Sun Yiding, CEO of Beijing-based RISE Education Cayman Ltd., which organizes study abroad tours. This year the numbers for RISE's U.K. tours "increased significantly," Sun says.

Other countries are trying to become more welcoming. British Prime Minister Boris Johnson's government in September announced it would soon allow foreign students who study in the U.K. to work there for two years after graduation, reversing a policy from 2012 that had forced those students to leave the country within four months of completing their studies. Canada in February unveiled a policy that would make it easier for foreign graduates of Canadian schools to receive work permits. And in Australia, the government gave work visas to 64,000 foreign graduates for the year ended in June, almost triple the figure for 2014.

"This is a very competitive market, and as U.S.-China relations take on a negative tinge, our friends in Australia and the U.K. are perfectly willing to take on Chinese students," says Ted Mitchell, president of the American Council on Education, which represents 1,700 colleges and universities.

Bright Scholar began its shopping last year with the purchase of Bournemouth Collegiate School in Dorset, England, for an undisclosed sum. It followed up in June, buying two more British schools for a total £38 million (\$47 million), and a month later announced the acquisition of 18 schools in the U.K., Canada, and the U.S. for £150 million.

Still, Chinese companies aren't giving up on the U.S. market. Among the schools acquired by Bright Scholar is a private high school on more than 20 acres in Braintree, Mass. In nearby Boston, Beijing-based Ambow Education Holding Ltd. owns Bay State College, a for-profit institution it acquired in 2017 as a destination for some of its students from China who want U.S. degrees. Ambow also expects this year to purchase another for-profit college, New School of Architecture and Design in San Diego, according to CEO Jin Huang.

Even with the chill in bilateral relations, Huang says, the appeal of an American degree will remain strong. "After studying in the U.S., they have a better chance to find a better job compared to other countries," she says. —*Bruce Einhorn and Jinshan Hong, with Angus Whitley*

**THE BOTTOM LINE** Chinese account for a third of foreign students in the U.S. Tensions between the two nations are causing applicants to consider schools in the U.K., Canada, and Australia.

# BW Talks

# Ed Bastian

Delta Air Lines led all U.S. carriers in net income last year, and CEO Bastian is intent on expanding its global reach. On Sept. 26, Delta agreed to pay \$1.9 billion for 20% of Latam Airlines Group, Latin America's largest. —*Carol Massar and Jason Kelly*



● Became CEO of Delta Air Lines Inc. in 2016 ● A CPA, he held finance jobs at PricewaterhouseCoopers and PepsiCo Inc. before joining Delta in 1998. He briefly left in 2005 before being wooed back to help manage Delta's bankruptcy ● Has bought minority stakes in Korean Air and Air France-KLM

What's one thing that excites you, looking ahead five or 10 years?

International. We're a great U.S. airline now. I want to be a great international airline. As the investments in our international partners take root... I think we have the opportunity to be that.

What's Delta's take on airline partnerships and code-sharing and frequent-flyer alliances?

One of the things that's not been successful in the airline world are the alliances, and I'm being self-critical. [Delta leads the SkyTeam alliance.] So we're going at this in a very different approach, through Delta making bilateral investments in the most important partners. They want to know what Delta has learned about operating efficiency and prowess and premium [service]. And we want to learn what it takes to win in those local markets. Over time, while we can't own them, we can have meaningful enough investment that we create

an international network of carriers that will be uniquely tied, with Delta as the centerpiece. That's our goal.

You've won plaudits from customers. What's the story for investors?

While the airlines may have performed [well] at certain periods of time, they also spent back what they made on labor, technology, capital, and fleet. We're doing that but also returning a meaningful amount [to investors]. So this year at Delta we expect to make over \$5 billion for the fifth year in a row in terms of profits. But we'll also have free cash flow to liberate this year of over \$4 billion. I think that performance and that consistency is rewarding.

How have your customers benefited?

Consumers are getting great value. Airfares at Delta are down 40% in real dollars over the last 20 years. It's remarkable—and another reason travel's booming.

● Interviews are edited for clarity and length. Listen to *Bloomberg Businessweek With Carol Massar and Jason Kelly*, weekdays from 2 p.m. to 5 p.m. ET on Bloomberg Radio.

2

TECHNOLOGY

# WEWORK'S FAMILY TIME IS



● Adam and Rebekah Neumann tried to run the company like an enormous mom-and-pop. That made things complicated

Adam Neumann spent some of his final days as WeWork's chief executive officer the same way he had for countless weekends in recent years: surrounded by family at his house in the Hamptons. With the company's plan to go public in tatters, his control over the business dwindling, and its biggest investor starting to turn against him, Neumann and his wife and business partner, Rebekah, and their five kids unplugged at sundown on Friday, Sept. 20, to observe the weekly Jewish ritual of Shabbat. At the same time, SoftBank Group Corp.'s Masayoshi Son was preparing to oust him. Son's businesses had more than \$10 billion riding on the company in stock and loans. Over the course of a month, financial advisers to WeWork determined that the shares

were worth about a quarter of the price SoftBank paid in January. The problem, Son reasoned, was Neumann. Within four days, the CEO and his wife had stepped aside.

WeWork long had the image of a family business: a husband-and-wife pair at the helm and company slogans about how life is "better together." Although Adam Neumann started the business in 2010 with Miguel McKelvey, a kindred spirit who, like Adam, spent time on a commune during childhood, they rewrote the founding story over the years to include Rebekah. She was also chief brand and impact officer of parent company We Co., CEO of an education arm of the business called WeGrow, and one of three people assigned

to select a replacement for her 40-year-old husband if he died.

There were a lot of things about WeWork that made public investors recoil. For every \$1 of revenue, it incurred about \$2 in expenses and didn't make a convincing case it could reverse that equation. It sought to be valued as a technology business but operated much like a real estate company. Its corporate structure looked like a schematic for a microwave. WeWork's disclosures in its initial public offering prospectus in August offered a litany of apparent conflicts of interest, though the company wrote in the filing that it provided them to "avoid the appearance of any conflict of interest." Adam Neumann hired multiple family members besides his wife, including her brother-in-law, who also left the company in recent days. Neumann borrowed company money, collected rent from WeWork on space in buildings he owned, and charged the company \$5.9 million for the rights to a trademark he held on the name "We." He had effective control of management decisions through stock with special voting rights, though it ultimately wouldn't be enough to keep him in power. On Sept. 30, WeWork's new co-CEOs withdrew the prospectus, officially putting the plan to go public on hold.

This account of Adam and Rebekah Neumann's nine-year reign and swift fall is based on interviews with seven current and former WeWork employees, advisers, investors, and other people familiar with the company. SoftBank declined to comment, as did representatives for the Neumanns and WeWork.

After an initial onslaught of investor criticism in recent weeks, WeWork took steps to address many of its apparent conflicts and lessen Neumann's grip on the company, but he still held on to his job. Son, a 62-year-old Japanese billionaire known for his own eccentricities and mystical pronouncements, had been an enthusiastic supporter of Neumann for years. He still appeared to be on board as recently as mid-September, when SoftBank named Neumann a speaker at its corporate retreat in Pasadena, Calif. But after Neumann postponed the IPO at the urging of SoftBank and other investors and advisers, he backed out of the speech, saying he might come on the last day of the conference. Ultimately he didn't appear at the gathering at all.

On Sunday, Sept. 22, Neumann returned from the Hamptons. The same day, SoftBank's plan to remove him as CEO became public. Among those supporting the move were Benchmark's Bruce Dunlevie and John Zhao, founder and CEO of Chinese private equity firm Hony Capital, both members of the board. By Tuesday, Neumann relented. Everyone, including Neumann, knew that he didn't have the

board support to continue as CEO before the directors met on a call that day to vote on the matter. Neumann voted with the rest to oust himself, making the decision unanimous, according to a person familiar with the matter. Rebekah also agreed to relinquish her role at the company.

The Neumanns' departure marks a dramatic shift for WeWork and its culture, which was shaped by the idea that personal and professional life should be indistinguishable. This ethos is on display at the company's coworking offices, where beer kegs are a fixture. And it's reflected in the private elementary school within WeWork, which Rebekah said they built to give their children a worthy education, and the time Adam was seen visiting his kids at the school wearing nothing but an open robe and Speedo. (He was coming from the steam room attached to his office.) In Neumann's email to staff announcing his departure, he suggested the mission hasn't changed. "When Miguel, Rebekah and I founded WeWork in 2010, we set out to create a world where people work to make a life and not just a living," he wrote.

When WeWork got its start, Rebekah, who descends from Hollywood royalty and is a cousin of Gwyneth Paltrow, was acting; she appeared in a handful of films alongside stars such as Lucy Liu and Rosario Dawson. She wasn't around the office much in those days, according to an early employee. When she was there, she had strong opinions. She asked to change the color of the T-shirts employees wore during move-in day for tenants at new offices. She also wanted to make one floor of an early WeWork headquarters a film production area, two former employees say, and the company built video editing stations and a screening room. Over time, Rebekah's roles in the company took on greater importance. In 2014, WeWork began describing her publicly as chief brand officer. The next year she became a founding partner and by 2016 a co-founder. In the IPO prospectus, she's listed second, behind her husband and ahead of McKelvey.

Professional life at WeWork frequently overlapped with the personal. Adam, a connoisseur of tequila, often partied with colleagues in WeWork offices, and in 2014, after an investment that granted him majority voting control of the company, he celebrated so hard he broke a floor-to-ceiling window in his office, according to a person familiar with the incident. He called in maintenance workers to replace the glass overnight so it wouldn't be visible in the morning, the person says. WeWork also fostered family ties within its executive ranks. The company disclosed two connections in the IPO prospectus: One was Adam's brother-in-law, who ran ►

**The IPO prospectus offered a litany of apparent conflicts of interest**



◀ the company gym. It also said an immediate family member was paid to host eight live events. And there were more instances that weren't disclosed in the filing. The chief product officer was Rebekah's brother-in-law; the longtime head of real estate was Rebekah's cousin; and for years the company's lavish summer retreats were hosted at a venue in upstate New York owned by the cousin's parents.

In 2017, WeWork debuted WeGrow, whose mission statement is "to unleash every human's superpowers." Rebekah became WeGrow's founder and CEO, saying she was inspired to build the school because she wasn't happy with her eldest daughter's experience in kindergarten. Students would be "raised as conscious global citizens of the world," she said. For a yearly tuition of as much as \$42,000, children run around the modern, blond wood floors, staff a vegetable stand, and take music lessons, in addition to more academic endeavors. The school, located on the third floor of the same New York building as WeWork's headquarters, has about 100 students and is buoyed by WeWork's resources: A significant number of students are the children of employees, and more than half receive financial aid, though the Neumanns' five children paid full price, according to two people familiar with the matter.

At WeWork, Adam had the role of fundraiser and visionary, and Rebekah was the driving force behind the lofty corporate ideals, three former employees say, embodied in the company's mission to "elevate the world's consciousness." She made decisions quickly and was known to hire or reassign WeWork staff on the basis of their "energy" or if they said something she disapproved of. She was also devoted to her ideal of familial obligations. Onstage at WeWork's annual company festival Summer Camp last year, she told an audience of 8,000 WeWork employees and customers that "a big part of being a woman is to help men manifest their calling in life."

In 2018, Rebekah decided that WeGrow needed a chief operating officer and had her eye on Adam Braun, according to four people familiar with the matter. At the time, Braun, founder of non-profit Pencils of Promise, was CEO of the education startup MissionU. The Neumanns approached MissionU about an acquisition and pitched placing its education services in WeWork's many campuses and offices, say two people familiar with the deal. Rebekah interviewed many of MissionU's 25-person staff, but the interviews weren't focused on their qualifications. She asked each of them about their "superpower," according to a former MissionU employee.

As the deal progressed, it seemed clear to MissionU staff that Rebekah simply wanted to hire

Braun, the people say. Eventually, Braun joined WeGrow, as did another employee. No one else from the startup was hired at the school, though three people joined WeWork. The company paid \$4 million in stock for the acquisition, according to a person familiar with the deal. "Adam Neumann waltzed into my startup's office 18 months ago under false pretenses to poach my co-founder," Mike Adams, who started MissionU with Braun, wrote in a now-deleted tweet the day the husband-and-wife team stepped down. "Rebekah 'didn't like my energy' so I wasn't even offered a job." —*Ellen Huet and Gillian Tan, with Peter Elstrom and Cathy Chan*

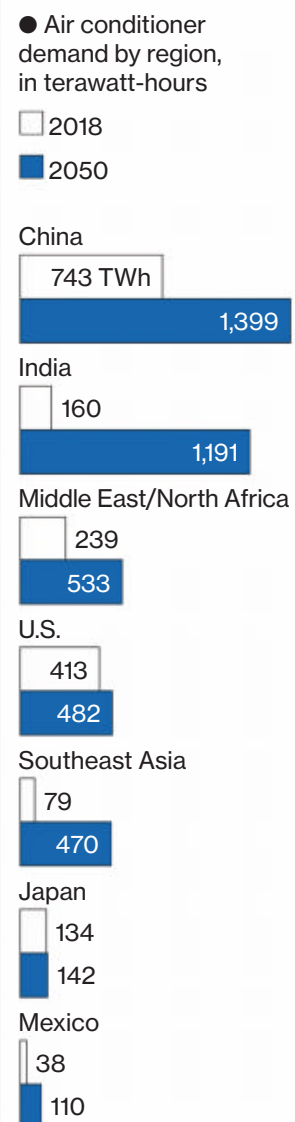
THE BOTTOM LINE As Wall Street took down WeWork's valuation, investors became uncomfortable with the blurring of personal and professional by the husband-and-wife team in charge.

## A Greener Way To Cool the Air

● Air conditioning systems that rely on water temperature are on the rise

Four decades after it supplied its last coal to the Netherlands, a shuttered mine near the German border is feeding low-emission air conditioning to homes nearby. The cooling system collects some of the millions of gallons of water held in flooded mine shafts about 200 meters (650 feet) below the surface and pumps it through a network of underground pipes. The cold water flows through a neighborhood of 400 homes and a handful of nearby businesses, keeping them cool during the summer. In the winter, warmer water from deeper in the mine is used to heat the same buildings.

The efficiency and low power requirements of the system in Heerlen, developed by Mijwater BV, means it consumes 65% less energy than traditional heating and cooling, according to the company. Such networks, known as district cooling—or heating—systems, are on the rise as towns and cities look for ways to cut emissions. They point the way to solving one of climate change's biggest challenges: As Earth warms and summer temperatures break records, demand rises for air conditioning, boosting energy consumption and the climate-warming emissions that come with it. Demand for power to cool homes and businesses is likely to more than double by 2050 and account for about 13% of the



world's electricity consumption, according to BloombergNEF. It's a dangerous feedback loop that threatens to accelerate global warming. "As human beings, we can't keep installing air conditioning systems that aren't efficient for this demand," says Olivier Racle, director of district heating and cooling for the French utility Engie SA.

What makes district cooling more efficient is centralizing the source of the chill. Instead of using individual air conditioners, it draws cold water from a single place and pumps it to different buildings. Mines aren't the only source: The systems can also take water from lakes or rivers where the water temperature is naturally cooler than the air.

It makes most sense in cities, where people and businesses are packed together. Some systems have been around for more than a century. Consolidated Edison Inc. operates the biggest U.S. steam system, with heating and cooling for 1,650 customers across Manhattan. It's easy to see how things can be improved. Projects and networks that come to rely on power from wind and solar will have no carbon footprint at all.

Now the technology is getting fresh impetus from policymakers seeking to slash the contribution buildings make to greenhouse gas emissions. There's a lot of room to grow: District cooling projects account for less than 3% of the air conditioning market in Europe, according to estimates from cooling and heating consultant Devcco.

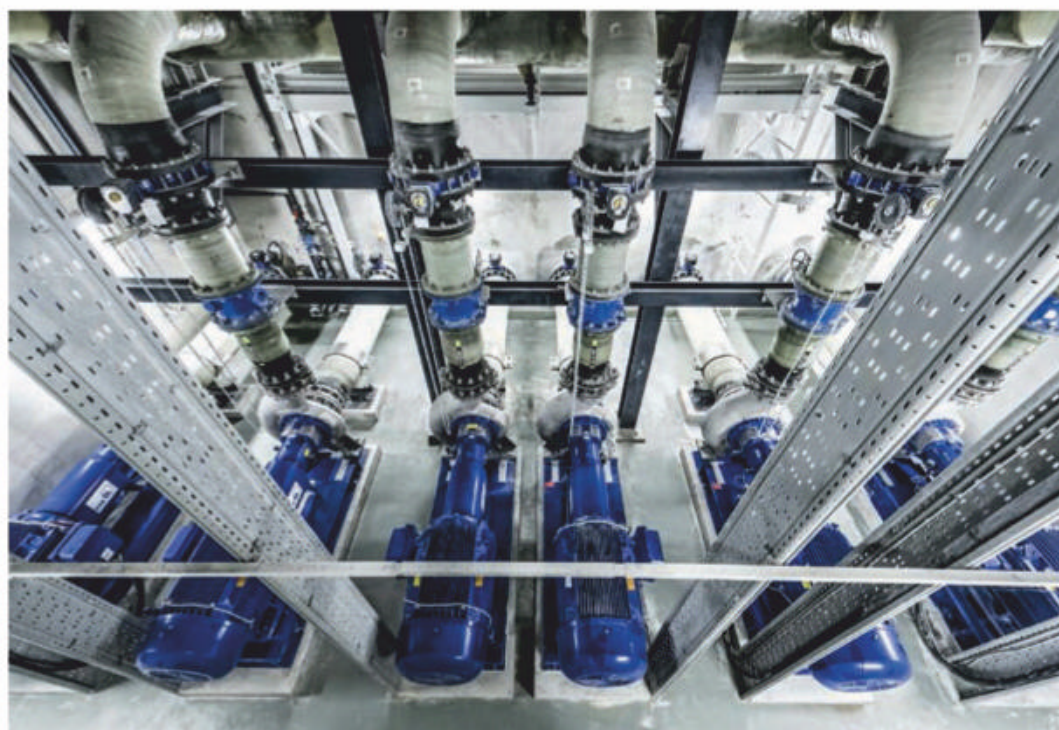
At Mijnwater, the European Investment Bank is supporting a plan to spend as much as €150 million (\$166 million) to extend the Heerlen system. And Engie, which runs an immense district cooling network in Paris, plans to spend about €3.7 billion on the cooling and heating technology worldwide over the next five years. The EIB signed off on a €260 million loan to help Engie finance a redevelopment of a system in Paris. About half the company's expansion will come in North America, where it has a 35-year project to expand and operate Ottawa's district heating and cooling system.

Not every system needs a source of conveniently cool water on hand. The United Arab Emirates, one of the largest recent adopters, is too hot to rely on ambient water. Instead, projects use refrigeration plants to cool water. Engie has a 40% stake in the Abu Dhabi-based National Central Cooling Co., known as Tabreed, which it bought in 2017 for \$775 million. Earlier this year, Tabreed signed a 30-year agreement to build a district cooling system for the new capital of the Indian state of Andhra Pradesh.

District heating and cooling systems can be expensive and complicated to start because they

involve miles of pipes. But the savings on energy and emissions can be significant. Even with the use of conventional power generation to lower the water temperature, the citywide scale of district cooling allows the system to use half as much electricity as conventional air conditioners. For heating systems, waste heat from industrial plants or from renewable power can be used. That's a good option, says Meredith Annex, an analyst at BNEF, "if you're having trouble with the power grid already and you're looking to have a reliable source of cooling."

While players such as Engie can back projects with their own balance sheets, financing remains a hurdle to wider adoption. Projects take years to build before customers enjoy any benefit, so a developer must find someone to shoulder upfront costs. There are also few regulations encouraging more efficient cooling networks, which limits banks' appetites to make loans. "The banks aren't willing to take the risk on an uncertain revenue," says Lambert Teuwen, senior banker at the EIB.



▲ Pumps for Engie's district heating and cooling system in Marseille

Then there's public awareness. In places where governments or municipalities aren't mandating the development of district cooling or heating systems, companies need to get a large number of consumers to agree to switch off conventional cooling and heating if a large-scale project is to make financial sense. "There are always money people around saying, 'Look, the money is there, what we need is feasible, realistic projects that are of a certain size,'" says Birger Lauersen, an official at the Danish District Heating Association. "It is a good idea, but selling good ideas can be difficult."

—Will Mathis

**THE BOTTOM LINE** As policymakers look for ways to decarbonize air conditioning, a technology that's more than 100 years old is making a comeback.

# It's Private Equity's World. That's a Big Deal

Private equity managers won the financial crisis. A decade since the world economy almost came apart, big banks are more heavily regulated and scrutinized. Hedge funds, which live on the volatility central banks have worked so hard to quash, have mostly lost their flair. But the firms once known as leveraged buyout shops are thriving. Almost everything that's happened since 2008 has tilted in their favor.

Low interest rates to finance deals? Check. A friendly political climate? Check. A long line of clients? Check.

The PE industry, which runs funds that can invest outside public markets, has trillions of dollars in assets under management. In a world where bonds are paying next to nothing—and some have negative yields—many big investors are desperate for the higher returns PE managers seem to be able to squeeze from the markets.

The business has made billionaires out of many of its founders. Funds have snapped up businesses from pet stores to doctors' practices to newspapers. PE firms may also be deep into real estate, loans to businesses, and startup investments—but the heart of their craft is using debt to acquire companies and sell them later.

In the best cases, PE managers can nurture failing or underperforming companies and set them up for faster growth, creating outsized returns for investors that include pension funds and universities. But having once operated on the comfortable margins of Wall Street, private equity is now facing tougher questions from politicians, regulators, and activists. One of PE's superpowers is that it's hard for outsiders to see and understand the industry, so we set out to shed light on some of the ways it's changing finance and the economy itself. —*Jason Kelly*

## ● Private Equity Throws Its Weight Around in Washington

As Republicans set out to overhaul the federal tax code in 2017, private equity began leveraging its influence. The industry was out to protect a wildly lucrative tax break that's helped mint more billionaires than almost any other kind of business. And it succeeded: The idea of closing the loophole simply went away.

The tax break on "carried interest" allows PE managers to pay a lower rate on much of their income. They get paid in two ways: an annual management fee and a share of investment profits. While the fee is taxed as ordinary income, the profit share is treated like a capital gain, which can be taxed less. Critics say this doesn't make sense, because the profit share is really just another fee paid by clients. The upshot is that superwealthy private equity managers could pay lower tax rates than their secretaries.

Ominously for PE managers, Donald Trump had vowed on the campaign trail to scrap the loophole. But soon, Kohlberg Kravis Roberts & Co.'s Ken Mehlman, a former head of the Republican National Committee who's now the buyout firm's global head of public affairs, was helping to persuade lawmakers on Capitol Hill to fight for PE's cause. After an effort spearheaded by Mehlman, 22 House Republicans signed a letter to the Ways and Means Committee saying the tax break "bolsters long-term investment in American companies."

Quietly meeting with Treasury Secretary Steven Mnuchin and top economic advisers was Blackstone Group Inc.'s Jonathan Gray, who'd later become the firm's No. 2. And Blackstone head Stephen Schwarzman was enjoying rare access to President Trump, his Palm Beach, Fla., neighbor and regular dinner date at Mar-a-Lago. Schwarzman, worth \$17.6 billion, is one of Trump's most generous donors. He's also traveled to China repeatedly on behalf of the administration.

Congress ultimately decided to put a limit on the tax break—money managers would have to hold their positions for three years to get it. But this barely put a dent in PE's business model, which typically involves investing in companies for years. The very day the Senate passed the law, Schwarzman hosted a \$100,000-a-plate fundraiser for the president at his Manhattan apartment.

Over the past decade, private equity and investment firms—not including hedge funds—have dropped about \$400 million into federal campaign coffers, according to the Center for Responsive Politics. That's more than commercial banks or the insurance

industry. "They have managed to have influence with both parties," John Coffee Jr., a law professor at Columbia University, says of PE.

Leading private equity's charge in Washington is the prosaically named American Investment Council. Formerly called the Private Equity Growth Capital Council, the lobbying group—like the corporate takeover game itself—has deftly rebranded. The AIC regularly places opinion pieces in newspapers across the country to burnish private equity's reputation. "We're working strategically to ensure decision-makers in Washington know how private equity benefits their local communities," says



Chief Executive Officer Drew Maloney. "And during this presidential primary process, we're sending a clear message to candidates that they are visiting towns where private equity supports local jobs and strengthens pensions for public-sector workers."

KKR's Mehlman—who in 2017 was chairman of the AIC—isn't the only one to toggle between politics and PE. Tim Geithner, Treasury secretary under Barack Obama, is now president of the buyout shop Warburg Pincus LLC. Jack Lew, who took Geithner's spot, eventually went to the firm Lindsay Goldberg & Co. Stacey Dion, head of government affairs at the Carlyle Group LP, previously worked as a policy adviser for former House Speaker Paul Ryan. Eli Miller, a managing director for Blackstone's government relations group, used to be Mnuchin's chief of staff.

PE has more wars to fight in Washington, foremost among them ensuring that federal regulators keep their hands off. In terms of assets, Blackstone, ►

◀ KKR, and Carlyle now dwarf regional banks such as Fifth Third Bank and Citizens Financial Group Inc. Yet “private equity is subject to almost no direct regulation beyond some very basic transparency,” says Jonah Crane, a senior official at the Treasury Department during the Obama administration.

Among the few windows the government has into private equity firms and the risks they take is a document filed with the Securities and Exchange Commission known as Form PF. Its Section 4 can reveal the amount of debt a PE firm is piling onto the companies it’s buying, as well as where in the world firms are investing. But the industry has successfully lobbied to limit access to that information, saying it’s proprietary. Only about a dozen of the SEC’s 4,500 employees can easily see it.

Even so, advocates for private equity have been pushing back against the disclosure requirements. The industry argues that so few people have access to the information that it can’t be of much use anyway and that it may present data-security risks. Natalie Strom, a spokeswoman for SEC Chairman Jay Clayton, says the regulator takes “data protection very seriously.” Clayton’s office said in a statement that officials had met with industry and investor groups about Form PF and that it wasn’t considering scrapping entire sections of the document.

The PE industry would also like to be able to reach everyday investors who’ve long been barred from investing in their funds—and, of course, to collect fees from them. And it’s gotten a sympathetic hearing from Clayton. Although it’s unclear how far the SEC might go, Strom says “we should explore whether it is possible to reduce cost and complexity and increase opportunities.”

In an April interview on Bloomberg TV’s *The David Rubenstein Show*, Clayton told Rubenstein, co-founder of Carlyle, that many people might benefit from having a slice of their retirement money in private equity. The host agreed. “Probably wouldn’t

be that damaging if 5% of it was lost or didn’t do as well,” Rubenstein said, speaking of retiree nest eggs. “So some percentage maybe should be allowed.”  
—Heather Perlberg and Ben Bain

## ● The Returns Are Spectacular. But There Are Catches

For investors the draw of private equity is simple: Over the 25 years ended in March, PE funds returned more than 13% annualized, compared with about 9% for an equivalent investment in the S&P 500, according to an index created by investment firm Cambridge Associates LLC. Private equity fans say the funds can find value you can’t get in public markets, in part because private managers have more leeway to overhaul undervalued companies. “You cannot make transformational changes in a public company today,” said Neuberger Berman Group LLC managing director Tony Tutrone in a recent interview on Bloomberg TV. Big institutional investors such as pensions and university endowments also see a diversification benefit: PE funds don’t move in lockstep with broader markets.

But some say investors need to be more skeptical. “We have seen a number of proposals from private equity funds where the returns are really not calculated in a manner that I would regard as honest,” said billionaire investor Warren Buffett at Berkshire Hathaway Inc.’s annual meeting earlier this year. There are three main concerns.

### ○ THE VALUE OF PRIVATE INVESTMENTS IS HARD TO MEASURE

Because private company shares aren’t being constantly bought and sold, you can’t look up their price by typing in a stock ticker. So private funds

● Familiar companies that went private in the buyout wave



## Wait, Remind Me How Private Equity Works?

PE invests in a range of different assets, but the core of the business is the leveraged buyout

The basic idea is a little like house flipping: Take over a company that’s relatively cheap and spruce it up to make it more attractive to other buyers so you can sell it at a profit in a few years. The target might be a struggling public company or a small private business that can be combined—or “rolled up”—with others in the same industry.

① A few things make PE different from other kinds of investing. First is the leverage.

Acquisitions are typically financed with a lot of debt that ends up being owed by the acquired company. That means the PE firm and its investors can put in a comparatively small amount of cash, magnifying gains if they sell at a profit.

② Second, it’s a hands-on investment. PE firms overhaul how a business is managed. Over the years, firms say they’ve shifted from brute-force cost-cutting and layoffs

to McKinsey-style operational consulting and reorganization, with the aim of leaving companies better off than they found them. “When you grow businesses, you typically need more people,” said Blackstone Group Inc.’s Stephen Schwarzman at the Bloomberg Global Business Forum in September. Still, the business model has put PE at the forefront of the financialization of the economy—any business it touches is under pressure

to realize value for far-flung investors. Quickly.

③ Finally, the fees are huge. Conventional money managers are lucky if they can get investors to pay them 1% of their assets a year. The traditional PE structure is “2 and 20”—a 2% annual fee, plus 20% of profits above a certain level. The 20 part, known as carried interest, is especially lucrative because it gets favorable tax treatment. —J.K.

# WHAT IS AVAXHOME?

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have some flexibility in valuing their holdings. Andrea Auerbach, Cambridge's head of global private investments, says a measure that PE firms often use to assess a company's performance—earnings before interest, taxes, depreciation, and amortization, or Ebitda—is often overstated using various adjustments. "It's not an honest number anymore," she says. Ultimately, though, there's a limit to how much these valuations can inflate a PE fund's returns. When the fund sells the investment, its true value is exactly whatever buyers are willing to pay.

Another concern is that the lack of trading in private investments may mask a fund's volatility, giving the appearance of smoother returns over time and the illusion that illiquid assets are less risky, according to a 2019 report by asset manager AQR Capital Management, which runs funds that compete with private equity.

○ RETURNS CAN BE GAMED

Private equity funds don't immediately take all the money their clients have committed. Instead, they wait until they find an attractive investment. The internal rate of return is calculated from the time the investor money comes in. The shorter the period the investor capital is put to work, the higher the annualized rate of return. That opens up a chance to juice the figures. Funds can borrow money to make the initial investment and ask for the clients' money a bit later, making it look as if they produced profits at a faster rate. "Over the last several years, more private equity funds have pursued this as a way to ensure their returns keep up with the Joneses," Auerbach says. The American Investment Council, the trade group for PE, says short-term borrowing allows fund managers to react quickly to opportunities and sophisticated investors to use a variety of measures besides internal rate of return to evaluate PE performance.

○ THE BEST RETURNS MIGHT BE IN THE REARVIEW MIRROR

Two decades ago an investor could pick a private equity fund at random and have a better than 75% chance of beating the stock market, according to a report by financial data company PitchBook. Since 2006 those odds have dropped to worse than a coin flip. "Not only are fewer managers beating the market but their level of outperformance has shrunk, too," the report says.

One likely reason will be familiar to investors in mutual funds and hedge funds. When strategies succeed, more people pile in—and it gets harder and harder to find the kinds of bargains that fueled the early gains. There are now 8,000-plus PE-backed

companies, almost double the number of their publicly listed counterparts. The PE playbook informs activist hedge funds and has been mimicked by pensions and sovereign funds. Some of PE's secret sauce has been shared liberally in business school seminars and management books.

A deeper problem could be that the first generation of buyout managers wrung out the easiest profits. PE thinking pervades the corporate suite—few chief executive officers are now sitting around waiting for PE managers to tell them to sell underperforming divisions and cut costs. Auerbach says there are still good PE managers out there and all these changes have "forced evolution and innovation." But it's possible that a cosmic alignment of lax corporate management, cheap debt, and desperate-for-yield pensions created a moment that won't be repeated soon. —*Hema Parmar and Jason Kelly*

**There are now 8,000-plus PE-backed companies, almost double the number of their publicly listed counterparts**

● **Buyouts Push Companies To the Limit. Or Over It**

If your company finds itself part of a PE portfolio, what should you expect? Research has shown that companies acquired through leveraged buyouts (LBOs) are more likely to depress worker wages and cut investments, not to mention have a higher risk of bankruptcy. Private equity owners benefit through fees and dividends, critics say, while the company is left to grapple with often debilitating debt.

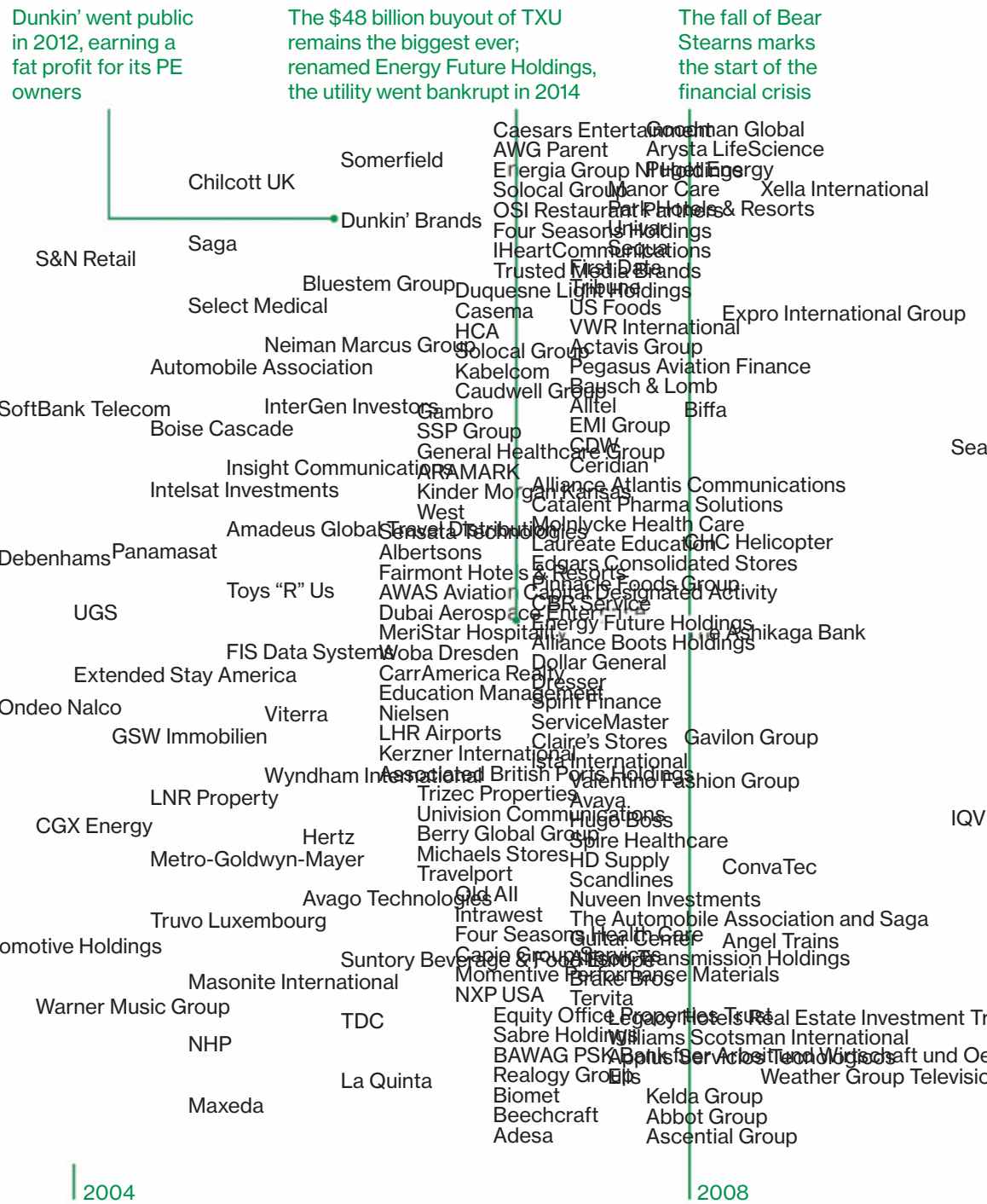
Kristi Van Beckum worked as an assistant manager for Shopko Stores Inc. in Wisconsin when the chain of rural department stores was bought by ▶





# A Crushing Tide of Megadeals

Around 2007, private equity buyouts of more than \$2 billion got so numerous that we can hardly fit them on the page. The financial crisis interrupted the flow, but only temporarily. Here's a look at two decades of deals. —Tom Maloney



◀ PE firm Sun Capital Partners Inc. in a 2005 LBO. “When they took over, our payroll got drastically cut, our retirement plan got cut, and we saw a lot of turnover among executives,” she says.

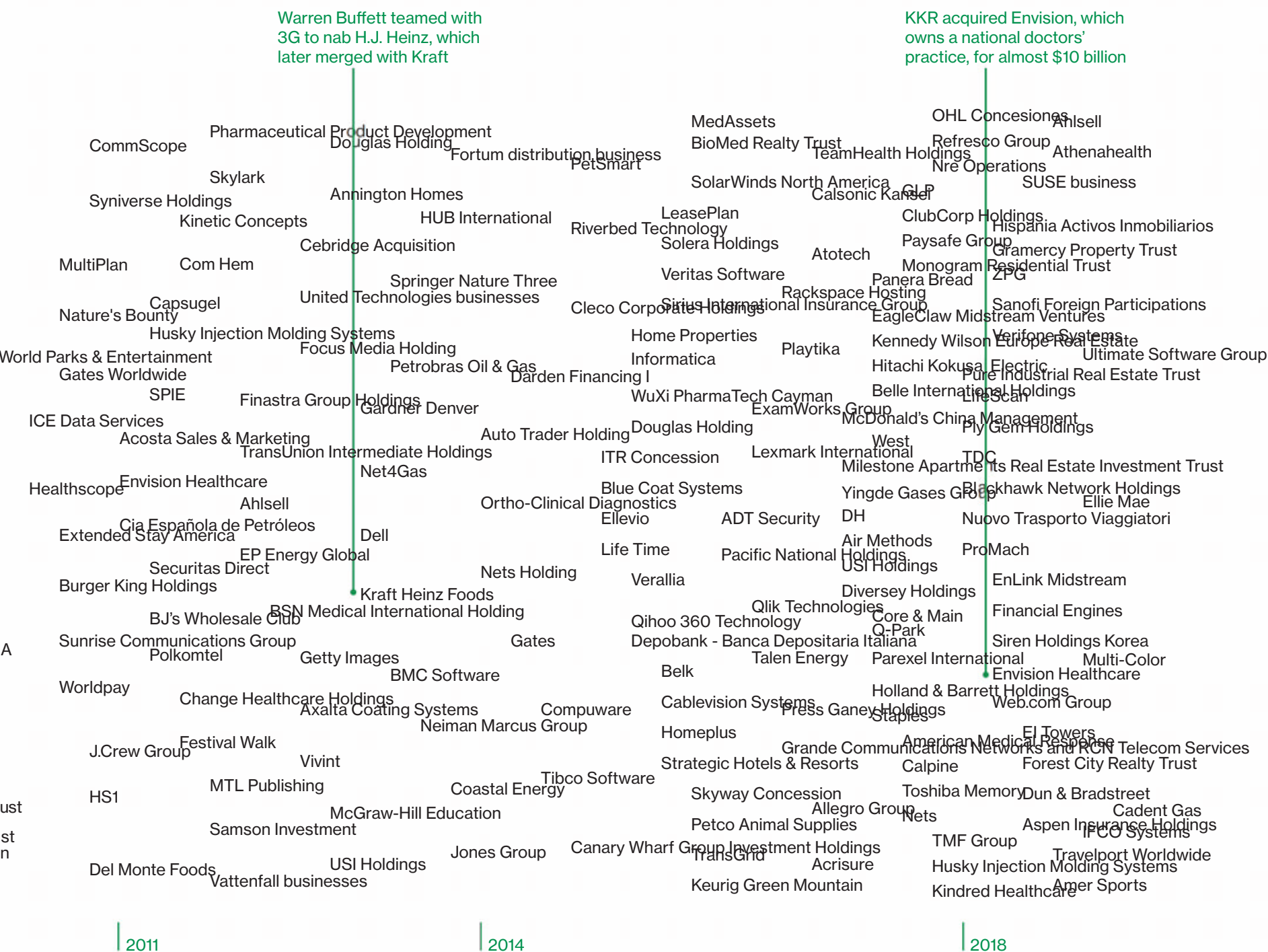
One of Sun Capital’s first moves as owner was to monetize Shopko’s most valuable asset, its real estate, by selling it for about \$800 million and leasing back the space to its stores. That generated a short-term windfall but added to Shopko’s long-term rent costs. “A lot of stores that were once profitable started to show lower profits because they had to start paying rent,” Van Beckum says.

In 2019, Shopko said it could no longer service its debt and filed for bankruptcy, ultimately shuttering all of its more than 360 stores. Van Beckum was asked to stay on as a manager during her store’s liquidation and was promised severance and a closing bonus in return, she says. Weeks later, she received an email telling her that her severance claim wouldn’t be paid. Sun Capital has said money has been contributed to

the bankruptcy plan that can pay such claims.

Private equity and hedge funds gained control of more than 80 retailers in the past decade, according to a July report by a group of progressive organizations including Americans for Financial Reform and United for Respect. And PE-owned merchants account for most of the biggest recent retail bankruptcies, including those of Gymboree, Payless, and Shopko in the past year alone. Those bankruptcies wiped out 1.3 million jobs—including positions at retailers and related jobs, such as at vendors—according to the report, which estimates that “Wall Street firms have destroyed eight times as many retail jobs as they have created in the past decade.”

Whether LBOs perform poorly because of debt, business strategy, or competition from Amazon .com Inc., research shows they fare worse than their public counterparts. A July paper by Brian Ayash and Mahdi Rastad of California Polytechnic State University examined almost 500 companies taken



DATA: COMPILED BY BLOOMBERG. COMPANIES MAY LATER HAVE BEEN SOLD OR TAKEN PUBLIC; NAMES MAY HAVE BEEN DIFFERENT AT THE TIME OF THE DEAL

private from 1980 to 2006. It followed both the LBOs and a similar number of companies that stayed public for a period of 10 years. They found about 20% of the PE-owned companies filed for bankruptcy—10 times the rate of those that stayed public. Pile on debt, and employees lose, Ayash says. “The community loses. The government loses because it has to support the employees.” Who wins? “The funds do.”

Research by Eileen Appelbaum, co-director of the Center for Economic and Policy Research, says the problem isn’t leverage per se but too much of it. She points to guidance issued by the Federal Deposit Insurance Corp. in 2013 saying debt levels of more than six times earnings before interest, taxes, depreciation, and amortization, or Ebitda, “raises concerns for most industries.” If that’s the case, plenty of upheaval lies ahead. A 2018 McKinsey report shows that multiples for median private equity Ebitda ticked up to more than 10 in 2017, from 9.2 the previous year.

Of course, by the time private equity acquires some

of these companies, they’re already in deep trouble. Defenders say PE fills a crucial role in the market. The firms have the resources and expertise to turn companies around and an incentive to invest in them to make sure there’s a healthy gain when they sell or take them public, says Derek Pitts, head of restructuring at investment bank PJ Solomon. “You have to make investments to grow a smaller company,” he says, and some require the kind of check that only a major PE shop can write. Being shielded from the quarter-by-quarter glare of public reporting requirements may allow PE companies to experiment and focus on more than short-term results.

The retail industry was long a prime target for buy-outs because of its reliable cash flow and the value of the real estate it owned. But the sector is no longer as suited to PE ownership amid ever-changing customer whims and the massive upheaval brought by Amazon, says Perry Mandarino, head of restructuring and co-head of investment banking at B. Riley ►

◀ FBR. “Private equity has successfully preserved companies across a number of sectors,” he says, “but the disruption in retail has proven difficult for even some of the most savvy investors to navigate. High leverage, especially in this difficult environment, can be fatal.”

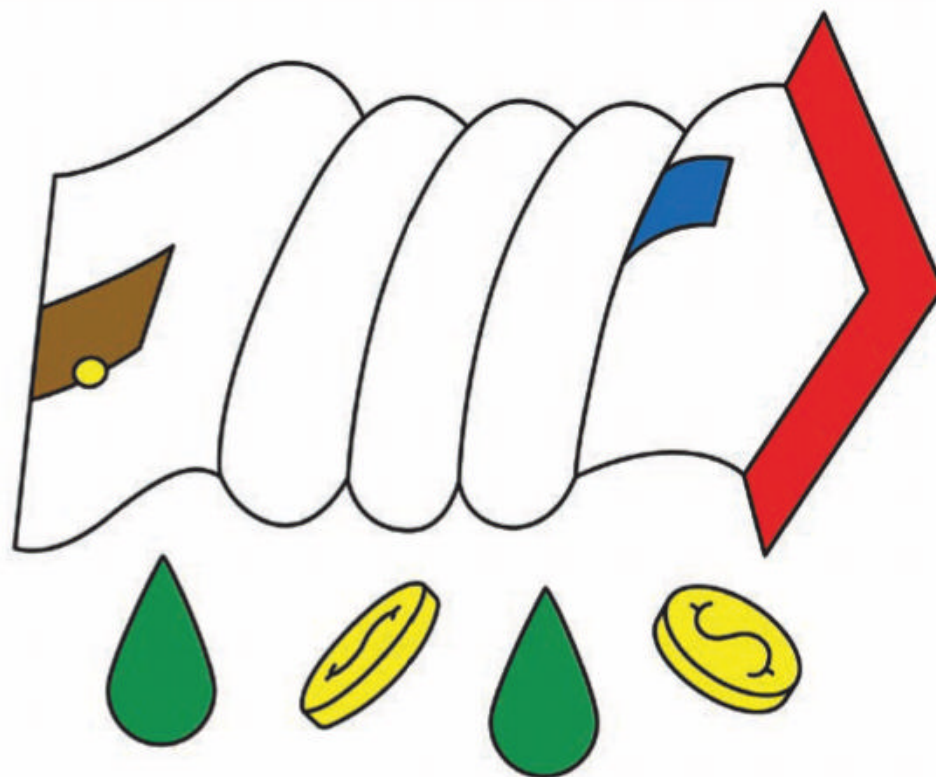
The most notable recent example of that is Toys “R” Us Inc. When the children’s toy retailer filed for bankruptcy in 2017, it was paying almost \$500 million a year to service the debt from its 2005 takeover by Bain Capital LP, Vornado Realty Trust, and Kohlberg Kravis Roberts & Co. After it was liquidated in March following poor holiday season sales, its owners became the target of protests by laid-off workers, as well as scrutiny from investors and criticism from elected officials. Senator Elizabeth Warren (D-Mass.) introduced a bill in July that would limit payouts private equity owners could receive from troubled companies.

That kind of impact isn’t unique to retail, says Heather Slavkin Corzo, senior fellow at Americans for Financial Reform and director of capital market policies at the union federation AFL-CIO. “The massive growth of private equity over the past decade means that this industry’s influence, economic and political, has mushroomed,” she says. “It’s hardly an exaggeration to say that we are all stakeholders in private equity these days, one way or another.”  
—*Lauren Coleman-Lochner and Eliza Ronalds-Hannon*

## ● After the Crisis, Rental Homes Became an Asset Class

Renting out houses used to be a relatively small-time business. Now rentals are what Wall Street calls an asset class—another investment like stocks or timberland, with tenants’ monthly checks showing up as yield in someone’s portfolio. About 1 million people may now live in homes owned by large landlords. This tectonic shift can be traced to the U.S. housing crisis.

Private equity companies including Blackstone Group Inc. had the money to gorge on foreclosed houses in the years after the crash and quickly applied their model to a whole new business. They used economies of scale, cost-cutting, and leverage to maximize profits on undervalued assets. The key was to create a standardized way to manage single-family homes, scattered from Atlanta to Las Vegas, almost as efficiently as apartment buildings. PE-backed landlords set up centralized 24/7 customer service centers and automated systems for rent collection and maintenance calls.



Blackstone-backed rental company Invitation Homes Inc. eventually went public, then merged with a landlord seeded by Starwood Capital Group and Colony Capital Inc. to create the U.S.’s largest single-family rental company, with more than 80,000 units. Invitation Homes owns less than 1% of the single-family rental stock, says Ken Caplan, Blackstone’s global co-head of real estate. “But it has raised the bar for professional service for the industry,” he says.

The aims of the landlords and the needs of their tenants often diverge, says Leilani Farha, the United Nations’ special rapporteur on the right to housing. Steady rent increases that make investors happy come out of tenants’ paychecks, straining household finances and making it harder to save for a down payment. Meanwhile, PE-backed companies’ sprawling portfolios of rental properties may limit the availability of entry-level houses that could be occupied by homeowners. Institutional landlords were 66% more likely than other operators to file eviction notices, according to Georgia Institute of Technology professor Elora Raymond, whose 2016 study of Fulton County, Ga., court records was published by the Federal Reserve Bank of Atlanta. Invitation Homes was less likely to file notices than its largest peers, according to the paper. A company spokesman says it works with tenants to avoid eviction and that its high renewal rates indicate customer satisfaction.

From Wall Street’s point of view, the model has worked beautifully. Invitation Homes has convinced stock market investors that it can manage operating costs. It also bought shrewdly, swallowing up starter homes in good school districts, anticipating that tight credit and anemic construction rates would push the U.S. toward what one industry analyst dubbed a rentership society. Sure enough, U.S. homeownership is

near its lowest point in more than 50 years, allowing Invitation Homes to raise rents by more than 5%, on average, when tenants renew leases.

“The single-family rental companies have a perfect recipe,” says John Pawlowski, an analyst at Green Street Advisors LLC. “It’s a combination of solid economic growth in these Sun Belt markets and very few options out there on the ownership front.” Shares of Invitation Homes have gained almost 50% since the start of 2019. Blackstone has sold more than \$4 billion in shares of it this year. Its remaining stake is worth about \$1.7 billion. —*Prashant Gopal and Patrick Clark*

## ● As Profits Grow, So Does Inequality

In July, Democratic presidential candidate Elizabeth Warren of Massachusetts likened the private equity industry to vampires. She struck a nerve: Even among Wall Street companies, PE stands out as a symbol of inequality in the U.S. “There’s this concentration of extreme wealth, and private equity is a huge part of that story,” says Charlie Eaton, an assistant professor of sociology at the University of California at Merced.

Income gains for the top 1% in the U.S. have been rising at a faster clip than for lower groups since 1980. Since that time, PE managers have steadily taken up a larger share of the highest income groups, including the richest 400 people, according to several research papers from the University of Chicago’s Steven Kaplan and Stanford’s Joshua Rauh. There are more private equity managers who

make at least \$100 million annually than investment bankers, top financial executives, and professional athletes combined, they found. The very structure of PE firms is particularly profitable for managers at the top; not only do they earn annual management fees, but they also get a cut of any profits.

Beyond that, PE may contribute to inequality in several ways. First, it offers investors higher returns than those available in public stocks and bonds markets. Yet, to enjoy those returns, it helps to already be rich. Private equity funds are open solely to “qualified” (read: high-net-worth) individual investors and to institutions such as endowments. Only some workers get indirect exposure via pension funds.

Second, PE puts pressure on the lower end of the wealth divide. Companies can be broken up, merged, or generally restructured to increase efficiency and productivity, which inevitably means job cuts. The result is that PE accelerates job polarization, or the growth of jobs at the highest and lowest skill and wage level while the middle erodes, according to research from economists Martin Olsson and Joacim Tag.

The imperative to make highly leveraged deals pay off may also encourage more predatory business practices. A study co-authored by UC Merced’s Eaton, for example, found that buyouts of private colleges lead to higher tuition, student debt, and law enforcement action for fraud, as well as lower graduation rates, loan-repayment rates, and graduate earnings. But the deals did increase profits.

Supporters of PE firms argue that they’re creating value. A 2011 research paper shows that overall job dislocation over time isn’t so bad. After a leveraged buyout, companies lost, on net, less ▶

**More private equity managers make at least \$100 million a year than top financial executives, investment bankers, and professional athletes combined**

### Barbarians at the Gate Become the New Establishment



1970s

The U.S. Department of Labor relaxes regulations to allow pension funds to hold riskier investments. This opens up a new pool of money for buyout artists. Cousins Henry Kravis and George Roberts leave Bear Stearns with their mentor Jerome Kohlberg to form Kohlberg Kravis Roberts & Co.



1980s

L.A. financier Michael Milken turns junk bonds into a hot investment, which makes getting leverage easier. Former Lehman Brothers partners Pete Peterson and Stephen Schwarzman found Blackstone Group. KKR takes control of RJR Nabisco in a stunning \$24 billion deal.



1990s

Milken goes to jail for securities violations, and his firm, Drexel Burnham Lambert, collapses. But takeover artists are finding more tools for financing deals, as banker Jimmy Lee popularizes leveraged loans at what’s now JPMorgan Chase & Co.



2000s

Pensions for California state employees and Middle East sovereign funds pour money into record-setting funds that routinely surpass \$15 billion apiece. Big deals of the era include Dollar General Corp. and Hilton Hotels. Several private equity firms themselves go public.



2010s

After the financial crisis, Blackstone, Ares Capital, and Apollo Global expand their private credit businesses, providing financing to companies no longer served by big banks. Veteran PE executive Mitt Romney is the 2012 Republican presidential nominee. —*J.K.*

◀ than 1% of total positions, because layoffs are largely balanced by new hires, with the effects concentrated in retail and service sectors, according to the paper, co-authored by the University of Chicago's Steven Davis. He and others argue that private equity owners can turn underperforming companies into thriving businesses that attract jobs, return more money to shareholders, and bolster new technology.

Critics and advocates of PE generally agree on at least one thing: When people are hurt by deals that turn companies upside down, there should be systems in place to assist them. "You don't want to stand in the way of economic innovation," says Gregory Brown, a finance professor at UNC Kenan-Flagler Business School. "But you would hope that people who get run over are helped."  
—*Katia Dmitrieva*

## ● Private Equity Is Getting Companies Hooked on Debt

Private equity couldn't exist without debt. It's the jet fuel that makes a corporate acquisition so lucrative for a turnaround investor. The more debt you can raise against a target company, the less cash you need to pay for it, and the higher your return on that cash once you sell.

Ultralow interest rates have made this fuel especially potent and easy to obtain. The market for leveraged loans—industry jargon for loans made to companies with less-than-stellar credit—has doubled in the past decade. Almost 40% of all such loans outstanding are to companies controlled by private equity, according to data from Dealogic.

Some leveraged loans are arranged by banks. But there's also been a boom in private lenders, who may be willing to provide financing when banks or public debt markets won't. All the while, bond and loan investors desperate for yield have accepted higher risks. As buyout titans have chased bigger and riskier deals, their target companies have been left with more fragile balance sheets, which gives management less room for error. This could set the stage for a rude awakening during the next recession.

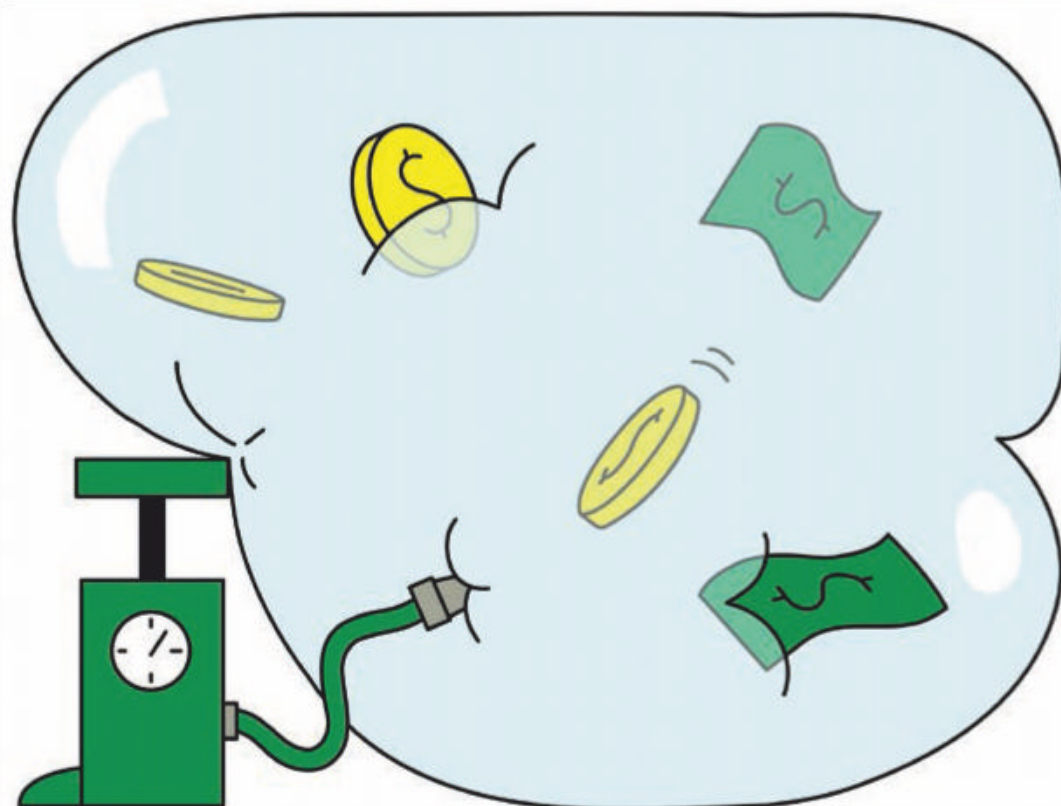
"We're seeing scary levels of leverage," says Dan Zwirn, chief investment officer of alternative asset manager Arena Investors. "Private equity sponsors are all slamming against each other to get deals done." Loans to companies with especially high debt loads now exceed peaks in 2007

and 2014, according to the U.S. Federal Reserve. And companies owned by private equity typically carry a higher debt load relative to their earnings and offer less transparency on their financial position than other corporate borrowers.

Debt usually comes with rules, embedded deep in loan and bond documents, that help lenders protect their investment. For example, they might restrict dividend distributions or asset sales. The strictness of such protections has been on a steady decline over the past few years, with PE-backed companies typically offering weaker safeguards compared with borrowers that aren't backed by private equity, according to scores developed by Covenant Review, a research firm that analyzes debt documents. "Investor protections used to be written on cocktail napkins a year ago," says John McClain, a portfolio manager at Diamond Hill Capital Management who invests in junk bonds. "Now they're scribbled in crayon on toilet paper."

Buyout firms have also come under fire for massaging financial projections presented to investors when new debt is sold to make earnings look bigger and a company's debt load more manageable.

PE firms can use some of the companies they own as virtual ATMs—having the company borrow money to pay its owner special dividends. That allows the funds to recover their investment sooner than they typically would through a sale or an initial public offering. Sycamore Partners LLC, known for its aggressive bets in the retail industry and related run-ins with creditors, has already recovered about 80% of the money it put down to acquire Staples Inc. in 2017 through dividends mostly funded by debt. Carlyle Group, Hellman & Friedman, and Silver Lake have also saddled their ▶



◀ portfolio companies with new debt to extract dividends this year. Representatives for the four private equity firms declined to comment.

Little bubbles have already started to pop, giving debt investors a glimpse of how quickly things can deteriorate. Bonds issued last year to finance Kohlberg Kravis Roberts & Co.'s deal to take private Envision Healthcare, a hospital staffing company, have already lost almost half their face value after initiatives in Washington to stop surprise medical bills spooked investors. (A representative for KKR declined to comment.) The debt of some other private equity-owned companies, including the largest Pizza Hut franchisee in the world and a phone recycling company, has also fallen in market value in recent months. "When you have people desperate for yield, buying lower-rated, poor-quality debt, the question is what's going to make this stuff blow out," says Zwirn. "And it will." —*Davide Scigliuzzo, Kelsey Butler, and Sally Bakewell*

## ● Women Are Few And Far Between

If private equity dealmakers are a tiny economic elite, they are a narrow one, too. A Bloomberg analysis found that women fill only 8% of senior investment roles globally at the 10 largest firms that use debt to buy companies. Only one or two women are present in top positions on the buyout investment teams of most firms, which are generally made up of dozens of executives. "There is a huge retention problem, since nothing has materially changed at the top," says Nori Gerardo Lietz, a senior lecturer at Harvard Business School. "Firms ought to be asking themselves why."

If they don't, clients might force them to—eventually. The explosive growth of the asset class has been fueled in part by big checks from large public pension plans, some of which have been vocal about social responsibility. More are questioning managers on their diversity numbers, but few have used their checkbooks to force change.

Bloomberg's analysis found that Carlyle Group LP put the greatest number of women in senior investment roles, 15, while TPG had the biggest proportion, with women accounting for 14% of its team. Apollo Global Management, CVC Capital Partners, and Hellman & Friedman each had one lone female making investments.

Apollo raised the largest buyout fund on record, \$24.7 billion, in 2017 and counts California State

Teachers' Retirement System, New York State Common Retirement Fund, and Oregon Public Employees' Retirement Fund among its largest investors. An Apollo spokesperson says the firm is strongly committed to continuing to improve diversity across its business.

Some of the firms analyzed have put women in leadership roles in other parts of their organizations, including those that invest in real estate, infrastructure, and credit. At Blackstone Group Inc., Kathleen McCarthy is co-head of the \$154 billion real estate group. But PE firms seem to have struggled more than other kinds of asset managers, including venture capital and hedge funds, to boost their number of women in general, according to a study earlier this year by data provider Preqin. Women are found mostly in investor relations, marketing, and finance roles at PE firms, the study finds.

Especially scarce are women running or co-managing buyout businesses—the historic heart of private equity and the source of some of the biggest profits. Their number can be counted on one hand. Women lead or co-run funds focused on investing for social good at Blackstone, Carlyle, and TPG.

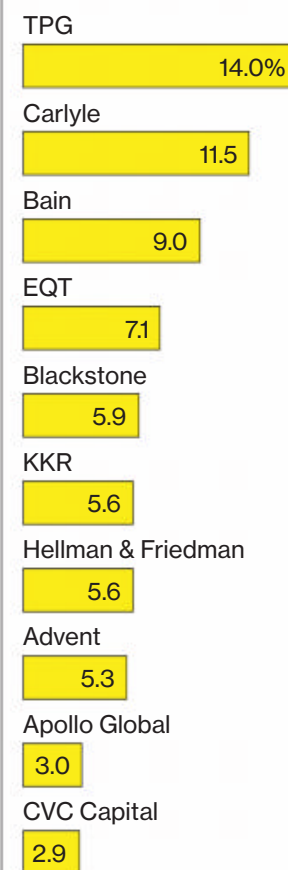
"We are focused on continuing to prioritize diversity in senior positions at TPG and addressing this industrywide problem that includes disparities in race and ethnicity, as well as sexual orientation," Anilu Vazquez-Ubarri, TPG's global head of human resources, said in a statement.

Sandra Horbach oversees about \$39 billion in buyout assets for Carlyle. Private equity is a relatively young industry, she says. It was started by men and attracted more men than women early on, but that's gradually changing. "When you have women leading businesses successfully, as we do at Carlyle, that helps underscore the importance and benefits of diversity," she says.

PE firms need to cast a wider net, says Heather Hammond, a senior member at recruiting firm Russell Reynolds Associates. She says she encourages firms to look beyond the usual banks and other buyout firms when hiring. For example, someone in corporate development at an acquisitive industrial conglomerate is likely to have skills a PE firm can use. "We have to push the boundaries," she says.

Some women are breaking through another way. "I felt like to really be able to run anything I needed to start my own firm," says Hollie Haynes, who founded buyout firm Luminare Capital Partners after working at Silver Lake Management LLC. "My memory of being a woman at these firms is it is really lonely." —*Sabrina Willmer*

● Women's share of senior roles in buyout businesses



DATA: BLOOMBERG REPORTING. BLOOMBERG COUNTED HEADS OF BUSINESS AND THE TWO MOST SENIOR TITLES ON BUYOUT TEAMS OF EACH FIRM. LIST COMPRISES PREQIN ANALYSIS OF THE LARGEST BUYOUT FIRMS BASED ON CAPITAL RAISED IN LAST 10 YEARS. DATA DOESN'T INCLUDE OTHER ASSET CLASSES SUCH AS REAL ESTATE, INFRASTRUCTURE, AND CREDIT. INCLUDES IMPACT FUNDS.

Concerns that machines would replace workers went viral during the Great Depression, sparking fears of chronic unemployment



*Stories matter. That, in a nutshell, is the central premise of Robert Shiller's book Narrative Economics: How Stories Go Viral & Drive Major Economic Events. The Nobel laureate economist cites Bitcoin, the Laffer curve, and the gold standard as examples of narratives that became infectious, spread by word of mouth, popular media, and more recently the internet. These epidemics can influence the behavior of consumers and companies, causing them to postpone purchases and investments or making them overconfident about their financial future, which may result in excessive risk-taking. Shiller argues that if economists were better at understanding how these contagion episodes unfold, they might be better at predicting recessions and asset bubbles.*

*Some narratives, like viruses, simply die out. But others mutate or become dormant only to flare up again years or even decades later. Shiller devotes two chapters of his book to one particularly durable narrative—a superbug, if you will. What follows is an excerpt.*

Concerns that inventions of new machines powered by water, wind, horse, or steam, or that use human power more efficiently, might replace workers and cause massive unemployment have an extremely long history, going back to ancient times. Aristotle imagined a future in which “the shuttle would weave and the plectrum touch the lyre without a hand to guide them.” In such a world, “chief workmen would not want servants, nor masters slaves,” he concluded.

Still, it wasn't until the 19th century, an era that brought innovations such as the water-powered textile loom, the mechanical thresher, and the Corliss steam engine, that concerns about technology-based unemployment took center stage. The narrative was particularly contagious during economic depressions when many were unemployed.

The phrase “technological unemployment” first appeared in 1917, but it started its epidemic upswing in 1928. The count for “technological unemployment” skyrockets in the 1930s in Google Ngrams, ►

tracing a hump-shaped pattern, rising through time for a while and then falling, much as is regularly seen with infection diseases. The “technological unemployment” curve peaked in 1933, the worst year of the Great Depression.

It is curious that the narrative epidemic of technological unemployment began in 1928, a time of prosperity before the Great Depression. How did the epidemic start? In March 1928, U.S. Senator Robert Wagner stated his belief that unemployment was much higher than recognized, and he asked the Department of Labor to do a study. Later that month the department delivered the study that produced the first official unemployment rates published by the U.S. government. The study estimated that there were 1,874,030 unemployed people in the United States and 23,348,602 wage earners, implying an unemployment rate of 7.4%. This high estimated unemployment rate came at a time of great prosperity, and it led people to question what would cause such high unemployment amidst abundance.

A month later, the *Baltimore Sun* ran an article referring to the theories of Sumner H. Slichter, who in later decades became a prominent labor economist. In the article, readers are told that Slichter noted several causes of unemployment but said technological unemployment was “at present the most serious.” The reason: “We are eliminating jobs through labor-saving methods faster than we are creating them.” These words, alongside the new official reporting of unemployment statistics, created a contagion of the idea that a new era of technological unemployment had arrived. The earlier agricultural depression, with its associated fears of labor-saving machinery, began to look like a model for an industrial depression to follow.

Stuart Chase, who later coined the term the “New Deal,” published *Men and Machines* in May 1929, during a period of rapidly rising stock prices. The real, inflation-corrected, U.S. stock market, as measured by the S&P Composite Index, rose a final

20% in the five months after the book’s publication, before the infamous October 1929 crash. But concerns about rising unemployment were apparent even during the boom period. According to Chase, we were approaching the “zero hour of accelerating unemployment”:

Machinery saves labour in a given process; one man replaces ten. A certain number of these men are needed to build and service a new machine, but some of them are permanently displaced....If purchasing power has reached its limits of expansion because mechanization is progressing at an unheard of rate, only unemployment can result. In other words, from now on, the better able we are to produce, the worse we shall be off.... This is the economy of the madhouse.

This is significant: The narrative of out-of-control unemployment was already starting to go viral before there was any sign of the stock market crash of 1929.

During the week before the October 28–29 stock market crash, a national business show was running in New York in a convention center (since demolished) adjacent to Grand Central Station that many Wall Street people passed through to and from work. The show emphasized immense progress in robot technology in the office workplace. After the show moved to Chicago in November, the following description appeared in the *Chicago Daily Tribune*:

Exhibits in the national business show yesterday revealed that the business office of the future will be a factory in which machines will replace the human element, when the robot—the mechanical man—will be the principal office worker....

There were addressers, autographers, billers, calculators, cancelers, binders, coin changers, form printers, duplicators, envelope sealers and openers, folders, labelers, mail meters, pay roll machines, tabulators, transcribers, and other mechanical marvels....

A typewriting machine pounded out letters in forty different languages. A portable computing machine which could be carried by a traveling salesman was on exhibit.

By 1930 the crash itself was often attributed to the surplus of goods made possible by new technology. According to the *Washington Post*, “When the climax was reached in the last months of 1929 a period of adversity was inevitable because the people did not have enough money to buy the surplus goods which they had produced.”

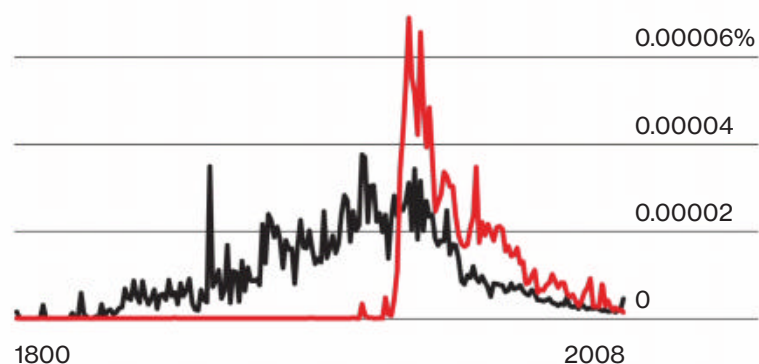
Fear of robots was not strong in most of the 1920s, when the word robot was coined. Historian Amy Sue Bix offers a theory to explain why this was so: The kinds of innovations that received popular acclaim in the 1920s didn’t obviously replace jobs. If asked to describe new technology, people would perhaps think first of the Model T Ford, whose sales had burgeoned to 1.5 million cars a year by the early part of the decade. Radio stations, which first appeared around 1920, provided an exciting ▶

**“It is curious that the narrative epidemic of technological unemployment began in 1928, a time of prosperity”**

### The Great Contagion

Frequency of appearance in books as a share of all words

▲ “Labor-saving machinery” ▲ “Technological unemployment”





◀ new form of information and entertainment, but they did not obviously replace many existing jobs. More and more homes were getting wired for electricity, with many possibilities for new gadgets that required electricity.

By the 1930s, Bix notes, the news had replaced stories of exciting new consumer products with stories of job-replacing innovations. Dial telephones replaced switchboard operators. Mammoth continuous-strip steel mills replaced steel workers. New loading equipment replaced coal workers. Breakfast cereal producers bought machines that automatically filled cereal boxes. Telegraphs became automatic. Armies of linotype machines in multiple cities allowed one central operator to set type for printing newspapers by remote control. New machines dug ditches. Airplanes had robot copilots. Concrete mixers laid and spread new roads. Tractors and reaper-thresher combines created a new agricultural revolution. Sound movies began to replace the orchestras that played at movie theaters. And, of course, the decade of the 1930s saw massive unemployment in the United States, with the unemployment rate reaching an estimated 25% in 1933.

It is difficult to know which came first, the chicken or the egg. Were all these stories of job-threatening innovations spurred by the exceptional pace of such innovations? Or did the stories reflect a change in the news media's interest in such innovations because of public concern about technological unemployment? The likely answer is "a little of both."

The "labor-saving machines" narrative was strongly connected to an underconsumption or overproduction theory: the idea that people couldn't possibly consume all of the output produced by machines, with chronic unemployment the inevitable result. The theory's origins date to the 1600s, but it picked up steam in the 1920s. It was mentioned in newspaper articles within days of the stock market crash of October 28-29, 1929.

The real peak of these narratives was in the 1930s, during which time they appeared five times as often as in any other decade, according to a search of Proquest's database of newspapers.

The topic now appears largely in articles about the history of economic thought, but it is worth considering why it had such a strong hold on the popular imagination during the Great Depression, why the narrative epidemic could recur, and the appropriate mutations or environmental changes that would increase contagion.

Today, underconsumption sounds like a bland technical phrase, but it had considerable emotional charge during the Great Depression, as it

symbolized a deep injustice and collective folly. At the time it was mostly a popular theory, not an academic theory.

In the 1932 presidential campaign, Franklin Roosevelt ran against incumbent Herbert Hoover, who had been unsuccessful with deficit spending to restore the economy. Roosevelt gave a speech in which he articulated the already-popular theory of underconsumption. His masterstroke was putting it in the form of a story inspired by Lewis Carroll's famous children's book *Alice's Adventures in Wonderland*. In that book, a bright and inquisitive little girl named Alice meets many strange creatures that talk in nonsense and self-contradictions. Roosevelt's version of this story replaced his opponent with the Jabberwock, a speaker of nonsense:

A puzzled, somewhat skeptical Alice asked the Republican leadership some simple questions.

Will not the printing and selling of more stocks and bonds, the building of new plants and the increase of efficiency produce more goods than we can buy? No, shouted the Jabberwock, the more we produce the more we can buy.

What if we produce a surplus? Oh, we can sell it to foreign consumers.

How can the foreigners buy it? Why we will lend them the money.

Of course, these foreigners will pay us back by sending us their goods? Oh, not at all, says Humpty Dumpty. We sit on a high wall called a tariff.

How will the foreigners pay off these loans? That is easy. Did you ever hear of a moratorium?



◀ Unemployed men line up for a free meal in New York in 1933

On the face of it, underconsumption seemed to explain the high unemployment of the Great Depression, but academic economists never seriously embraced the theory, which had never been soundly explained.

The massive unemployment caused by the Great Depression set off serious social problems. For example, in the United States it caused the forced deportation (then called repatriation) of a million workers of Mexican origin. The goal was to free up jobs for “real” Americans. The popular narrative supported these deportations, and there was little public protest. Newspaper reports showed photos of happy Mexican Americans waving goodbye at the train station on their way back to their original home to help the Mexican nation.

The dial telephone also played an important part in narratives about unemployment and the associated underconsumption. During the Great Depression, there rose a narrative focus on the loss of telephone operators’ jobs, and the transition to dial telephones was troubled by moral qualms that by adopting the dial phone one was complicit in destroying a job. Three weeks after dial phones were installed in the U.S. Senate in 1930, Senator Carter Glass introduced a resolution to have them torn out and replaced with the older phones. Noting that operators’ jobs would be lost, he expressed true moral indignation against the new phones:

I ask unanimous consent to take from the table Senate resolution 74 directing the sergeant at arms to have these abominable dial telephones taken out on the Senate side.... I object to being transformed into one of the employees of the telephone company without compensation.

His resolution passed, and the dial phones were removed. It is hard to imagine that such a resolution would have passed if the nation had not been experiencing high unemployment. This story fed a contagious economic narrative that helped augment the atmosphere of fear associated with the contraction in aggregate demand during the Great Depression.

The loss of jobs to robots (that is, automation) became a major explanation of the Great Depression, and, hence, a perceived major cause of it. Even if the man hasn’t lost his job yet, he will consume less owing to the prospect or possibility of losing his job. The U.S. presidential candidate who lost to Herbert Hoover in 1928, Al Smith, wrote in the *Boston Globe* in 1931:

We know now that much unemployment can be directly traced to the growing use of machinery intended to replace man power.... The human psychology of it is simple and understandable to everybody. A man who is not sure of his job will not spend his money. He will rather hoard it and it is difficult to blame him for so doing as against the day of want.



Albert Einstein, the world’s most celebrated physicist, believed this narrative, saying in 1933 that the Great Depression was the result of technical progress:

According to my conviction it cannot be doubted that the severe economic depression is to be traced back for the most part to internal economic causes; the improvement in the apparatus of production through technical invention and organization has decreased the need for human labor, and thereby caused the elimination of a part of labor from the economic circuit, and thereby caused a progressive decrease in the purchasing power of the consumers.

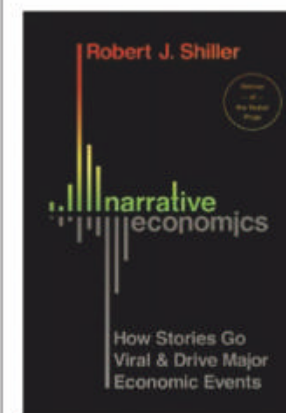
By that time, people had begun to label labor-saving inventions as “robots,” even if there were no mechanical men to be seen. One article in the *Los Angeles Times* in early 1931, about a year into the Great Depression, said that robots then were already the “equivalent of 80 million hand-workers in the United States alone,” while the male labor force was only 40 million.

Though the technological unemployment narrative faded after 1935 (as revealed by Google Ngrams), it did not go away completely. Instead, it continued to exert some influence in the runup to World War II, until new narrative constellations about the war became contagious.

Many historians point to massive unemployment in Germany to explain the accession to power of the Nazi Party and Adolf Hitler in the election of 1933, the worst year of the Depression. But rarely mentioned today is the fact that a Nazi Party official promised that year to make it illegal in Germany to replace men with machines.

To go viral again, the labor-saving machines narrative needed a new twist after World War II, a twist that could seem to reinforce the newly rediscovered appreciation of human intelligence, and, ultimately, of the human brain. The narrative turned to the new “electronic brains”—that is, computers.

▲ A farewell for Mexican-Americans being expelled from Los Angeles in 1931



● Adapted from *Narrative Economics: How Stories Go Viral & Drive Major Economic Events*, by Robert J. Shiller, published on Oct. 1 by Princeton University Press. Copyright 2019 by Robert J. Shiller

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POLITICS

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## Will the Senate Have Trump's Back?

Majority Leader Mitch McConnell has given himself a tiny bit of wiggle room

Even as Democrats in the House pursue an impeachment inquiry into his dealings with Ukraine President Volodymyr Zelenskiy, President Donald Trump has doubled down on his attacks, using Twitter to go after his perceived political rivals as well as the members of Congress investigating him. Trump's actions suggest he has no

fear of being removed from office—as well he shouldn't. So far, Senate Majority Leader Mitch McConnell and his GOP have proved an almost indestructible firewall against attacks on the president and his agenda.

While McConnell has called it “laughable” to claim that Trump committed an impeachable

offense, he's also taken a few careful steps to insulate his caucus against a possible reversal. "If this is the 'launching point' for House Democrats' impeachment process," he said in a statement to Politico, "they've already overplayed their hand." But he also told CNBC he'd have "no choice" under Senate rules but to take up impeachment articles and stopped short of blessing Trump's conduct. In recent weeks he's ordered a bipartisan Senate intelligence investigation, backed a resolution written by Senate Minority Leader Chuck Schumer demanding that the administration turn over the then-secret whistleblower report, and announced he'd been privately pushing the administration to release aid to Ukraine that had been held up before Trump's phone call with that country's president.

While no Senate Republican has yet said Trump should be impeached over Ukraine, what they have said suggests he might not have a solid wall behind him if damaging information continues to come out. Trump's sometime rival Mitt Romney of Utah has called the president's actions "troubling in the extreme." Nebraska's Ben Sasse, who criticized Trump as a candidate but has fallen in line since, said his colleagues shouldn't rush to "circle the wagons" around the president. And Senate Intelligence Chairman Richard Burr of North Carolina has vowed to "get to the bottom" of what happened.

It would likely take a collapse in support for Trump among Republican voters to change GOP senators' calculus. While polls show increasing approval among the public for impeachment, it's come mostly from Democrats. The president's approval rating among GOP voters remains above 80% in public polls, making any Republican senator's defection a potentially career-ending decision.

The administration is counting on Republicans

to toe the party line. Before it released a rough transcript of Trump's call with the president of Ukraine, the White House summoned a group of Republican lawmakers for a strategy briefing. Anyone who might have been considering breaking ranks wouldn't have had to look further than former Senators Jeff Flake of Arizona and Bob Corker of Tennessee to see the consequences: Both decided to retire last year rather than run for reelection after their dust-ups with Trump sent their poll numbers plummeting.

Having to cast a vote in an impeachment trial would put some swing-state Republicans, such as Pat Toomey of Pennsylvania and Rob Portman of Ohio, on the spot. Toomey and Portman have sought to split the difference, criticizing the president but suggesting his actions don't warrant removal from office. GOP Senators Cory Gardner (Colorado), Martha McSally (Arizona), Joni Ernst (Iowa), and Thom Tillis (North Carolina), all up for reelection in battleground states, have accused the House of overreaching.

Others, including Susan Collins of Maine, have started telling reporters they don't want to comment on the impeachment question because they might end up serving as de facto jurors, a line that conveniently keeps them out of the daily political fray. Collins has yet to say whether she's running next year, but she could face the toughest fight of her career if she did, having to court voters in a state that went for Hillary Clinton in 2016. Many Democrats who have voted for Collins in the past are angry over her support for Trump's agenda and her vote to confirm Supreme Court Justice Brett Kavanaugh, causing her approval ratings to tumble.

By contrast, an impeachment fight could benefit McConnell—who is himself running for reelection next year—given that Trump won his state, ►

● Republican senators who voted against Trump's emergency border directive

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### Six Republicans Trump Should Keep Close

His fate could hinge on these senators



● MITCH McCONNELL  
Kentucky  
The Senate majority leader is up for reelection in a state that loves Trump.



● MITT ROMNEY  
Utah  
One of Trump's frequent critics within the party, Romney also has a major national platform.



● MARTHA McSALLY  
Arizona  
Appointed to fill John McCain's seat, McSally faces voters next year in a state she lost in 2018.



● BEN SASSE  
Nebraska  
Sasse, who has tried to position himself as Congress's moral voice, said the party shouldn't rush to defend Trump.



● CORY GARDNER  
Colorado  
He's one of the most vulnerable Republicans running for reelection in 2020, in a state Hillary Clinton won easily.



● SUSAN COLLINS  
Maine  
Seen as a crucial swing vote, Collins is vulnerable on both the left and the right in her state.

◀ Kentucky, by 30 points. McConnell's campaign has attacked Amy McGrath, his Democratic rival, for supporting an impeachment inquiry.

Trump's best protection remains the constitutional requirement that two-thirds of the Senate vote to remove him from office, rather than the simple majority it takes to impeach in the House. No president has ever been removed by Senate vote—Richard Nixon resigned before he could be—and for the Senate to do so in this case would require an almost unimaginable 20 Republican votes to convict.

Even a few defections, however, could damage the president heading into 2020. The White House would have to worry the most about senators like Romney, the 2012 Republican nominee who ripped Trump's character in 2016 and, like some other Republican senators, refused to

vote for him. And Trump has little leverage over long-serving senators planning to retire, such as Lamar Alexander of Tennessee.

There is some precedent for Republican senators turning against the president. Earlier this year, a dozen Senate Republicans, including Alexander, Collins, and Romney, defied Trump on his emergency declaration at the border, despite McConnell's publicly encouraging them to "vote for border security." The opposition was enough to rebuke Trump, but not enough to override a veto, making it a relatively safe show of independence. A vote to remove the president from office would of course be far more consequential—and potentially far more politically dangerous. —*Steven T. Dennis*

THE BOTTOM LINE While Trump has little reason to fear a mass Senate desertion, some Republicans in the upper chamber have been cagey on the subject of impeachment.

# Rudy Giuliani, Front and Center

● The former prosecutor's actions are at the heart of the case against Trump

Congress's impeachment inquiry into President Donald Trump is going to look a whole lot like an investigation of Rudy Giuliani. The president's personal lawyer, public attack dog, and shadow diplomat is at the center of the storm brewing over Trump's attempt to pry damaging information about Vice President Joe Biden out of Ukraine. Whatever happens, Giuliani will play a pivotal role.

Among the questions House Democrats are asking: What is the extent of Giuliani's involvement in Trump's effort to dig up dirt on a potential political rival? Already, House Democrats have called several of Giuliani's business partners and government contacts to testify and demanded that he produce documents related to his communications with a range of associates in Kiev and within the U.S. Department of State. "He could claim an attorney-client privilege and refuse to testify," says John Barrett of St. John's University School of Law. "And I'm not sure it would be worth the House's time and trouble to challenge such claims in court."

Giuliani has flip-flopped publicly on whether he'll cooperate. Reached by phone on Oct. 1, he declined to comment on whether he'd comply with the subpoena. By then he'd also hired his old friend Jon Sale, an assistant to Watergate Special Prosecutors

Archibald Cox and Leon Jaworski, to represent him in the subpoena fight. Sale says he can't say yet whether Giuliani will comply. "It's a complex issue," he says. "A lot of potential privileges."

The crusading prosecutor who took down dirty financiers and dirtier organized crime lords as a U.S. attorney in the 1980s and became known briefly as "America's Mayor" after the Sept. 11 attacks now faces several forms of legal jeopardy, all stemming from his unofficial, ill-defined role within the Trump administration. Before Giuliani began working as Trump's unpaid personal lawyer in the probe into Russia's interference in the 2016 election, he was a prominent Trump campaign surrogate and briefly thought to be a contender for secretary of state.

As the House barrels ahead with its impeachment inquiry, Senate Democrats have zeroed in on Giuliani's private consulting business and whether he's broken federal lobbying laws by selling his services to foreign leaders, including prominent clients in Ukraine. Since Trump took office, Giuliani has earned fees from Ukrainian billionaire Victor Pinchuk and advised the mayor of the eastern city of Kharkiv in a contract paid for by Pavel Fuks, another Ukrainian oligarch. On Sept. 25, seven Democratic senators wrote to the U.S. Department

**"If Trump directed Rudy's activities, then he's criminally responsible for them"**

of Justice, renewing a demand for an investigation into Giuliani's contracts with foreign clients originally made a year earlier.

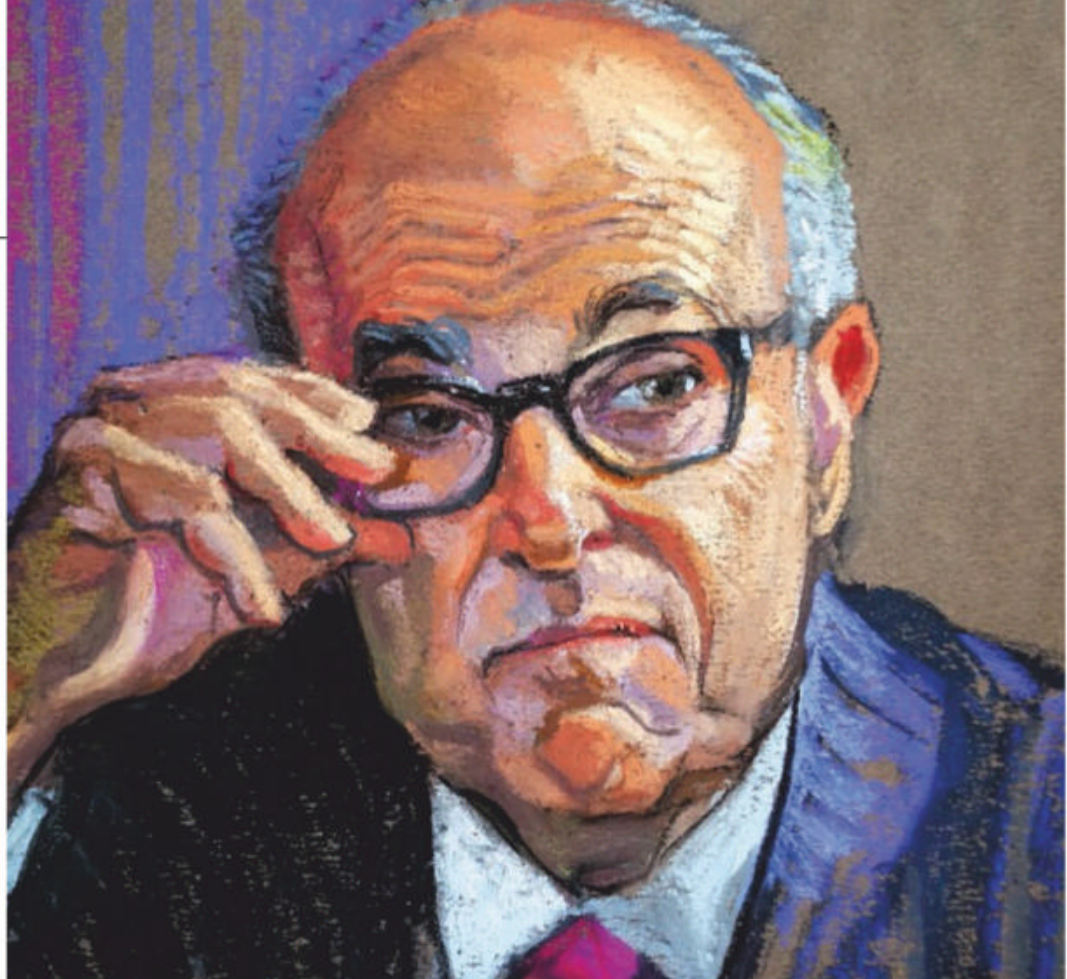
At the same time, former prosecutors say, Giuliani could be in violation of the Logan Act, a rarely enforced federal statute that forbids private citizens from conducting unauthorized negotiations with foreign governments that have disputes with the U.S. In early May, the State Department unexpectedly recalled Marie Yovanovitch, the U.S. ambassador in Kiev, whom Giuliani falsely accused of helping bring to light secret payments made by the party of Ukraine's then-President Viktor Yanukovich to former Trump campaign chairman Paul Manafort.

According to a whistleblower complaint made public on Sept. 26, Giuliani also spent months reaching out to Kiev through back channels in an effort to persuade officials to dig up dirt on Biden and his son Hunter, who sat on the board of Ukrainian natural gas company Burisma Holdings. Giuliani's claim, which has been debunked by officials in the U.S., Ukraine, and European Union, is that Biden pushed for the ouster of Ukraine's prosecutor general in 2016 to quash a probe into Burisma.

The whistleblower's allegations principally concern a July 25 phone call between Trump and newly elected Ukraine President Volodymyr Zelenskiy. According to a summary of the call released by the White House, Trump asked Zelenskiy to do him a "favor" and investigate a conspiracy theory that fixes blame for interference in the 2016 election on Ukraine instead of Russia. Then Trump asked his counterpart to investigate the Bidens, saying twice that he'd have Giuliani and Attorney General William Barr follow up. On Oct. 1, Zelenskiy stated at a press conference that he'd had no contact with Giuliani by phone or in person.

Giuliani has said his overtures to Ukrainian officials were sanctioned by the State Department, but the whistleblower complaint makes the situation appear otherwise. The document describes efforts by former U.S. Special Representative to Ukraine Kurt Volker and Gordon Sondland, the U.S. ambassador to the EU, to help Ukrainian officials make sense of the different messages they were getting from Giuliani and through official channels.

Volker, who resigned as the investigation into Trump's behavior began to gain momentum, didn't respond to a request for comment. He was scheduled to appear before the House Intelligence Committee to give a deposition on the matter on Oct. 3, which could help clarify whether Giuliani was acting on behalf of the government or Trump. At press time, it wasn't clear when that testimony would be made public, if at all.



"Whatever Rudy was doing, the question was, what did Trump know about that, and did Trump direct it?" says Renato Mariotti, a former federal prosecutor and frequent presidential critic. "If Trump directed Rudy's activities, then he's criminally responsible for them." Trump's Justice Department is unlikely to pursue an investigation of Giuliani, especially given that Barr's own conduct is being questioned as part of the whistleblower complaint.

Giuliani isn't the first Trump fixer to come under fire since he's been in office. His predicament recalls the one that confronted Michael Cohen, who once served as Trump's personal lawyer and factotum. Cohen's hush-money payment to adult film actress Stormy Daniels on the eve of the 2016 election served as the basis for a wide-ranging federal investigation of his financial records and tax returns, resulting in multiple felony convictions and a three-year prison sentence. Cohen eventually flipped on the president, testifying before Congress that Trump had directed him to pay off Daniels. During that unfolding drama, Giuliani became the president's cudgel on TV, slamming Cohen as an "incredible liar."

So far, Giuliani has given no indication that he'll abandon the president to save himself. In this, he may be like another former presidential aide who once came under fire from Congress, G. Gordon Liddy. An operative on President Richard Nixon's reelection campaign, Liddy refused to testify before the Senate on his role in the Watergate break-in. He was eventually convicted of conspiracy, burglary, and illegal wiretapping and served 52 months in prison. —*Stephanie Baker and Greg Farrell, with David Voreacos*

**THE BOTTOM LINE** Giuliani's many legal risks relate to his ambiguous role in the Trump administration and whether he acted as an agent of the government or as a private citizen.



# Manufacturing



## Toyota Remakes Its Biggest Plant

Elkington at a Camry assembly line

By adding more popular models to the lineup, the carmaker aims to bring the factory to capacity

Toyota Motor Corp.'s largest plant in the world sits on 1,300 acres surrounded by rolling fields of bluegrass in rural Kentucky. With floor space equal to about 170 football fields, the Georgetown factory houses more than 2,000 industrial robots, 6 cafeterias, 2 paint shops, and an indoor basketball court. Walking down crowded aisles between parts bins and half-assembled cars, plant manager Susan Elkington scans the facility, obsessed with finding more open space. "I talk a lot about space," she says. "If you want something new, you need space first." Say for room to build a RAV4 sport utility vehicle, which isn't presently built in Georgetown but Elkington expects will be starting in January.

The 48-year-old engineer was tapped to

run the factory last year, and her first order of business has been to add the gas-electric hybrid version of the popular SUV to one of the plant's three assembly lines. Retrofitting a Camry sedan assembly line for the RAV4 is part of a company mandate to update Toyota's oldest North American plant with newer technology, more efficient processes, and fresher products. "We want to continue to be competitive, and sometimes it's very hard to compete against newer plants," Elkington says.

Georgetown is fighting to hold on to its status as Toyota's biggest plant globally as demand for its sedans has plummeted and the three-decade-old factory deals with high fixed costs, falling productivity, and the rise of a network of sibling plants in North America

October 7, 2019

Edited by  
Dimitra Kessenides and  
David Rocks

churning out more popular crossovers, SUVs, and trucks.

When the factory opened in 1988—the first wholly owned Toyota plant in the U.S.—it was designed to assemble hundreds of thousands of mass-market vehicles, such as the midsize Camry. For 27 years that was Toyota's best-selling car in America. The Georgetown plant's output peaked at 514,590 vehicles in 2007, just before the Great Recession. Americans' appetite for sedans didn't keep pace with a recovery in auto demand over the past decade.

Toyota boosted annual capacity at its Kentucky facility to 550,000 vehicles with the addition of a third assembly line in 2015 for a Lexus luxury sedan that shares parts with the Camry. But it's only cleared the half-million production mark once since then—it made 500,766 vehicles in 2016. In 2018, Georgetown's production totaled 430,224 cars, a sign of rapidly changing auto tastes. Now, says Jim Jordan, an engineering manager in charge of the plant's RAV4 project, the focus is on bringing the plant up to capacity. "That's a point of pride for us," he says.

That's meant investing \$238 million in Kentucky to add the RAV4 hybrid as well as a hybrid version of the Lexus ES sedan, bringing Toyota's total investment in the plant to \$7 billion since it was first announced in 1985.

Bragging rights also are harder to come by than in years past, when Georgetown had fewer rivals inside and outside the company and it racked up a string of quality awards. The factory took top place for fewest defects in a J.D. Power ranking in 2016 for its new Lexus assembly line. But it earned the highest award only twice over the past 10 years, compared with four times in its first decade producing the Camry. The J.D. Power citations, based on consumer feedback on new-car purchases, are an important barometer of plant efficiency in the industry and of vehicle quality, which can affect demand and pricing. "In the past it would win fairly frequently, but today it's much tougher," says Dave Sargent, vice president of J.D. Power's global automotive practice.

Georgetown's ebbing fortunes have increased pressure to cut costs and boost efficiency. In 2017, Elkington's predecessor, Wil James, warned employees that the plant faced an uncertain future if it didn't do more to reduce costs. He said it was less expensive to build a Camry in Japan and ship it to Kentucky than it was to manufacture one locally. "I'm not sharing this to scare you but to heighten your awareness of the current risk we now have," James said, urging workers to make as much progress on cost reduction and efficiency as they had in safety and quality.

His message was clear: If the plant doesn't stay competitive with peers, it could put jobs at risk in Georgetown.

That resonated deeply with the 8,000 full-time workers, none of whom have ever been laid off—even when Toyota completely stopped production for several weeks during the worst of the recession. But the plant's 1,600 temporary workers don't have the same job

security and benefits, and critics say Toyota has used these lower-paid employees as a buffer and allege it has underpaid some of them for years.

Toyota has denied the claims and says it always complies with legal requirements. But it agreed to settle a class-action suit filed last year by temporary workers against Toyota Motor Manufacturing Kentucky for alleged pay violations over a six-year period starting in 2013, according to public filings. Terms of the deal, which a federal court preliminarily approved in August, are confidential. "We elected to make an early resolution and end the costly litigation," a plant spokesman said in a statement. "Toyota values its team members and offers fair pay and benefits in accordance with the law."

Elkington was made plant chief after a three-year assignment at headquarters in Toyota City, Japan, during which she oversaw global manufacturing operations and toured more than 200 Toyota facilities in every region outside the U.S. The Georgetown posting is the result of an effort by the company to nurture future leaders who are well-versed in Toyota production and empowered to run their plants more autonomously. Overseas plants are no longer required to use blueprints from Toyota City and are adopting smart-data-led production practices sometimes more advanced than those in Japanese plants.

"Headquarters doesn't interfere in the day to day unless they need to," says Steve St. Angelo, a former Georgetown plant head who recently retired after heading Toyota's Latin America operations. "Local plants are more on their own now."

Kentucky is installing advanced flaw-detecting cameras, self-driving supply carts, and systems for sequencing component delivery so fewer parts need to be stored on the factory floor. That will require fewer workers doing manual tasks and will boost efficiency in line with newer factories that integrate parts production on-site. Toyota also is reconfiguring equipment to match its most flexible factories in Japan, which make a half-dozen different models on the same assembly line. "One of the big things that is changing is the plant layout," says Elkington, who's creating space by eliminating a large meeting area and moving training rooms to an administrative area of the plant.

A gasoline-powered RAV4 in addition to the newly arrived hybrid might also be in Georgetown's future as one of several possible new models, she says, something which could lift output closer to the plant's capacity.

Raising annual production above half a million vehicles looms large as a make-or-break goal for the plant head. "I think we can," Elkington says. "When we'll get back there, I'm not sure." —*Chester Dawson*

**THE BOTTOM LINE** Rapidly changing tastes have led Toyota to invest \$238 million to add the assembly of more popular models to its Kentucky plant.



Surging demand for products such as Louis Vuitton handbags means the luxury sector is a bright spot for retail. In September, LV opened its 16th leather workshop in France, where it plans to add 1,500 jobs over the next three years. —*Robert Williams*



1



2

1 Bee houses on the property of the new facility, which is in Beaulieu-sur-Layon  
2 Employees at the workshop, which specializes in handbags  
3 Hand-stitching a leather strap  
4 Conducting a quality check

Recent years have seen Louis Vuitton open factories from Tuscany to Texas. But the 165-year-old brand, whose sales surpassed €10 billion (\$10.9 billion) in 2019, says it's committed to keeping the majority of its production in France. "If we let the craftsmanship leave, even to places as close as Italy, I think it's inevitable that the creativity in the sector will follow," says Chief Executive Officer Michael Burke. To keep employees happy, the 60,000-square-meter (646,000-square-foot) facility in western France features natural lighting, minimal noise, and optimal energy use.



3



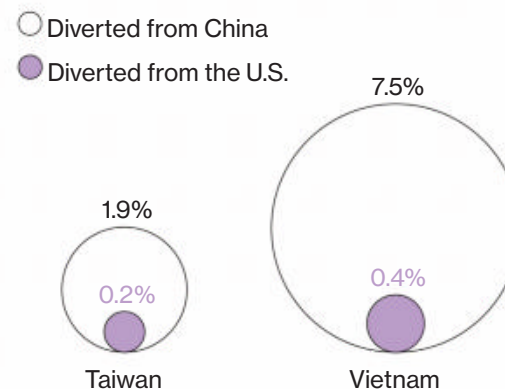
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# Taiwan Tech Rethinks China

These men created a manufacturing boom. Now they're poised to pivot

Thirty years ago, Taiwanese tech entrepreneurs started moving factories to the mainland, kicking off a global economic transformation that's made China the world's top manufacturer of electronics. Today, four Taiwan-based companies—Foxconn Technology Group, Inventec, Quanta Computer, and Compal—together account for some 40% of exports from China to the U.S. of computers, phones, and related items. But faced with growing trade tensions and U.S. tariffs, the leaders of those companies are reconsidering their commitment to China. Although any pivot away from the country is just starting, factories that leave won't come back anytime soon. Here are four men responsible for the shift decades ago who will play a key role in deciding how much longer China will remain the global manufacturing king. —*Debby Wu*

Contribution to GDP from output diverted by the U.S.-China trade war as of Q1 2019



Terry Gou, 68, founder and board member, Foxconn Technology Group



- KEY PRODUCTS: Apple iPhone, Amazon Kindle, Google Pixel
- SIGNS OF CHANGE: Expanded Indian manufacturing of older-model iPhones; building a plant in Wisconsin

Gou started out making knobs for black-and-white TVs, then connectors for game-console maker Atari, then just about every gadget imaginable. Today, Foxconn is the world's biggest electronics contract manufacturer, with facilities in more than 30 Chinese cities and in 14 other countries. Gou relinquished his chairmanship this year for a failed bid for Taiwan's presidency, but company insiders say he remains the ultimate decision-maker at Foxconn. While the company has faced criticism for its treatment of factory workers, Gou has raised wages and improved working conditions. A promised facility in Wisconsin praised by U.S. President Trump hasn't yet opened, but the company says it will build server components and device screens there.

Yeh Kuo-I, 78, founder and board member, Inventec Corp.



- KEY PRODUCTS: HP laptops, Apple AirPods, Google servers
- SIGNS OF CHANGE: Plans to move production of laptops for the U.S. market to Taiwan by December

Yeh is a key backer of Taiwanese tech companies and has invested in businesses from real estate to orchids. As the trade war intensified, an Inventec executive said Yeh had offered to convert an orchid-growing facility in Vietnam into an Inventec factory to skirt U.S. tariffs. While the comment was in jest, Inventec has shifted some production of small appliances to Malaysia and has said it will move manufacturing of U.S.-bound laptops to Taiwan.

Barry Lam, 70, founder and chairman, Quanta Computer Inc.



- KEY PRODUCTS: Apple MacBook, Apple Watch, Amazon and Google servers
- SIGNS OF CHANGE: Expanding capacity in Taiwan and looking at locations elsewhere in Asia

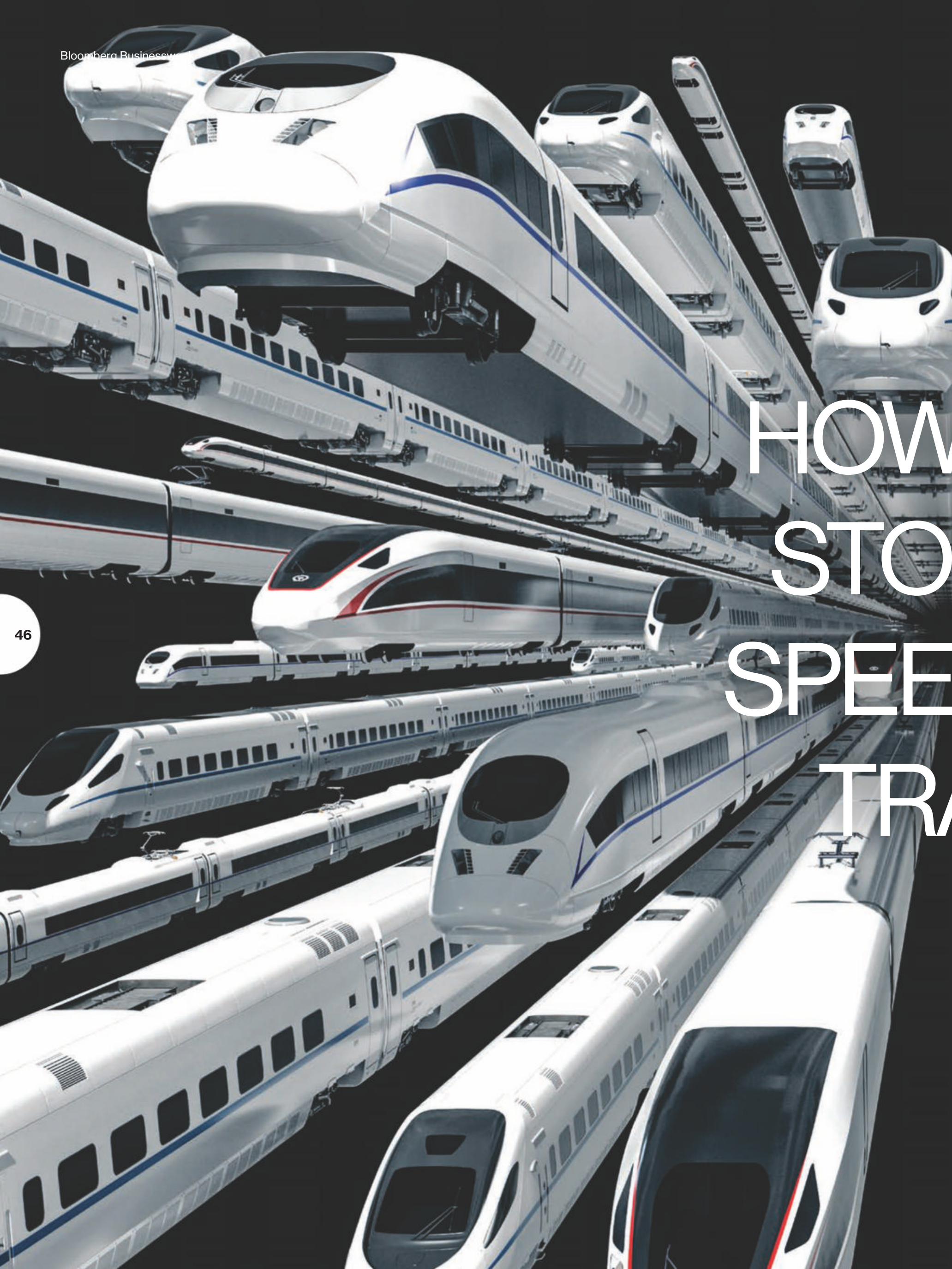
Lam was born in Shanghai, but his family fled to Hong Kong during the Chinese civil war, and he studied in Taiwan. Although he was diagnosed with lung cancer more than a decade ago, he's still the public face of Quanta. Lam describes the company as a turtle—patient and persistent—but it can strike fast when necessary. He's bought a factory adjacent to a Quanta facility in the northern Taiwanese city of Taoyuan, where he'll make what he calls "premium products"—likely servers and high-end laptops. He's also scouting locations in Southeast Asia and expanding a 7-year-old data center business in the U.S.

Ray Chen, 70, vice chairman, Compal Electronics Inc.



- KEY PRODUCTS: HP and Dell laptops
- SIGNS OF CHANGE: Adding notebook-manufacturing capacity in Taiwan and considering further investments in Vietnam

Chen has a mixed record in China: In 2018, Lenovo Group paid Compal \$257 million to unwind a joint venture the two founded in 2011. But a year earlier, Compal lost more than \$130 million when Chinese phone brand LeEco failed to pay for handsets. Today, Compal is looking back home, with a new factory in Taoyuan and expansion of a plant nearby. After Trump introduced his tariffs, Compal began making networking gear in Vietnam, and the company says it may add other products to its facilities there.

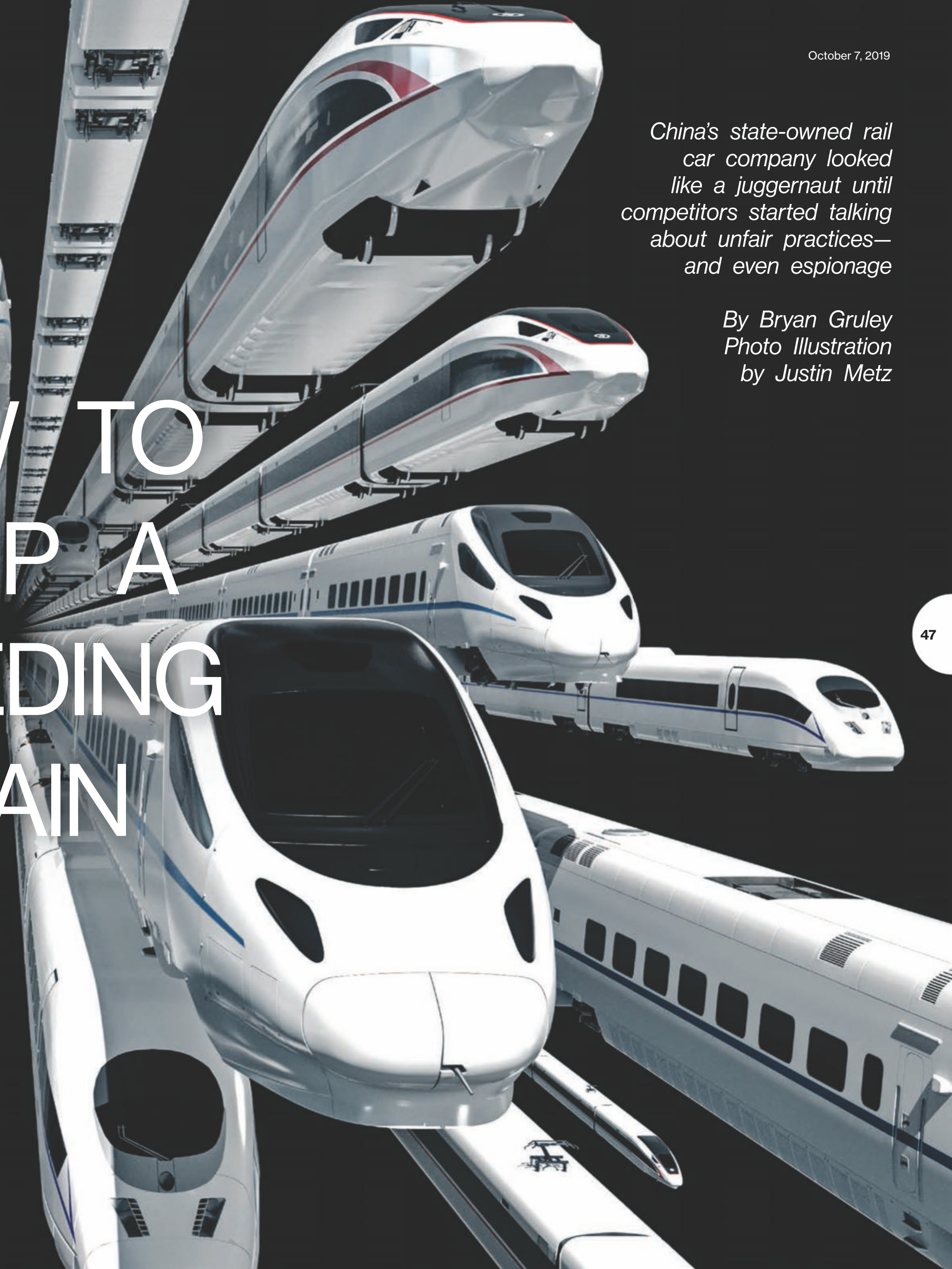


# HOW STO SPEE TRA

*China's state-owned rail car company looked like a juggernaut until competitors started talking about unfair practices—and even espionage*

*By Bryan Gruley  
Photo Illustration  
by Justin Metz*

# W/ TO P A DING AIN



The concrete floors shine in the new \$100 million factory on Chicago's far South Side. Towering shelves painted in blue, yellow, and red are mostly empty. The quiet is eerie, punctuated only by a forklift's occasional beep.

On a bank of 6-foot-high platforms rest the steel shells of five 48-foot-long passenger rail cars destined for the Chicago Transit Authority. Inside the cars, clutches of workers trace multicolored bundles of wire. Outside, others in safety helmets and glasses attach HVAC equipment to the undercarriages. All work for the Chicago subsidiary of China Railway Rolling Stock Corp. And what they're doing scares the hell out of some U.S. manufacturers and Washington politicians.

CRRC is the world's largest maker of freight and passenger rail cars. Over the past decade, the state-owned Chinese company has gone from country to country underbidding rivals and taking business from giants such as Alstom, Bombardier, Siemens, and Hyundai's rail unit, Rotem. When Siemens and Alstom tried to merge two years ago, before being blocked by European Union regulators, they cited the CRRC juggernaut as one rationale. The Chinese company effectively wiped out



Breaking ground for the Chicago factory

Australia's homegrown rail car industry in less than a decade. Early in 2018, CRRC declared in a since-deleted tweet, "So far, 83% of all rail products in the world are operated by #CRRC or are CRRC ones. How long will it take for us conquering the remaining 17%?"

Since 2014, CRRC has won \$2.6 billion in contracts to supply subway cars to transit authorities in Boston, Chicago, Los Angeles, and Philadelphia. The Chicago factory and another in Springfield, Mass., along with a parts-making facility in Los Angeles, collectively employ about 365—including more than 150 union members earning as much as \$32 an hour—and plan to add dozens more. In Chicago, production manager Brian Vasquez strolls the floor pointing out empty areas where his facility intends to expand into, among other things, double-decker commuter cars. "It kind of looks like overkill," Vasquez says, "but CRRC is preparing for the future."

That future is uncertain, in no small measure because of the dysfunctional relationship between the U.S. and China. This is how fraught things are: In a Congress where it's almost impossible to get anything significant done, four U.S. companies in the freight car business have persuaded the House and Senate to pass legislation that would withhold federal funds for any municipal project using CRRC cars.

CRRC's antagonists echo the Trump administration's harangues against Huawei Technologies Co. and ZTE Corp. They argue that CRRC will use its advantages as a subsidized company to dominate not only the U.S. passenger rail industry but also, eventually, the larger freight car business. They say, too, that China will use CRRC rail cars for espionage, an

economic and military security concern. Lawmakers from both parties have embraced these arguments, though there's clearer evidence for the former than the latter.

In either case, if you'd like Washington to help you kneecap a Chinese rival, now is a good time. FBI Director Christopher Wray told a congressional hearing in July that "there is no country that poses a more severe counterintelligence threat to this country right now than China," accusing it of trying "to steal their way up the economic ladder at our expense."

Lobbyist Erik Olson of the Rail Security Alliance, which represents the four domestic freight car companies, says it's perilous to give CRRC any benefit of the doubt. "You can't mitigate against the threat," Olson says. "You have to choose risk avoidance: Don't buy the train in the first place."

On a sunny March day in 2017, then-Mayor Rahm Emanuel plunged a shiny silver shovel into a mound of dirt 20 miles south of downtown Chicago. He, along with a few other local politicians and CRRC officials, was breaking ground for the factory. It was going up in the blue-collar Hegewisch neighborhood on a 45-acre site near a Ford Motor Co. plant, a United Auto Workers hall, and a couple of beer-and-shot joints.

The project promised the community 170 jobs and the renewal of an industry that had disappeared when the last rail car shop closed in the early 1980s. "Four years from now, Chicagoans like myself will be commuting on a rail car made in Chicago by Chicagoans," Emanuel said. That the plant would be built by a company based in Beijing didn't seem to matter.

No U.S. companies make passenger rail cars. That's partly because Americans don't travel on trains nearly as much as they do in automobiles. Most of the companies that make passenger rail cars for the U.S. hail from countries where personal train travel is more common: Alstom (France), Hyundai Rotem (South Korea), Kawasaki (Japan), and Siemens (Germany).

And CRRC. The company dates to 1881, when Xugezhuang Machinery Works built China's first steam locomotive, nicknamed "Rocket of China." Today, CRRC is effectively a subsidiary of the People's Republic, with more than 180,000 employees working at more than 40 subsidiaries around the world. The current version of the company was formed by the merger of two huge makers of rail gear in 2015, the same year the national government issued its Made in China 2025 policy. That initiative listed 10 industries in which China seeks to become a global power. No. 5 is advanced rail equipment. China has tried to mute its ambitious tone as the trade war has heated up, but a recent report from the Berlin-based Mercator Institute for China Studies said the country "has not at all abandoned its economic—and strategic—goal of catching up with Western industrialized countries and gaining a competitive edge in high-tech and emerging technologies."

CRRC posted a profit of \$1.5 billion last year on revenue of \$33.1 billion. It landed its first U.S. contract in Boston five years

*“So much of the conversation about China is what we think they might be up to but so far have no evidence for”*

ago and secured orders to build rail cars for Chicago and Los Angeles not long after. In Boston, its \$567 million bid to supply 284 subway cars beat out the closest rival, Hyundai Rotem Co. Ltd., by \$150 million. In Chicago, its \$1.3 billion bid for 846 cars was \$226 million less than the offer from Canada’s Bombardier Inc. Dave Smolensky, a spokesman for CRRC’s plant in Chicago, says Bombardier originally bid lower in a previous round in which CRRC didn’t participate, then raised its bid after a competitor dropped out. Bombardier “thought they were going to be the sole bidder,” he says. “It’s a perfect example of what happens when you lose competition.” A Bombardier spokeswoman calls this a misrepresentation, saying the requirements changed for the second bid. “We submitted a highly competitive proposal designed to win.”

CRRC’s critics say the Chicago contract was the almost inevitable result of a state-owned company undercutting rivals with financial help from back home and dangling baubles like new factories before local politicians. According to the U.S.-China Economic Security and Review Commission, created by Congress in 2000, CRRC received \$194 million in subsidies in 2014 and an additional \$268.7 million the next year. However, a recent study by the Congressional Research Service concluded that allegations of unfair undercutting have “not been proven,” given that the company failed to win contracts in Atlanta and New York City.

It wasn’t CRRC’s initial success making U.S. passenger cars that provoked the company’s antagonists, but a flop in freight cars. The freight business is decidedly different than its passenger cousin. For one, it’s a viable domestic industry—consulting firm Oxford Economics estimates that it accounts for about \$5 billion in annual revenue and 65,000 U.S. jobs. While passenger cars, with their interior seating, air conditioning, and other comfort features, can cost more than \$1 million apiece, a freight car rarely costs more than \$150,000. But freight is a more consistent business over time, because while it’s linked to broad economic cycles, it relies less on customers’ episodic decisions to upgrade their fleets. Municipalities that use federal funds to buy rail cars must also follow “Buy American” laws dating to the Great Depression that require manufacturers to use minimum levels of parts from U.S.-based suppliers. No such rules apply to freight.

CRRC’s freight car ambitions in the U.S. first became evident in 2014, when it joined with a Wilmington, N.C., rail technology company called Vertex and a Chinese private equity firm to form Vertex Railcar Corp. Vertex was to build a variety of freight rail cars in Wilmington, creating more

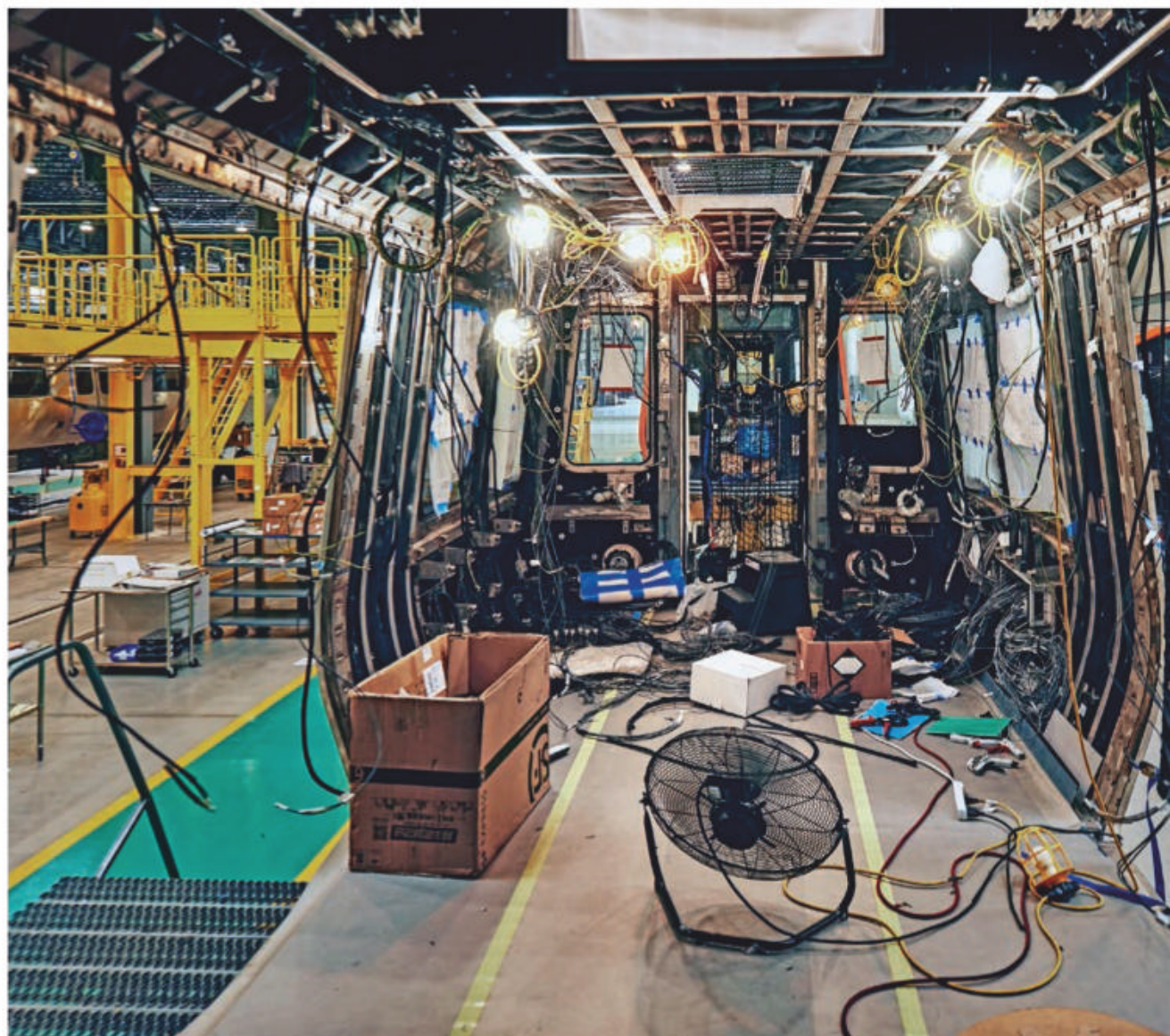
than 1,000 jobs. The company apparently sold some cars, but legal and other troubles forced it out of business in 2018. CRRC’s involvement nevertheless caught the attention of Amsted Rail Co., a Chicago-based maker of axles, brakes, wheels, and other freight car parts.

Olson, of the Rail Security Alliance, says Amsted was concerned about CRRC partly because Chinese state-owned enterprises tend to rely heavily on Chinese suppliers. Amsted had noticed with alarm that after CRRC’s two predecessor companies entered the Australian rail car industry in 2016, they took over. The largest Australian rail car maker, Bradken Pty Ltd., had 40% of the market in 2008; by 2017, it had exited the freight and passenger markets and CRRC claimed virtually all of both. Amsted sought help from Olson, a former congressional staffer who had joined Venn Strategies, a Washington lobbying firm.

In May 2016, Olson helped form the Rail Security Alliance with Amsted and three other U.S. rail equipment makers: American Railcar Industries, Greenbrier Companies, and Trinity Industries. That’s not an especially large lobbying force, but it quickly proved effective. By September more than 50 congressional Republicans and Democrats had signed letters to the Committee on Foreign Investment in the U.S., or Cfius, urging it to review CRRC’s role in the Vertex joint venture. The lawmakers argued that the Chinese company was likely to shift purchasing to China, leaving Americans with nothing more than assembly work. They also raised concerns about cybersecurity.

Cfius never acted on Vertex. But the U.S. suppliers started lobbying for legislation that would ban municipalities from accepting federal funding for contracts with CRRC. Key congressional supporters included Texas Senator John Cornyn, a Republican, and others with rail interests in their states or districts. Last year the ban on federal money made it into a government funding bill but was stripped out before the legislation reached President Trump’s desk. The companies have continued pushing for the ban, amplifying concerns that CRRC trains pose a cybersecurity threat.

**T**he ground in Washington was fertile for such talk. As the Rail Security Alliance cranked up its spy-train campaign, the Pentagon was banning the sale of Huawei and ZTE phones on U.S. military bases, and the Army was stripping its bases of surveillance cameras made by Chinese state-owned Hangzhou Hikvision Digital Technology Co. China’s government was denying reports that it had bugged the headquarters it built in Ethiopia for the 55-nation African Union. On Capitol Hill, the alliance circulated a glossy 15-page pamphlet, authored by retired U.S. Army Brigadier General John Adams, highlighting potential economic and cybersecurity threats posed by CRRC. It raised the possibilities of China secretly monitoring military rail movements and facilitating toxic chemical spills. “I know they have the capability because we have the capability. We just don’t do it,” Adams says. “And I do believe,



CRRC's Springfield plant, where cars for the orange line of the Boston T are being built

◀ based on their behavior, that they have the intent.”

It was in this atmosphere that CRRC emerged in late 2018 as a possible bidder on a contract to supply rail cars to the Washington, D.C., subway system. Security hawks immediately started floating the prospect of China using secretly implanted devices to watch and listen to policymakers as they rode the rails near the Pentagon and Capitol. Congressional hearings followed. The legislation that fell short last year started moving again, and the Rail Security Alliance picked up support from the Alliance for American Manufacturing, the Railway Supply Institute, and other advocacy groups.

There have been no reports of CRRC trains being used to snoop. “It’s a conspiracy theory right up there with Bigfoot,” says Smolensky, the company spokesman in Chicago. “Once a rail car is delivered to the transit authority, they have full operational control. The manufacturer does not have access to the rail car.” Robert Puentes, chief executive officer of the nonprofit Eno Center for Transportation, says transit authorities carry out regular quality inspections and it’s “ludicrous” to think a manufacturer could sneak surveillance devices into trains. “If the federal government really wanted to be helpful,”

he says, “instead of blocking CRRC, they could give people more money to do better inspections.”

It’s not always that simple. The inspector general of Washington’s transit authority found that third-party contractors and vendors could unwittingly make the subway system vulnerable to cyberattacks. In theory, as CRRC helps to maintain the cars it built, the company could create backdoors for intrusion via software updates. Those “could be turned on and off as needed,” Adams says.

CRRC’s adversaries have seized on a federal indictment charging a Chinese software engineer at an unnamed Chicago locomotive manufacturer with stealing proprietary information and taking it to China. Although CRRC wasn’t implicated, the alleged theft “makes clear that the U.S. rail market is also becoming a target” of China, says a recent report by consulting firm Veretus Group.

Freight cars pose a somewhat different vulnerability than passenger ones because they ferry economically valuable items such as lumber and oil, and also because they’re crucial to military mobilizations. “Rail networks are particularly at risk because they are extensive, dispersed, and complex,” says a recent report by management consulting firm Oliver Wyman. The industry is rolling out a nationwide web of Wi-Fi, GPS, and other technologies designed to smooth scheduling and prevent crashes; that, too, could be a target for bad actors, the report says.

“So much of the conversation about China is what we think they might be up to but so far have no evidence for,” says Bruce Dickson, a political science professor at George Washington University. “You either are suspicious that they

*“If it isn’t CRRC, who’s it gonna be? There is no American rail car manufacturer”*



might do something and deprive yourself of a high-quality, low-cost rail car, or you can say there's no evidence and then look like a dupe."

**J**ohn Scavotto Jr., business manager of Sheet Metal Workers Local 63, which represents some workers at CRRC's Springfield plant, 90 miles west of Boston, says it's frustrating that CRRC hasn't gotten more credit for paying Americans good union wages. "Before this plant was here, this was a big, empty lot," he says. "CRRC is offering Springfield a lifeline. It's a place where you know you're going to go every day and walk out in 20 years with a pension. There's security."

Scavotto says he gets "wound up" at talk of CRRC building spy trains, because his members worry it could cost them their jobs. "Are we really saying to ourselves that the Chinese are smarter than us?" he says. "If it isn't CRRC, who's it gonna be? There is no American rail car manufacturer. We let the Germans come in here, South Korea, France—they're all foreigners."

CRRC's critics say the Chicago and Springfield factories employ far fewer workers than would be required to manufacture entire rail cars—hence the relative quiet in the two facilities. The company ships prefabricated train shells to the U.S., where workers fit them out with necessary equipment. Officials at the Chicago and Springfield plants say they satisfy Buy American rules, which require 70% U.S. content. The recent Congressional Research Service study concurs.

"Do we have an advantage in building shells in China?

Absolutely," says Springfield facility director Vince Conti, a 30-year rail car industry veteran who previously worked for Bombardier in China and India and elsewhere. "It feels like we're being targeted because we're a Chinese company."

Well, yes. The question is whether the concerns surrounding CRRC are legitimate. The Rail Security Alliance has spent \$2 million on lobbying, most of it going to Olson's firm, Venn Strategies, according to OpenSecrets.org. The two U.S. CRRC factories, which have retained lobbyists only in the past year or so, have spent at least \$160,000. The Massachusetts factory recently launched a website that seeks to counter anti-CRRC claims, boasting that the plant uses parts sourced from New Jersey, South Carolina, Wisconsin, and other states. The site also links to *Wall Street Journal* and *Boston Globe* editorials casting trains as no more of a spying threat than ubiquitous Chinese-made smartphones.

None of this is likely to stave off the legislation, which this time is part of a defense spending bill. Assuming that it becomes law, CRRC would be allowed to fulfill its current contracts, all of which involve federal funds except the one with Boston. Any transit authorities that sign a contract with CRRC in the future would have to do without federal dollars.

That could change the calculations considerably. CRRC's spokeswoman in Springfield, Lydia Rivera, says the legislation would eventually force the factory to close. Smolensky, the spokesman in Chicago, won't go that far. He says CRRC will continue to educate policymakers about the "unintended consequences" of the legislation: lost jobs and higher prices for rail cars. **B** — *With Chunying Zhang*



A large, glowing yellow butter wheel is the central focus, set against a backdrop of a vibrant green field and a dramatic sky with a rainbow. The scene is illuminated by bright, white light rays that create a sense of magic and wonder. The overall composition is visually striking and evokes a sense of natural beauty and quality.

# Pat o' Gold

*Kerrygold's butter has conquered America's kitchens, because its happy Irish cows eat only grass. Oh, yeah, and great marketing*

*By Elizabeth Dunn*



In 1999 the Irish Dairy Board, which had been selling butter and cheese abroad under the Kerrygold label for almost four decades, shipped a few thousand foil-wrapped bricks of butter to the U.S. The group didn't have high hopes. American farmers produced more than enough milk to go around, and tariffs on imported butter, along with the cost of shipping it, meant that Kerrygold would be substantially more expensive than it was in Ireland. On top of that, the U.S. grocery industry was notoriously fragmented. With so many grocers to woo, penetrating the market would be an arduous process.

Twenty years on, Kerrygold is America's second-best-selling brand of butter by revenue—a result that surprises even the team that pushed to introduce it here in the first place. (Land O'Lakes, the domestic brand that's dominated shelves since 1921, holds the top spot.) If you've visited a supermarket dairy aisle recently, you're likely to have seen it: gold (salted) and silver (unsalted) foil blocks featuring an illustration of a grazing cow, with the Kerrygold name in a Celtic font. It's often displayed alongside Plugrá, a European-style butter produced in the U.S. by the Dairy Farmers of America Inc.; Lurpak, imported from Denmark; and Président, a French offering—all of which come in half-pound slabs, priced at a premium to Land O'Lakes and other mainstream domestic brands.

But Kerrygold is unique in its power to turn consumers into unpaid, yet vigorous, brand ambassadors. Sarah Jessica Parker, the actress, and Chrissy Teigen, the model and cookbook author, have both raved about it, unsponsored, on social media. Kourtney Kardashian called for it by name in recipes published on her now-shuttered app. (Perhaps it's a "K" thing?) Last year the actress Kate Beckinsale told *People* magazine that she packs Kerrygold in her suitcase when she travels.

Chefs rhapsodize about the butter's intense flavor and extravagantly creamy texture. Adam Biderman, the chef and owner of the Company Burger in New Orleans, says he spent most of his career using Plugrá until he tried Kerrygold and never went back. Jessica Quinn, the pastry chef at Rezdôra in New York City, says she's tested Kerrygold against other European butters and found that it stands apart. "It's rich and milky and bakes up with really nutty nuanced flavors," she says. She also says that cookies made with Kerrygold turn out crispier than with European alternatives.

After a childhood fed on Land O'Lakes, I, too, have the zeal of the Kerrygold convert. The butter is canary yellow, with a movie-theater popcorn richness that verges on the addictive. Many butters shatter or crumble when you cut or spread them cold, but Kerrygold is dense and pliable right out of the fridge, like modeling clay. In your mouth, it dissolves without waxiness or greasiness. Over the years I've graduated from smearing a socially acceptable sliver onto toast to eating it, like cheese, in thick slices on crackers. Quinn admits that her usual breakfast is a baguette with a slab of Kerrygold so massive her fellow cooks have started to tease her about it. When I speak to Katie Button, the chef and co-owner of two restaurants in Asheville, N.C., she mentions doing something similar. "It tastes like what butter tastes ►

◀ like in your mind, whereas so much butter just tastes sort of waxy, like fat and salt,” she says.

Of all the 50,000 items for sale in the average American grocery store, butter is one of the simplest: cream that’s churned to separate out the buttermilk. It can be cultured—fermented with live bacteria to bring out tangy notes—or salted. That’s pretty much it. And yet, according to the Irish Dairy Board (rechristened Ornuia Co-operative Ltd. in 2015), sales of Kerrygold products have increased by double digits in every one of the past nine years. Volume soared 30% in 2018 alone, and growth is now humming along at eight times the pace of the butter category overall. What on earth is Kerrygold doing?

“I guess you could say that Ireland kind of skipped the Industrial Revolution.” I’m in a car with two Ornuia employees, one of whom is reflecting aloud on Ireland’s landscape and economy, which both remain dominated by agriculture. We’re winding along lonely roads on the way to a dairy farm in County Waterford, along the country’s southeast coast.

Dairy is big business here. Buttermaking in Ireland dates back 6,000 years, and in the 19th century, the Cork Butter Exchange was the world’s largest butter market. The country’s mild, wet weather produces some of the world’s best grass-growing conditions, which has made dairy a natural export industry. In 1961 the Irish government set up the Irish Dairy Board, which created the Kerrygold brand the following year to boost the value of Irish dairy exports. (It’s been sold in Ireland, too, since 1973, and is currently the country’s best-selling butter brand.) Two-thirds of the land in Ireland is still used for farming, and 80% of that grows grass. Today the country has one dairy cow for every 3.6 citizens, with only 10% of the bovine output consumed domestically.

Three hours after leaving Dublin, we arrive at the home of Tom Power, a young farmer with sandy blond hair dressed in blue jeans and Wellington boots. He’s one of more than 14,000 Irish farmers who supply milk to Ornuia, a cooperative owned by Irish dairy processors, which are, in turn, owned by the farmers. It’s a misty day, and we’re surrounded by fields an electric, almost surreal shade of green. We pile onto a tractor to see the cows, which Power moves every 12 hours, so they always have fresh grass in front of them. He shows me an app on his phone that keeps track of how much grass is on his farm and which pastures have the greatest volume. “It’s like looking at how much money is in your bank account,” he says. Right now, he’s a rich man: This has been a superior year for grass.

Unlike in the U.S., where 100% grass-fed production represents only 1% to 2% of dairy farms, in Ireland a grass diet is the norm. Irish cows benefit from the longest grass-growing season

in Europe: They graze for as many as 300 days each year. In the winter months, they eat primarily fermented grass known as silage. Public policy plays a role, too. Ireland’s Department of Agriculture closely monitors each farm’s stocking rate, ensuring they don’t raise more cows than they have the grass to feed. With enough pasture available to support the cows, buying grain to feed them would amount to an added cost, without the added benefit.

After visiting the Power farm, we travel 30 minutes down the road to see where the butter gets made. I’m half-expecting quaint artisanal wooden churns; instead, we roll up to Kerrygold Park, a highly automated €38 million (\$42 million) facility capable of producing as many as 50,000 tons of butter per year. As we put on protective hairnets and scrub our hands with antibacterial soap, Norma Hanlon, the customer relationship manager, tells me that they churn butter here only from March to October, when the cows are out grazing and the cream is therefore at its best. That’s a hard-and-

fast rule, and the facility must make and freeze enough in this period to satisfy demand year-round. My visit coincides with peak grass season, and the place is running full tilt.

On the factory floor, we watch the churn spin like a cement mixer doing double time, as a technician swaddled in sterile coverings samples the butter, analyzing it for fat, salt, and moisture content. The butter flows out the consistency of cake frosting, coursing through a net-

work of pipes to be stamped into bricks, wrapped in foil, boxed, and chilled.

Among both the amateur and professional cooks I spoke with, the prevailing theory to account for Kerrygold’s creamy texture is that the butter has more fat and less moisture than mainstream American butters. But Kerrygold unsalted butter clocks in at 82% butterfat and the salted at 80%, the U.S. legal minimum. Harold McGee, the food science expert and author of *On Food and Cooking*, says the type of fat plays a much more significant role than the amount in texture and baking properties.

Robert Bradley, a professor emeritus of food science at the University of Wisconsin at Madison and an expert on butter, backs that up. He says anytime a cow eats fresh grass, it creates cream higher in oleic acid and conjugated linoleic acid, heart-healthy unsaturated fats that are liquid at room temperature. In cream from animals fed grain, however, saturated fats dominate, which makes for a stiffer, more brittle butter. (The manufacturing process affects texture, too, but on that front, Bradley says, there’s little difference among today’s mainstream processors.)

What about flavor? Robustly flavored European butters are often cultured—inoculated with a bacterium that



*Butter inspection at Kerrygold Park*

# “It tastes like what butter tastes like in your mind”

helps preserve freshness and turns the flavor slightly—and Americans have come to associate that attribute with quality. But Kerrygold’s salted butter, its flagship product, isn’t cultured. Bradley says that, again, diet makes a difference. The flavors of fresh grass do pass into finished butter, as does color. Legally, a butter maker can add yellow coloring to the product, but Kerrygold’s color comes from the beta carotene found in grass. “I don’t know of anyone who adds color,” Bradley says. “And certainly not the Irish.”

*Kerrygold tends to fare well in blind taste tests, but it doesn’t, in fact, reliably win top honors. In 2014 the magazine *Cook’s Illustrated* published an evaluation of salted butters that praised Kerrygold as “silky” and “custardy” but chose Lurpak as the all-around favorite; a *Bon Appétit* taste test from 2018 endorsed Organic Valley’s Cultured Pasture Butter as best in class. Chris Morocco, *Bon Appétit*’s deputy food editor, says that among the “fancy supermarket butters” that were tested, differences tended to be minor and often a matter of personal preference. Some tasters might like a nutty, grassy product such as Kerrygold; others, a brighter, more neutral flavor.*

But in the court of public opinion, Morocco agrees, the Kerrygold brand reigns supreme. He credits good marketing—its gold foil packaging and strong association with Ireland—for helping it stand out. “The butter has a sense of place, which I think is key,” he says. “I couldn’t tell you where Plugrá comes from. Lurpak comes from Denmark, but is Denmark known for rolling green hills? I don’t know. But Ireland? I’ve been to Kerry. It’s a lot easier to make that connection.”

This association with Ireland hasn’t always been a plus. In 1998, Ornu executive Róisín Hennerty was dispatched to the U.S., charged with designing a marketing strategy for Kerrygold, and found local impressions of the country to be mixed. “Research showed that Americans loved Ireland, but when they thought about food they thought about the famine, Guinness, and boiled corned beef and cabbage,” she says. “It was a terrible place to start.” To make matters worse, retailers tended to want to stock Irish products only around St. Patrick’s Day, as a holiday novelty, rather than as year-round staples. “When you’re in beside the Guinness and the green lemonade—well, you might not want to be merchandised that way,” Hennerty says.

She decided to focus her efforts on the West Coast, where consumers were more likely to seek out high-quality, natural food products, and to target only three retailers where affluent Americans tend to shop: Whole Foods, Costco, and Trader Joe’s. Hennerty was given a tiny advertising budget, so television campaigns and splashy magazine ads were out. She brought a handful of young Ornu employees to the U.S. to do store tastings, exposing shoppers to the product while also selling them on charming Irish shtick: emerald hills, multigenerational farms, happy cows.

Hennerty also courted early food influencers such as David Lebovitz, the pastry chef-turned-blogger and cookbook author, and Sara Kate Gillingham, co-founder of the blog *the Kitchn*, inviting them to visit Ireland to see for themselves. Gradually a sort of grassroots following took hold. Alison Roman, the cookbook author, *New York Times* recipe columnist, and high priestess of millennial dinner parties, has teamed with the brand to develop recipes. Today, Kerrygold is a sponsor of *Cherry Bombe*, the sexy-hip indie media brand celebrating women in food.

Dietary changes have buoyed sales, too. After decades of demonizing animal fats, Americans were beginning to embrace the Atkins diet just after Kerrygold entered the U.S. market. Butter and bacon were back. Since 1999 per capita butter consumption in the U.S. has increased from 4.6 pounds per person to 5.8 pounds in 2018—its highest point since 1968. More recently the growing popularity of the ketogenic diet, a very low-carbohydrate, high-fat regimen, has given the brand an added boost. Kerrygold is favored by keto adherents because of its grass-fed production. (The diet doesn’t just discourage eating grains, but eating food from animals that have eaten grains, too.) On Instagram the 70,000 posts tagged #kerrygold often share billing with such tags as #ketoporn and #ketochef. Dave Asprey, the wellness guru and entrepreneur whose Bulletproof diet is a close cousin to keto, introduced a wildly popular recipe for coffee mixed with a hunk of butter in 2009. He recommends Kerrygold by name.

Today, in addition to butter, Kerrygold’s U.S. product line includes an extensive array of cheeses, including cheddars, Swiss, and a specialty cheese called Dubliner, as well as an Irish cream liqueur. Butter, though, still accounts for the lion’s share of sales. Ornu recently introduced Kerrygold Butter Sticks—unsalted and salted butter in parchment-wrapped quarter-pound bars—to appeal to American home bakers, who are accustomed to measuring out butter this way. The cooperative says sales of sticks have exceeded every forecast. At the peak of butter season, Kerrygold Park operates 24/7, and the main thing limiting production is the factory’s single churn.

But how much cream can the cows on one little island produce? Since the European Union removed dairy production caps in 2015, Irish farmers have been building their herds, and milk output has soared, from 5 billion liters (1.3 billion gallons) a year to almost 8 billion today. (U.S. production, by comparison, is 96 billion liters.) Ornu’s agricultural analysts say that, given constraints on pasture land and labor, milk volume will reach 9 billion liters by 2022, with growth tapering off thereafter. But Jeanne Kelly, a representative for Ornu, says there’s no risk of a butter shortage. Plenty of Irish dairy still goes to lower-margin uses, such as milk powders, and driving more of it to a value-added product such as Kerrygold is exactly what Ornu was built for. “Ireland running out of cream?” Kelly repeats my question, with amusement. “Ah, that’d be the day.” **B**



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Anduril founder Palmer Luckey with one of his creations

TECH'S MOST CONTROVERSIAL STARTUP,  
FOUNDED BY A 27-YEAR-OLD GAMER AND  
BACKED BY TRUMP'S FAVORITE BILLIONAIRE,  
**MAKES ATTACK DRONES**

***'YOU ARE  
SIGNING UP  
TO BUILD  
WEAPONS'***

BY JOSHUA BRUSTEIN  
PHOTOGRAPHS BY MAGGIE SHANNON

Jason Levin stood on a craggy hill on a Southern California ranch in late July and prepared to destroy a drone. First he grabbed the controls for an Up Air One, a remote control hobbyist model that retails for about \$300, and steered it until it was hovering about 100 feet above the ground. Next he used a laptop to activate a system he'd spent the past several months building.

A second drone roughly the size of the Up Air quadcopter spun into action, buzzing like a mechanical wasp as it ascended to about 20 feet below its target. As it hovered, a crowd of Levin's colleagues gathered around. A prompt appeared on-screen asking for permission to attack. Levin tapped a button, and the second drone, dubbed the Interceptor, shot upward, striking the Up Air One at 100 mph. The two aircraft somersaulted skyward briefly, then they plummeted back to earth and landed with two satisfying *thuds*. Levin grinned and explained that he hadn't been controlling the Interceptor after telling it to attack—it finds targets and steers toward them on its own. If the first collision doesn't take its quarry down, the drone can circle back and strike a second and third time, all by itself. "It's a good feeling as an engineer," he said. "You've put in the work, and it knows what to do. It's like sending your kid off to college."

The Pentagon has spent years searching for reliable ways to combat consumer drones that have been repurposed as reconnaissance craft or bombers. Anduril Industries Inc., the 2-year-old startup in Irvine, Calif., where Levin is one of about 130 employees, began shipping Interceptors to military clients in the U.S. and the U.K. earlier this year; it's sent dozens so far and has hundreds more in production. The company says its most recent contract is to deploy Interceptors overseas to conflict zones, though it declines to provide details. This summer it raised \$120 million from Founders Fund, General

Catalyst, Andreessen Horowitz (in which Bloomberg LP, which owns *Bloomberg Businessweek*, is an investor), and other venture capital firms. Investors valued the company at about \$1 billion, four times its last funding round in 2018.

Anduril already had contracts to build surveillance systems on military bases and along the Mexican border, using towers and drones packed with cameras and other sensors. Its software then processes the field data, alerting officers and soldiers to possible disturbances. But the company wants to move beyond simply identifying threats using computers. The Interceptor, which Anduril hasn't previously discussed publicly, is its first computer-operated weapon.

Silicon Valley has a long history of supplying the Pentagon, but the two have drifted apart over the past 50 years. Today the Department of Defense relies mostly on a few traditional suppliers such as Boeing, Lockheed Martin, and Northrop Grumman. It's had little use for startups. Commercial tech companies haven't been particularly enthusiastic about government work, either, and the antipathy has increased since the election of Donald Trump.

Last year a group of Google employees resigned in protest of the company's work on Project Maven, a program to use artificial intelligence software to analyze drone imagery. Google's parent, Alphabet Inc., then announced it would stop working on the project, embarrassing and angering U.S. officials in the process. Workers at Amazon.com, Microsoft, Palantir, and other companies have also demanded that their employers cancel contracts with military, law enforcement, and federal agencies that are enacting Trump's border and immigration policies.

The protesters have argued that technologists shouldn't build products without regard for the way they're used. In mid-September, Seth Vargo, a former employee of Chef Software Inc., a Seattle company, deleted publicly available code he'd written for its systems after finding out Chef worked with U.S. Immigration and Customs Enforcement. "When I learned that my code was being used for purposes that I perceive as evil, I had to act," he says. A week later, Chef said it would stop working with the agency.

Anduril presents itself as immune to such angst. Its founder, Palmer Luckey, is one of Silicon Valley's most famous Trump partisans. The 27-year-old has gleefully trolled the Valley's liberals since he left Facebook Inc. in 2017 under controversial circumstances. Founders Fund, one of Anduril's first big investors, was started by another Trump stalwart, Peter Thiel. Trae Stephens, Anduril's chairman, is also a Founders Fund partner and took part in Trump's transition team. The company recently began working on Maven, the project Google dropped.

Executives at the company say they're less interested in serving any particular



The Interceptor

president than in fulfilling the Pentagon's enduring need for reliable technology. Some companies, Stephens says, have complicated things for themselves by concealing or downplaying their defense work, leaving employees who are uncomfortable with such projects to feel, justifiably, that they've been lied to. "They said, 'We didn't sign up to develop weapons,'" Stephens says. "That's literally the opposite of Anduril. We will tell candidates when they walk in the door, 'You are signing up to build weapons.'"

**A**nduril's origins date to conversations Stephens had with his colleagues at Palantir Technologies Inc., a data-analysis company Thiel co-founded in 2004. They thought a software startup focused on high-tech military applications could outmaneuver traditional contractors. At first, according to Matt Grimm, who spent seven years at Palantir and is now Anduril's chief operating officer, it wasn't so much a plan as a bonding exercise as they sat in airport lounges or attended each other's weddings. "It's like that idea, 'Hey, we should all go camping sometime!' But it doesn't really happen," he says.

Palantir executives had experienced the frustrations of trying to win federal contracts. Until he left the company in 2013, Stephens worked to sell technology to the government, a job he describes as "yelling as loud as possible into the void." The shouting did eventually pay off. Palantir sued the U.S. Army in 2016 for refusing to consider it for a large intelligence contract. It won the case and, this March, landed the contract itself, which could be worth as much as \$800 million.

Such doggedness helped Palantir open the government's door to startups, but the push for change also came from the inside. In 2015, Ashton Carter, then President Obama's defense secretary, took a series of actions to make the government a friendlier business partner for what Pentagon bureaucrats call "nontraditional." After Trump won the presidency, Stephens was appointed to the Defense transition team. He later joined the Defense Innovation Board, a central part of Carter's reform effort.

Stephens had also begun looking for defense startups in which Founders Fund could invest. Luckey, who'd sold his virtual-reality company, Oculus VR Inc., to Facebook for \$2 billion in 2014, was also looking to put some of his windfall into upstart military contractors. Founders Fund had backed Oculus, and he and Stephens had become friends over time. Luckey's career had veered off course just before the 2016 election, when the *Daily Beast* reported that he'd donated \$10,000 to a pro-Trump group that grew out of a Reddit message board, r/The\_Donald, known for incubating right-wing memes and conspiracy theories. Luckey's money was dedicated to putting up insulting billboards about Hillary Clinton. Almost immediately, he disappeared from Facebook's campus, and in March 2017 the company announced he was no longer an employee. (Luckey says he was fired because of his politics, a claim Facebook Chief Executive Officer Mark Zuckerberg denied before Congress in April 2018.)

With Luckey now a free agent, he and Stephens got to work on Anduril, recruiting a handful of people who'd been

at Palantir or Oculus. Their plan was to follow the approach that had worked for Luckey with virtual reality: combine low-cost, widely available components with sophisticated software. Luckey figured the bar would be relatively low. Despite the lore of the U.S. military's technical prowess, he argues, the defense industry has been stagnant for decades. "How is it there's so many billionaires and no Iron Man?" he asks, referring to the fictional weapons-manufacturer-turned-superhero.

Luckey's colorful public persona was bound to influence Anduril's brand, for better or worse. At one point early on, he showed up at a Japanese anime festival dressed as a character from a video game, in a costume consisting of a bikini top and fishnet stockings. (He generally avoids cosplay in the office, but he lays on the comic book references pretty heavy no matter the situation.) Such antics haven't been a liability, even in the buttoned-up defense business, says Joe Lonsdale, an early Anduril investor. "He's a more serious person than people realize."

## **"ALL THE SOFT KILL SYSTEMS ARE A WASTE OF TIME"**

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Anduril's first contract, awarded in 2017, was to provide electronic surveillance technology to U.S. Customs and Border Protection (CBP) for the U.S.-Mexico border. Luckey was a strong proponent of the work—a logical way, he says, to demonstrate Anduril's technical vision. Of course it also made Anduril instantly controversial by tying it to the Trump administration's harsh anti-immigration rhetoric and policies.

Luckey at times has seemed to embrace this connection. Almost immediately after his departure from Facebook, he traveled to Washington to advocate for digital border security alongside Chuck Johnson, a right-wing internet provocateur. Even the company's name called to mind the administration's nationalist rhetoric: In the *Lord of the Rings* trilogy, Anduril is a sword whose elvish name means "Flame of the West."

Critics described Anduril as either a technological manifestation of Trumpism, an amoral profiteer, or both. Luckey saw the outrage as useful. "We were telling people that border security is not going to be the last time there's a controversy around something we're working on," he says. Not all Anduril employees are pleased. Grimm, who describes himself as an "Obama fanboy" and the most liberal member of the founding team, grimaces when the subject comes up. "The goal was not to set out and say, 'We're the border security company,'" he says. "It was actually quite frustrating for us through the first year and a half, because of course that was the narrative." ►



◀ Anduril executives are quick to point out that many Democrats have supported electronic border surveillance as a more humane alternative to a physical border wall.

On the other hand, immigration rights advocates say companies that work with law enforcement agencies can't ignore how those agencies treat the people being apprehended. "Assisting in that cruelty, facilitating that cruelty, making sure they have access to more people to be cruel to, it makes the whole situation worse," says Jacinta Gonzalez, an organizer with Mijente, an advocacy group that's put together protests against technology companies it believes are aiding in implementing the administration's immigration policies. The American Civil Liberties Union, meanwhile, has said technologies implemented in conflict zones such as border areas or battlefields tend to seep into civilian life.

Anduril says it now takes in twice as much revenue from the military as from CBP and argues that there should be nothing controversial about providing security on bases. But the Interceptor project steers it toward another hot-button technological issue: the development and deployment of autonomous weapons.

**T**he possible use of miniature quadcopters for spying or terrorism has concerned the U.S. military for years. The fear was underscored this year when military-grade drones were implicated in attacks in Saudi Arabia and the Strait of Hormuz, and last year during an assassination attempt in Venezuela using hobbyist drones. The Defense Department has pursued various remedies, including jamming drones' signals and netting them like butterflies. But the idea of electronically disabling or ensnaring a drone without destroying it seemed ludicrous to Luckey. Why not just shoot it down? "All the soft kill systems are a waste of time," he says.

He, Levin, and a handful of colleagues came up with the idea of the Interceptor while hanging around the office one weekend earlier this year. The idea was to equip small drones with computer vision software that would scan a slice of airspace that needed protecting, then automatically ram any objects deemed hostile. They built a rough prototype that could knock down its target some of the time, then shot a smartphone video of a successful attempt and passed it to their contacts at the Pentagon.

As Anduril rushed to refine its early prototypes, the military ordered a handful to try out. By summer the company was claiming a near-perfect success rate. Newer versions of the drones can reach speeds of 200 mph or more—potentially enough to knock larger projectiles from the sky. Anduril has

begun building prototypes to take out larger targets, too. Luckey envisions clients who say, "We'd like to apply this to people who are not just attacking a base with a quadcopter—maybe they're attacking it in an ultralight aircraft, or a helicopter, or a cruise missile." Anduril plans to sell the counter-drone systems to commercial customers and has held preliminary discussions with oil and gas companies and others that have to police large, wide-open spaces.

The prospect of a 2-year-old startup building and distributing a new class of potentially lethal weapons will undoubtedly

Anduril's surveillance towers are used on the U.S.-Mexico border and on military bases





An engineer works on the Interceptor

raise ethical questions, especially amid a larger backlash against overreach by tech companies. The Interceptor in its current form doesn't target humans and requires explicit permission from a human operator before each attack, but it's conceivable that those controls could be changed in the future. "You've already developed this technology, opened the so-called Pandora's box," argues Marta Kosmyna of the Campaign to Stop Killer Robots, a group opposed to autonomous weaponry. Technologies such as the Interceptor are "very rarely used as intended," she says.

The day after Levin's Interceptor demonstration, employees, their families, investors, and other VIPs filtered in for an office-warming party at Anduril's new headquarters. Luckey sat with his wife, Nicole, in a booth in the cafeteria. The couple had gotten married a few weeks earlier, and the Anduril event felt almost like a second reception. Sun filled the room, and Dave Brubeck's *Take Five* played on the speakers. The crowd sipped cocktails with ice cubes that had Anduril's logo frozen into them.

Luckey had spent the afternoon across town at a political fundraiser with Donald Trump Jr. Anduril's founder

has donated about \$1.3 million to GOP-connected groups since 2017, according to Federal Election Commission disclosures, making him an important young donor in Republican circles. One of the first people to approach the cafeteria booth was Hal Lambert, an early Anduril investor and fellow GOP fundraiser, followed by a young man wearing a MAGA hat.

Guests wandered through the cavernous space under a huge American flag, checking out Anduril's milling machines, 3D printers, and green-screen studio. The walls of every conference room were covered in complicated-looking equations. Grimm confessed he'd told employees to scrawl mathematical things to impress people without advanced degrees.

Later, Stephens and Luckey gave speeches mocking Silicon Valley's caution about military contracts. "I'm so happy to come back down here to a place full of wonderful people who are also sane and support national security," Luckey said, to loud applause. Stephens thanked employees for choosing Anduril over the big software companies,

even though it had meant sacrificing dream careers in digital advertising optimization.

Not on hand for the event was Thiel, who'd told Stephens in a one-word text message that he wouldn't make it. Thiel declined an interview request for this story; a Founders Fund spokeswoman, Erin Gleason, says he has "no involvement in the company," despite his firm's ownership stake.

Anduril's founders present themselves as an alternative to a defense industry gone soft after decades of fat contracts. But it's hard not to notice how deftly the company has insinuated itself into Washington circles in its short history, with prominent allies in both chambers of Congress. Tom Cotton, a Republican senator from Arkansas, says he sees the emergence of defense startups as an encouraging development. "It would be healthier if we had more defense companies to compete on Pentagon contracts," he says.

Cotton was one of a half-dozen members of Congress who an Anduril spokesman suggested would vouch for it for this story. Another was Will Hurd, a Republican congressman who represents a Texas district along the border with Mexico. Before an interview could be arranged, though, Hurd announced his retirement, saying he was leaving the House of Representatives "to help our country in a different way." Rumors emerged that he'd be joining Anduril. It isn't clear how seriously anyone took the possibility, but Luckey was deluged with questions about it. "It was nice that everyone thought of us," he says, clarifying that, though he's talked to Hurd since the announcement, he doesn't expect to hire him. But, Luckey adds, "I'm glad they weren't thinking, Oh, Will Hurd is going to work for Lockheed Martin." **B**

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# So, You Crashed Your Bugatti.

No actual Bugatti Chirons were harmed in the taking of this photograph

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## Now What?

The complicated, costly, world-crossing process of fixing a wrecked supercar. *By Hannah Elliott*  
*Photographs by Victor Prado*

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- 71 Rockin' earbuds

October 7, 2019

Edited by  
Chris Rovzar

Businessweek.com

**T**here's no rule that says you've got to be a great driver to own a supercar. Oftentimes, quite the opposite is true. Witness the chronicle of crashes on wreckedexotics.com, the *TMZ* stories breathlessly divulging which celebrity ride got mangled in L.A. traffic, or the cover of the *New York Post* blaring news of Tracy Morgan's Bugatti bang-up in Midtown Manhattan in June.

But for the lucky few who do own such high-powered machines, the considerations that go into preserving their car from dings and dents are myriad. And they're not, unfortunately, limited to perfecting their own driving skills. Just ask Kris Singh. In 2016 the Miami-based investor was hit while driving his \$3 million Pagani Huayra down Collins Avenue. The culprit? An Uber driver.

"It sounded like a slap, and then I started spinning," says Singh, whose 720,000 Instagram followers get eyefuls of his collection of million-dollar supercars from Koenigsegg, Lamborghini, Ferrari, and McLaren. "He ran a stoplight during rush hour, and I was the unlucky person he hit," Singh says. "I thought I'd blown a tire, but when I looked back, the whole wheel was hanging off the car. If I'd got hit any harder and hopped the curb, people could have died."

Singh's first phone call, once he stepped gingerly out of the Huayra, was to Pagani's publicist. "I gave him a heads-up that this was probably going to be in the news tomorrow," he says. "Then I asked for a truck."

People who own supercars tend to have all the money in the world, but getting the cars fixed after a serious accident is a thorny procedure even for them. A small handful of technicians tend to be authorized to work on these outrageously complex and sensitive vehicles. If an unqualified monkey wrench tinkers with a supercar, a brand will be reluctant to take on further responsibility fixing it up.

Fast-forward five months, and Singh was reunited with the car in Italy, where it had been transported by air for weeks of rebuilding and fresh calibrations. Pagani engineers conducted X-ray scans for hairline fractures in the chassis and made completely new components to replace those damaged in the wreck. Aestheticians matched the clear coating on the carbon fiber of the exterior and polished it to an impeccable sheen. (Singh's insurance policy covered the cost of the

repairs; he declines to specify the total amount but says the incident did not increase his monthly premium.) He's since put thousands more miles on the Huayra, driving it in rallies in Europe, Asia, and South America. "I still drive that car literally every day," he says. "It's solid."

As a small, family-owned automaker that produces about 30 cars a year, Pagani has a reputation for providing hands-on care and upkeep for its vehicles, many of them owned by close friends of its founder, Horacio, and his son, Christopher. But more prolific carmakers make big commitments to personal attention, too. The sales program for the sold-out \$2.3 million Aston Martin Vulcan went so far as to include a repair and maintenance clause for all customers, promising that the original technicians and engineers who built the cars would conduct any necessary work. Aston Martin will

## "It sounded like a slap, and then I started spinning"

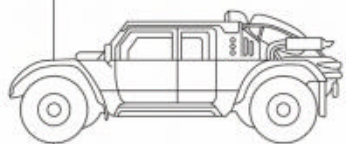
either operate services at the special operations facility near its headquarters in Gaydon, England, flying cars back from where the incident took place, or provide a mobile fix-it service if the customer finds that more convenient. "Of course, each repair is dealt with on a case-by-case basis dependent on the level of damage," a representative says.

Brands are notoriously squeamish about divulging just how much repairs cost for something so rare and powerful, and the owner might not even report it to the insurance company.

The most dramatic vehicular disaster protocol may very well be Lamborghini's. The Italian brand deploys a team of Boeing-trained specialists to rescue and redeem cars from VIP owners the world over. Known collectively as "the flying doctors," they descend on any damaged Aventador, say, desecrated not to the point of total loss, and tend to it on-site. (China and

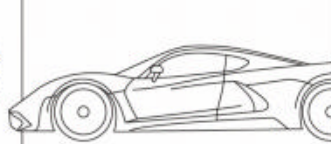
## Small-Batch Supercars

While Lamborghini owners can count on teams of elite repairmen to arrive at a moment's notice, those with hypercars from truly boutique manufacturers must rely almost entirely on the skills and resources of just one small shop. The brands may be obscure, but their cult followings attest to their brilliance—and the prestige of owning their precious creations. —H.E.



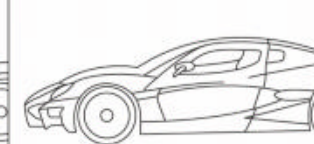
### SCUDERIA CAMERON GLICKENHAUS

The 8-year-old New York brand makes \$2 million Le Mans-style race cars, plus the \$275,000 SCG 005 Baja Race Boot. This 650-horsepower truck can compete in Mexico's historic Baja 1000 rally.



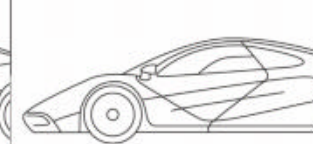
### HENNESSEY PERFORMANCE

A tuner since 1991 for sports cars made by other companies, Texas-based Hennessey created the 1,244-horsepower Venom GT under its own banner in 2011 and the 1,600-horsepower Venom F5 in 2019.



### RIMAC AUTOMOBILI

The Croatian manufacturer makes electric hypercars such as the 258 mph C Two. It also provides electric motor technology for other automakers, including Koenigsegg and Jaguar.



### GORDON MURRAY DESIGN

Famed for designing the revered McLaren F1, Murray is now building a car under his own eponymous line, the three-seater, \$2.5 million T.50. Deliveries are set for 2022.

the Middle East are frequent destinations.) If the disaster is in the U.S., Lamborghini can also transport the car to a dedicated repair center in Seattle, which the company has developed with research labs at the University of Washington.

While there, the doctors do things like strip the car down to its bare bones so they can graft new layers of carbon fiber to the monocoque tub underneath, building it up again from the inside out. To complete even a small patch takes hours and the precision of a fine art restorer. The process means sanding down the torn portion, layering on skeins of carbon fiber, and baking on the new components to make them blend imperceptibly with the existing body. It can take weeks, and the price can reach six figures.

McLaren employs a more proactive approach with the hautest of its haute couture cars. For its F1, made from 1992 to 1998, the company suggests sending the car by air or ship to its Woking, England, headquarters for routine annual maintenance. An oil change there costs \$8,000; repairing the damage done by a single nail puncture in a tire runs \$6,000, since to achieve the perfect rolling splendor of the F1 means replacing both tires on an axle. (Compare this with the tire plug, patch, and repair rates for the hoi polloi at a local garage like Les Schwab, which are free.)

Closer to home for some of the toniest F1 owners (Ralph Lauren, for one), McLaren opened a certified service center in Philadelphia in 2017, the only one outside the factory. Owners can send their F1 there for everything from minor maintenance to a large rebuild, but most choose the Woking option.

All told, annual running cost of an F1 is estimated at \$30,000 per year, McLaren says—before any major collision. That level of TLC doesn't apply to the \$1 million Senna, or anything "below" that car, like the \$285,000 720S, both of which get sent via truck to the nearest dealer in the event of a crash. "The F1 is just a different animal," the McLaren spokeswoman says, "because of the limited quantity and the price point." Just 106 of them have ever been made, and insuring one can cost more than \$20,000 per year, according to Hagerty Classic Insurance.

There's not really such a thing as wrecking an F1 beyond



Not a real Lamborghini  
Huracán Performante

salvaging anyway, since the value of this extraordinary car is rising so consistently. Witness Rowan Atkinson (aka Mr. Bean): He crashed his twice—then sold it for \$12.2 million in 2015, or a rumored \$8.5 million profit on what he paid for it in 1997. Even if it's just matchsticks, it probably merits rebuilding.

"Up to \$250,000, I probably wouldn't even report the claim," says one supercar owner, who prefers to remain discreet. It's just not worth the insurance bump compared with the value of the car. Also, a wreck on a car's public record can diminish its resale value.

Then again, for the hypercar elite, it's more about time lost driving than expense. No one has any fun when the car is in the shop. And if the damage isn't too bad, it's tempting to opt for a rather more mundane repair, such as

fixing the car in your own shop, as Jay Leno did years ago when he backed one of his half-million-dollar Lamborghini Miuras into the other. (It's not a common problem.)

The DIY method is usually what California collector Dan Kang does with his Swedish-built Koenigseggs. He has the knock-on-wood fortune of having sustained only minor cosmetic damage after occasional mishaps on the track, he says. And between the mechanics he keeps on his own payroll and the close working relationship he has with company founder Christian von Koenigsegg and his 220-person operation, he often just orders parts from the factory and has his guys install them stateside. Should anything more severe happen, Kang says, Koenigsegg would take back the entire car and rebuild it as necessary. "If it goes back to the factory, then we know it's going to come back in even better condition than before the accident," he says, noting that any upgrades developed since that particular car hit the street would be integrated into the repairs. "Christian would never let a car just be buffed out."

Some collectors even make the same call as the rest of us. "I will usually just call AAA," says David Lee, an L.A. businessman known to his 1.2 million Instagram followers for his large collection of modern and vintage Ferraris. "Their Plus service will do more than the car companies' basic roadside service," he reasons. "It's easier." **B**

To learn more  
about what's on this  
plate, go to:  
[bloomberg.com/cheese](http://bloomberg.com/cheese)

# Cheese, Please!



## Six rules for building a better board. *By Kate Krader* *Photograph by Ted + Chelsea Cavanaugh*



### 1 VARIETY IS KEY

Besides a mix of base milks—cow, goat, sheep—consider textures. Arrange crowd-pleasing classics such as Camembert and the goat cheese Bucheron alongside adventurous, full-flavored cheeses like the blue-veined Red Rock cheddar and the bloomy-rinded Italian buffalo cheese Casatica. Plan for 1 or 2 oz. per person per cheese.

### 2 YOUR PLATE

**SHOULD BE CROWDED** Ignore the rule of thumb that food needs space to look appealing. “Cheese plates are impressive when they’re full,” says [thatcheeseplate.com](#) founder Marissa Mullen. Create a wave of folded cured meat, such as salami or prosciutto, to intersect the board, and fill any gaps with nuts and fresh and dried fruit.

### 3 SWEET SIDES

**ARE MANDATORY** Fig jam and quince jelly have become staples to balance the richness and accentuate the saltiness of cheese. More advanced options include hot honey, cabernet pepper wine jelly, and pungent apricot mostarda, an Italian preserve made with mustard.

### 4 VEGAN IS NOT A CRIME

For the inevitable dairy-free guest, there’s an expanding category of well-crafted options from companies such as

California’s Vromage (try the truffle brie or “picorino,” with ash), French-style nut cheese from Treeline, or Dr. Cow’s Cajun-aged cashew cheese.

### 5 TIMING COUNTS

Cheese should sit out for about 45 minutes before serving to optimize the texture—wait for it to come to room temperature before cutting. Serve small-format fresh and young cheeses (i.e., chèvre, burrata, robiola) whole; chip firmer ones (cheddar, blue) from a large piece; and cut semi-hard varieties (Alpine, natural rind) into wedges or chunks. The goal is to create a tapestry, according to *Cheese Boards to Share*, by Thalassa Skinner (Ryland Peters & Small; \$21). Cut soft cheeses with a thin knife, or one with holes in the blade, which stop the cheese from sticking to the metal.

### 6 THEMES ARE A WOW FACTOR

If you’re serving wine from, say, France’s Jura district, try cheeses with a similar, complementary terroir (local source). Advanced cheese lovers might create a “vertical tasting plate” made with Gouda or jack from different age profiles, or seasonal, limited batches. Eataly North America Head of Formaggi Theresa McNamara recommends cow’s-milk selections from different Alpine valleys made by farmers who migrate their cattle seasonally.





Sandals Montego Bay  
in the early 2000s

# Just Add People

A renovation at Sandals Montego Bay highlights a 35-year love affair with the swim-up bar. *By Claire Ballentine*

The swim-up bar is a polarizing amenity: It's either the pinnacle of leisure—think of lounging in a Caribbean pool watching the sunset with a piña colada in hand—or a ridiculous chain resort gimmick to siphon more dollars from hotel guests' soggy wallets.

No surprise, then, that they can be found in locations that range from the Four Seasons Resort Maui, which has panoramic views of lush tropical gardens, to a thatched-roof version serving giant pickles at a theme park in Des Moines. There's even an indoor one at a Times Square hotel.

"It goes along with the whole vacation experience," says Eric Herman, senior editor at *Aqua Magazine*, which covers the

pool industry. "It's like being served cocktails on the beach. It's a hedonistic indulgence activity."

Traditionally a swim-up bar is like a regular bar but located directly in the pool, allowing guests to order their rosé without the burden of getting out. There are usually submerged bar stools and a shallow depth, so you don't actually have to tread while you sip.

This year, Sandals Resorts International Ltd. is celebrating the 35th anniversary of the first Caribbean swim-up bar at its Montego Bay resort in Jamaica with a redesign, which was introduced on Aug. 30. Architects removed the window panels that framed the bar's opening to break down the divide

between indoors and outdoors and installed Spanish cedar and teak along the front facade. “Our pool bars are kind of the heart of the hotel—that’s where everyone pictures themselves,” says Maggie Rivera, senior vice president for strategic communications at Sandals. “This one is the iconic cornerstone.”

The swim-up bar has its roots in the Las Vegas gambling scene of the ’50s, when poolside amenities began to be used to keep guests spending money while they were relaxing, Herman says. In 1952 the Sands Hotel & Casino introduced blackjack tables and slot machines near their swimming pools. Soon after, the Tropicana Resort offered floating gambling tables.

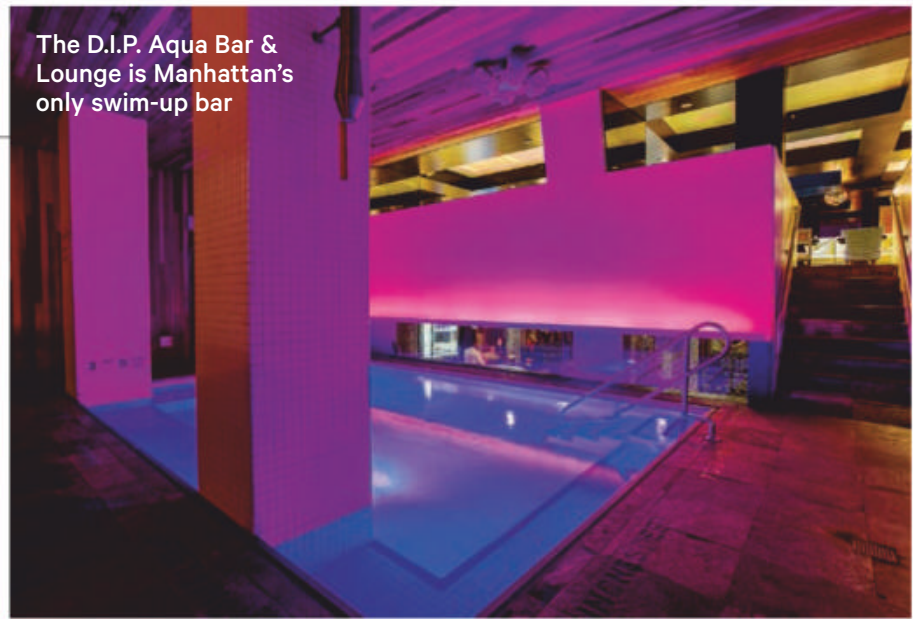
“In Las Vegas, pool design was the key differentiator between resorts [at that time],” says Stefan Al, an architect and author of *The Strip: Las Vegas and the Architecture of the American Dream*. “If you can’t afford to have your own swimming pool at home, you could go to a resort and experience that suburban luxury.”

It wasn’t until 1981, when Sandals Chairman Gordon “Butch” Stewart opened the Montego Bay resort, that serving beachside cocktails to guests became a tradition. During renovations three years later, the brand decided to push the idea further after architect Evan Williams told Stewart that he never understood why you couldn’t have bars in pools. So they decided to create one.

It was an immediate hit, and it wasn’t long before other resorts waded into the category. Today you can order a cocktail from swim-up bars at the Hotel Punta Islita in Costa Rica, the Hotel Monte Mulini in Croatia, the Crystal Cove resort in Barbados, and Le Méridien Bali Jimbaran in Indonesia. Sandals has at least one in nearly all of its 15 all-inclusive resorts.

Swim-up bars are having a resurgence in popularity for a simple reason: social media. The one at the Four Seasons Resort Maui is one of the hotel’s iconic features, says general manager Marc Bromley. Situated in the adults-only Serenity pool, built in 2009, it serves such signature drinks

The D.I.P. Aqua Bar & Lounge is Manhattan’s only swim-up bar



as a mojito with blueberry compote. “It’s kind of ground zero for Instagram in our hotel,” he says.

They don’t have to be outside, either. Room Mate Grace hotel in New York has operated the D.I.P. Aqua Bar & Lounge since 2008. (The acronym stands for “dance in the pool.”) Hotel director Alvaro Diaz Martos says it’s the only indoor swim-up bar in Manhattan. There’s also an in-water bar at Iceland’s famous Blue Lagoon, a man-made geothermal spa steaming up a scenic rocky landscape, and the Lotus Swim-Up Bar at the InterContinental Tahiti Resort & Spa, with an infinity-edge pool.

Some people choose to bring the vacation vibes to their everyday lives by installing a swim-up bar at home. Austin-based pool designer Brian Cullingworth says the average build-out can add \$10,000 or \$15,000 to the approximate \$60,000 cost of building a home pool. This feature became popular about 20 years ago, as a pool customization trend took hold, coinciding with skittishness following Sept. 11. “People started not wanting to travel, so they started to create staycations,” Cullingworth says. “They were spending money they would normally spend traveling on a pool.”

The renovations at Sandals’ Montego Bay swim-up bar include new stonework and quartz countertops, says Sarah Hartman, one of the architects who worked on the project. The hotel installed fans and chandeliers with glass imported from Spain. In addition, coral stone clads the entire building, and the floor is Spanish porcelain tile. “We wanted to enjoy the outside inside and keep the atmosphere casual yet elegant,” Hartman says.

Sandals also modernized some of its classic cocktails, such as the Dirty Banana (Appleton Reserve rum, Kahlúa, Baileys Irish Cream, banana, and milk) and added new drinks like the Buffalo Soldier (Casa Noble Crystal tequila, Appleton Reserve rum, lime juice, grapefruit juice, soda, and Scotch bonnet pepper).

Still, some drinks needed no improvement, says Ricky DuQuesnay, group manager for food and beverage at Sandals. “When you’re in business for 38 years and clients expect the rum punch to taste a certain way,” he says, “you don’t want to be changing it.” **B**



The Four Seasons Maui

# When the Stage Is Brooklyn

David Binder wants to awaken new audiences to a 158-year-old outer-borough cultural institution. *By James Tarmy*  
*Photograph by Alec Kugler*

When David Binder was asked to apply for the position of artistic director at the Brooklyn Academy of Music—a sprawling, three-theater arts complex with annual revenue of \$50 million—he didn’t think he had a shot. “Who wouldn’t want it?” he says. But unlike colleagues up for the job, Binder hadn’t spent decades working in an arts institution.

Instead he’d worked as a producer of Broadway hits including *Hedwig and the Angry Inch*, organized the High Line festival (with David Bowie as curator), and guest-directed the London International Festival of Theatre.

But for a 158-year-old institution with 700,000 annual visitors and 260 employees, a fresh perspective was crucial. BAM is in the middle of an ambitious expansion, adding a visual arts space and updating its theaters, as it competes in an increasingly crowded field for New Yorkers’ time and money. The Shed, a \$475 million multidisciplinary exhibition-performance space, opened at Hudson Yards this year, and the lionlike Lincoln Center—with its world-class venues for theater, dance, music, and opera—continues to be the city’s standard-bearer. So when Binder’s appointment was announced in February 2018, he was put in the position of charting a new, and everyone hoped unique, direction for BAM’s artistic future.

“To do this job, you have to have enormous cultural curiosity across just about every discipline,” says Katy Clark, BAM’s president. “One of the things that stood out about David was his ability to go across genres and be open-minded.” His assignment: Hew to the institution’s original mission to be the home “for adventurous artists, audiences, and ideas,” all while bringing stars and fresh talent to a local and international audience.

Binder started 18 months ago on a part-time basis, shadowing outgoing executive producer Joseph Melillo, who’d been there for 35 years. When BAM’s fall season kicks off on Oct. 15 with the Next Wave festival, Brooklynites, and anyone else, will get to see Binder’s vision in action. “I always want to find the widest audience for my work,” he says. The strategy is simple: variety. At Next Wave—co-sponsored by Bloomberg Philanthropies—Irish choreographer Michael Keegan-Dolan



Binder outside BAM

will present his acclaimed 2016 interpretation of *Swan Lake*, an ebullient production that draws on Irish folklore; a month later the festival will premiere a theatrical version of *The End of Eddy*, a coming-of-age novel by Edouard Louis that scandalized France with its tales of poverty, homophobia, and bullying.

What that audience looks like, or should look like, is a trickier question. BAM’s mission prioritizes “engaging both global and

local communities.” But even as it pursues diverse patrons with subsidized ticket sales, increased accessibility, and outreach programs, the surrounding community has gentrified.

Thirty years ago, Downtown Brooklyn and Fort Greene, BAM’s neighborhood, were predominantly low-income. (The latter was the backdrop of the 1986 Spike Lee film *She’s Gotta Have It*.) But in the past decade, in tandem with the Brooklyn Cultural District development project, luxury condominiums and rentals have sprung up around BAM’s campus. One new building in Fort Greene, 475 Clermont, has two-bedroom apartments that ask \$5,995 a month; 230 Ashland, which will soon house the BAM Strong exhibition space, has a two-bedroom condominium listed at \$1.4 million. “Of course it’s great to welcome new, affluent people to Brooklyn,” Clark says. “But that doesn’t change our aspiration to be a place for everyone.”

Binder’s solution is to present “the most exciting, adventurous artists who leave an impression on us long after we’ve experienced their work and who make us experience the world differently,” he says. That could involve Simon Stone’s contemporary rewrite of Euripides’ *Medea*, or a film series that explores contemporary Arab cinema, both of which might appeal to those who’d initially come to BAM for, say, Madonna’s *Madame X* tour, which runs through Oct. 12. “Hopefully, if you’re a theater person, you end up coming to see dance. Or maybe you’re a dance person, and you end up seeing film.

“We can speak to a lot of different audiences,” Binder adds. The trick is to get “different communities to be in the same room for the same things.” **B**

# The Beats Go On

Wireless headphones from Dr. Dre's brand offer nine hours of playing time for music lovers on the move. *Photograph by Heami Lee*

Finding comfortable, high-quality headphones for an active lifestyle has long required some sort of compromise, whether in design, function, or battery life. The \$250 PowerBeats Pro take a step in the right direction. Apple Inc. acquired Beats by Dr. Dre in 2014, and these have similarities to its own AirPods, including speech accelerometers to filter external noise and motion detection that recognizes when the buds are in your ear so they start playing right away. At just 20 grams (0.7 oz.), they're lightweight enough to wear for hours—whether you're taking business calls or training for a marathon—without causing the ear soreness that can come with long listening sessions.



## THE COMPETITION

• The Klipsch T5 True Wireless set (\$200), released in June, is a throwback to '70s-era style but offers cutting-edge sound. Its black buds, emblazoned with a copper-toned signature logo, can play eight hours on a charge, and they're water- and sweat-resistant.

• Jaybird's \$180 Vista earbuds stay snug—they lock into your ear—but if the fit is off, the fan-blade shape of the ear gels can be annoying. Battery life is not bad, at six hours, but the pocket-size rechargeable case offers 16 hours total. On the plus side, they weigh a mere 0.2 oz.

• With the new iOS 13, two sets of Apple's AirPods (\$160 with charging case; \$200 with a wireless charging case) will be able to connect to a single phone. Battery life runs to about five hours, or 24 hours with the quick-charging, 1.34-oz. case.

## THE CASE

PowerBeats have found the sweet spot between fit and comfort—the bud doesn't jam into your ear like others do—and a loop stretching over the top of the ear really keeps them in place. (This can be a problem if you wear non-wire-rimmed glasses.) Minor adjustments allow you to block out all noise or let some in if you're biking or running. The nine-hour play time is adequate for most endeavors, but you can get an additional 90 minutes of power if you plopping them into the charging case for just five minutes. On the downside, they have a wingspan of 2.2 inches, which means the lithium-ion case is a chunky 3-inch square box—not small enough to slip in a pocket. They're available in black, ivory, navy, and green. \$250; [beatsbydre.com](https://beatsbydre.com)

# What's Your Net Worth Number?

By Peter Coy

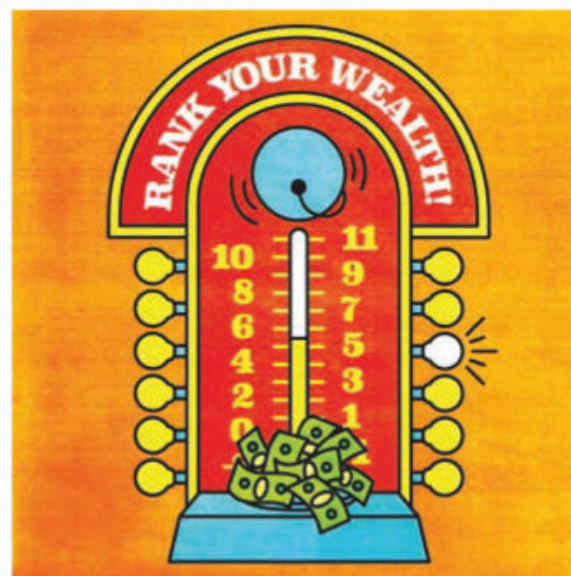
72

The world needs a more precise way to describe wealth. “Millionaire” is too broad, covering everyone from random pikers with a scant \$1 million in net worth all the way up to people just shy of billionaire status. “Billionaire” has the same problem. There’s a huge difference between your local anonymous rich person who just clears the \$1 billion mark and, say, Jeff Bezos or Bill Gates. The language down the scale of wealth is even more impoverished. “Thousandaire” isn’t even an accepted word.

We have a solution. It’s a scale of net worth based on scientific notation, or powers of 10. As with the seismic scale for earthquakes, it squeezes a lot of variation into a compact set of numbers. The poorest of the poor, at -2, are only 13 units away from the richest of the rich, the 11s who have unimaginable wealth and power.

The numbers of people in each group are rough estimates. Bloomberg calculates there are more than 2,800 adult billionaires (Nos. 9-11, combined) in the world, while Credit Suisse estimates there are about 1,600. Credit Suisse Group doesn’t break things down for numbers below 3, simply estimating that about 1.5 billion adults worldwide have net worth less than \$1,000. It’s best to view the numbers as ballpark figures subject to change. The academics who put together the *World Inequality Report 2018* edition write that “available data sources make it impossible at this stage to properly estimate the level and evolution of the global distribution of wealth.” The purchasing power figures are likewise intended to be illustrative, not hard data.

It’s a bit appalling that disparities in wealth have gotten so big that we need logarithms to describe them. But that’s the world we live in. **B** — *With Tom Maloney*



**● METHOD**

One million is 10 to the sixth power, so a basic millionaire is a 6 on our scale. Someone with \$1 is a zero. Anyone with liabilities exceeding assets is undefined on this scale, because there’s no such thing as a logarithm of a negative number. But for simplicity, we throw them into -2, which is for people with 1¢ to 9¢ of net worth.

Your Net Worth Number

Your number	Bottom of your bracket	How many adults in the world are in your bracket	Who
-2 through 2	1¢ to \$100	1.5b	Subsistence farmer
3	\$1,000	1.7b	Median renter
4	\$10,000	1.3b	Median family with no college education
5	\$100,000	436m	Alexandria Ocasio-Cortez (in a year or two)
6	\$1m	40m	Boris Johnson
7	\$10m	1.7m	Ginni Rometty
8	\$100m	49,000	Rex Tillerson
9	\$1b	2,700	Silvio Berlusconi
10	\$10b	150	Elon Musk
11	\$100b	2	Jeff Bezos and Bill Gates. Really, just those two.

ILLUSTRATION BY GEORGE WYLESOL

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# SAMSUNG

# Galaxy

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 **Secured by Knox**