Bloomberg Businessweek

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◀ Hunter Reinard, 4, is battling long Covid with help from specialists at Rainbow Babies & Children's hospital in Cleveland

PHOTOGRAPH BY DANIEL LOZADA FOR BLOOMBERG BUSINESSWEEK

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CORRECTION

"Gourmet From Scraps" (Solutions, May 2) should have attributed the estimated £20,000 annual loss from wasted food at an average U.K. restaurant to the Sustainable Restaurant Association.

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■ COVER TRAIL

How the cover gets made

❶

"So this week's story is coming fast out of Europe—"

"Oh, God, not another Covid variant."

"No! I'm happy to say it's about Formula One racing, which is speeding into the U.S. market."

"Racing puns! I love it."

"What's not to love?"

"They're going *neck and neck* with Nascar?"

"Um, that's horse racing, but I'm gonna go with it. Yes! F1 is taking on the whole American sports landscape: football, baseball, basketball, hockey, golf, boxing, WWE, badminton, all-you-can-eat contests, excessive drinking, competitive Netflix bingeing, Miami! Shaq!"

"A real entertainment *scrum*!"

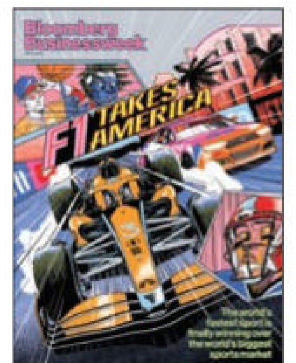
"That's rugby, but you're on the right path. We can fit that all into one illustration, right?"

"How about I get, like, 20% of that into an illustration?"

"Forty percent!"

"Thirty percent, and that's my final offer."

"Deal."



Cover: Illustration by Viktor Hachmang

BUSINESS: PHOTOGRAPH BY HOUSTON COFIELD FOR BLOOMBERG BUSINESSWEEK

for every child

CHILDREN IN UKRAINE URGENTLY NEED OUR HELP

Help provide critical supplies and support to children affected by the war in Ukraine.

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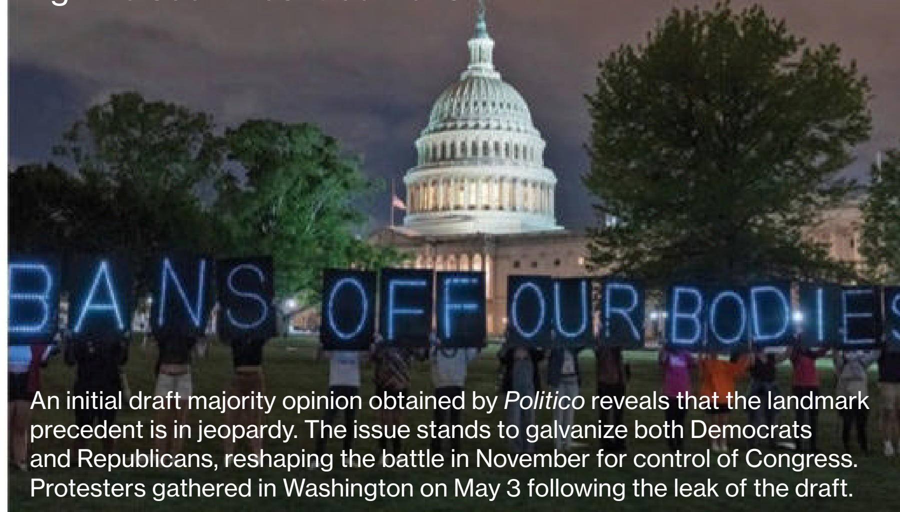
● Globally, more than

515m

people have been infected with the coronavirus, at least 6.2 million have died, and about 11.7 billion vaccinations have been given. As case numbers drop in Hong Kong, the city is accelerating its reopening plans by easing mask-wearing rules, allowing bars to extend their hours, and permitting beaches to reopen.

● The End of *Roe v. Wade*?

Conservatives on the U.S. Supreme Court are poised to strike down the ruling giving women a constitutional right to seek most abortions.



An initial draft majority opinion obtained by *Politico* reveals that the landmark precedent is in jeopardy. The issue stands to galvanize both Democrats and Republicans, reshaping the battle in November for control of Congress. Protesters gathered in Washington on May 3 following the leak of the draft.

● Russia managed to avert its first foreign-currency default in a century.

Buckling under financial and economic penalties since it invaded Ukraine in February, the country dipped into its local U.S. dollar holdings to make payments on two bonds on May 3.

● A district court judge ruled that a lawsuit seeking reparations for survivors and descendants of victims of the 1921 Tulsa Race Massacre can proceed.

The lawsuit says the actions of the White mob that killed hundreds of Black residents and destroyed what had been the nation's most prosperous Black business district still affect the city.

● "We are not going back. Because at our core, the strength of our country is that we fight to move forward."

Vice President Kamala Harris delivered an impassioned defense of abortion accessibility in a May 3 speech, accusing Republicans of attacking women's rights and warning that justices might seek to strip away other rights, including same-sex marriage.

● The Fed's Open Market Committee voted unanimously on May 3 to raise its benchmark interest rate to .75%-1.0%. The half-point increase is the steepest since 2000.

● Qantas will buy 12 Airbus long-haul jets that can stay in the air for

20

hours or more. The A350-1000s, which sell for about $355 million each, can make the longest direct flights ever, from Australia to any city in the world.

● Mercedes-Benz and BMW sold their car-sharing venture to rival Stellantis.

The deal, at an undisclosed price, ends a bold—but ultimately unprofitable—initiative to offer urban consumers an alternative to car ownership by making rentals available for cents a minute.

● The OMX Stockholm Benchmark Index nosedived as much as

8%

in just five minutes on May 2. A trader at Citigroup's London desk made an error inputting a transaction, sparking an abrupt selloff of European equities that briefly wiped out €300 billion ($316 billion).

● Dolly Parton was voted into the Rock & Roll Hall of Fame, alongside Eminem, Lionel Richie, the Eurythmics, and others. In March the country singer said she'd turn down the honor, saying she hadn't earned the right. But in the end, Parton said she'd "accept gracefully."

CAPITOL: ALEX BRANDON/AP PHOTO. HARRIS: YURI GRIPAS/BLOOMBERG. AIRBUS: ROSLAN RAHMAN/GETTY IMAGES. PARTON: BRIDGET BENNETT/GETTY IMAGES. ILLUSTRATION BY WENDY WONG

The CDC Needs Reform to Restore The Public's Trust

For many years the U.S. Centers for Disease Control and Prevention was known as the world's preeminent public-health agency. No longer. During the pandemic, it's stumbled repeatedly. Accused of incompetence, overreach, and muddled messaging, the CDC is now in need of repair. Director Rochelle Walensky was right in early April to order a review of the agency's operations. She shouldn't shrink from significant reforms.

To be sure, some of the CDC's troubles have resulted from political interference. Donald Trump's White House sought to undermine the agency. Political operatives pushed to revise some of its publications and revoked its authority to gather hospital Covid-19 data from states. Although President Joe Biden has shown greater respect for the CDC's expertise, he's kept White House personnel involved in Covid communications and thereby helped to muddle the message and confuse the public.

It's true, too, that Covid has been inherently bewildering. Researchers have struggled to understand how the virus spreads and how best to hold it at bay. As public-health leaders strained to keep up with changing conditions and emerging bits of evidence—on masks, mutations, and more—their updated guidance often came across (fairly or not) as self-contradictory.

But the CDC also made unforced errors. Starting in February 2020 it distributed faulty and contaminated Covid test kits, stymieing the government's response in the crucial early phases of the pandemic. The agency was initially slow to share real-time data on Covid's spread with other health agencies, and it waited months after the evidence came in to acknowledge that the coronavirus spreads mainly via airborne particles.

At other times the CDC has seemed to act too abruptly. In December it suddenly halved the recommended isolation period for people testing positive for Covid—leaving the impression that it was only pushing to get people, especially health-care workers, back on the job.

What changes might prevent such mistakes in the future?

First, a thorough review of laboratory operations is needed. Systems and standards must be improved to prevent the kind of bungling that undermined the first test kits. Federal red tape, which compounded the problem by restricting the use of alternative tests, should be cleared away where possible.

To guard against political meddling, the CDC's *Mortality and Morbidity Weekly Report* should be made part of the federal statistical system, which includes the National Center for Health Statistics and other agencies that gather and report essential data. Such a designation should guarantee the CDC's independence and protect it from further interference.

Next, the agency needs to speed up disease data collection and report it without delay. Restoring its responsibility for state hospital data collection would help. CDC leaders should also work with state health officials to streamline efforts and ensure states report case and hospital data in a standardized format.

With such reforms in place, it would make sense to put the CDC solely back in charge of public communications about the pandemic. Recall how, during the Ebola scare in 2014 and 2015, the CDC director held regular press briefings to keep Americans informed and answer questions. Doing the same with Covid-19 would help keep people up to date on the virus's spread and informed about the continuing need for vaccines and treatments, booster shots, and other precautionary measures.

Although the CDC lacks the national regulatory powers that its counterparts in other countries have, it can still provide crucial data, expertise, and advice to health officials and the public alike. First, though, it needs to rebuild the trust that it long took for granted. Ⓑ *For more commentary, go to bloomberg.com/opinion*

■ AGENDA

► Keeping It Together

German Foreign Minister Annalena Baerbock hosts her counterparts from the G-7 countries May 12-14 to discuss the war in Ukraine. She'll seek to maintain a unified front against Russia as its invasion drags into a third month.

► Moscow, meanwhile, hopes to celebrate its invasion of Ukraine at its annual May 9 military parade, despite high casualties among its troops and a failed effort to take Kyiv.

► Disney reports earnings on May 11. The company has been dragged into a culture war after opposing a Florida bill restricting discussion of sexual orientation in schools.

► President-elect Yoon Suk Yeol of South Korea, a political novice whose conservative People Power Party won in March, will be inaugurated on May 10.

► Spooked by Russia's Ukraine invasion, Finland may decide to apply for NATO membership in the week of May 9. Neighboring Sweden is likely to follow suit shortly after.

► The largest white diamond ever to be auctioned will go on sale at Christie's in Geneva on May 11. The 228.31-carat gem is expected to fetch from $20 million to $30 million.

► To celebrate Queen Elizabeth's 70 years on the throne—her platinum jubilee—more than 1,000 performers and 500 horses will take part in daily shows at Windsor Castle May 12-15.

The Next Abortion Battle

● If the Supreme Court reverses *Roe v. Wade*, the fight will shift to access to the abortion pill

● By Cynthia Koons

For decades the fight to end abortion in America has been waged over *Roe v. Wade*. With the Supreme Court poised to overturn the landmark decision that legalized a woman's right to choose, the fight to stop abortion is going to become a fight about a pill.

Mifepristone, originally known as RU-486, was approved in the U.S. in 2000 after being on the market overseas for more than a decade. When used in combination with another drug, misoprostol, it's more than 95% effective in terminating a pregnancy within the first 10 weeks. Data overwhelmingly

PHOTO ILLUSTRATION BY 731; PHOTO: GETTY IMAGES

show it's safe. Yet, as I wrote in a *Bloomberg Businessweek* cover story earlier this year, it's regulated like almost no other drug in the U.S. The federal government has one set of restrictions on how the pill is used, and state governments have additional, often more onerous rules.

It's been a cat-and-mouse game for years now. Those opposed to abortion have tried to use laws and regulations to prevent the pill from becoming the answer for women who can't get access to a clinic. Some two-thirds of U.S. states require that doctors prescribe the pill, which is more stringent than the U.S. Food and Drug Administration's rules, which also allow certified nurse practitioners to do so. In December, a new law went into effect in Texas that introduced penalties of jail time and a fine of as much as $10,000 for anyone who prescribes the abortion pill via telehealth. Texas is also one of seven states that have attempted to keep the drug from being mailed directly to women; three succeeded, but four such bans were blocked by courts.

Despite these efforts–and mifepristone's being perhaps the least marketed pharmaceutical product in the U.S.– what's known as "medication abortion" has been steadily gaining ground. According to the Guttmacher Institute, a reproductive health research organization, the pill now accounts for 54% of all abortions in the country, up from 39% in 2017 and 24% in 2011. "At the moment the anti-abortion movement is realizing its decades-long goal of overturning *Roe*, it's totally lost control of how abortion is accessed," says Greer Donley, an assistant law professor at the University of Pittsburgh School of Law. "Abortion pills are a huge threat to the anti-abortion movement."

To get around some of the restrictions states have imposed, services have cropped up that mail abortion pills to a woman's home or a location of her choosing. The website Aid Access, for instance, offers an online consultation for anyone dealing with an unwanted pregnancy, after which the pills are sent from an overseas manufacturer.

Rebecca Gomperts, the Dutch physician who launched Aid Access in 2018, says her organization's help desk was "really flooded" following the leak of a Supreme Court draft opinion showing the majority of justices were on track to overturn *Roe v. Wade*. "People are really, really anxious and scared," she says.

There have been attempts to crack down on Aid Access already. During the Trump administration, the organization received a warning letter from the FDA saying it was causing the "introduction into interstate commerce of misbranded and unapproved new drugs" in violation of several codes of the Federal Food, Drug, and Cosmetic Act, which it disregarded. She says she hasn't heard from the agency since Biden took office.

Even so, services like Gomperts's that distribute abortion pills can't singlehandedly compensate for a world without abortion access. There are women who need to terminate their pregnancy later than 10 weeks, those who discover they're pregnant too late, and those who discover a problem in a pregnancy that requires a termination later than that. For a small percentage of patients, the abortion pill simply doesn't work, requiring a follow-up with a surgical abortion.

"Abortion pills are not a solution to this problem of a complete dismantling of people's basic human rights," says Daniel Grossman, director of Advancing New Standards in Reproductive Health at the University of California at San Francisco. "It is perhaps a mitigation strategy for the harm this may cause, but it's not a solution."

In fact, overturning *Roe* may have a chilling effect on even the most robust efforts to expand access to abortion by use of the pill. "We've seen prosecutors go after people who are miscarrying or who have self-managed an abortion using, for instance, statutes prohibiting the practice of medicine without a license or child abuse statutes," says Julia Kaye, an attorney for the American Civil Liberties Union who has been spearheading litigation against the FDA pushing for the removal of restrictions on the abortion pill. In December 2021 the FDA decided to allow the pill to be sent by mail in response to the ACLU's lawsuit. But the agency added other requirements, such as requiring pharmacies that ship the pill apply for special certification, making it only a partial win.

Groups seeking to preserve women's access to medicinal abortion have been exploring legal pathways to do away with state bans and other restrictions on the pill. One potential avenue would be to challenge state laws by arguing that federal law preempts them, because the state regulations conflict with those issued by the FDA. There is one case that could be considered a precedent for this. When the Massachusetts governor tried to ban the powerful, long-acting opioid Zohydro in 2013, the drugmaker sued. A U.S. district court ruled in April 2014 that the state couldn't overstep the FDA's authority in regulating a drug.

GenBioPro Inc., which makes the generic version of the abortion pill, invoked the same argument in its lawsuit against Mississippi's health department. The drug company sued in October 2020, arguing that the state's additional requirements on the pill "improperly displaced the FDA's judgment" and "upset the balance that the FDA struck between risk mitigation and ensuring access to a safe and effective medication." That case has slowly been working its way through the courts.

If the experience in Texas is any guide, demand for the abortion pill will surge if *Roe* is overturned. Since the state enacted a law last year that placed a number of new restrictions on abortion, including banning it as early as six weeks, "requests for medication abortion have skyrocketed," says Elizabeth Nash, state policy analyst at Guttmacher.

Research by Abigail Aiken, an associate professor at the University of Texas at Austin's Lyndon B. Johnson School of Public Affairs, published in *JAMA Network*, showed that in the last three months of 2021, after the Texas law passed, there were an average of 29.5 requests per day to Aid Access for abortion pills, 174% more than before the law took effect. Other states that didn't have such laws didn't see such increases.

"We might be seeing it on a much larger scale," Nash says. Ⓑ

● Paris

● The ride-hailing pioneer wants more EVs in its fleet. London shows how to do it

In 2019, London officials revoked Uber Technologies Inc.'s permit to operate in the city for the second time in just over two years, with Mayor Sadiq Khan citing a "pattern of failure" regarding background checks and drivers' identity verification. Uber Chief Executive Officer Dara Khosrowshahi fired back on Twitter, calling the decision "just wrong" and pledging to do whatever it took to regain the license.

The company won an appeal a year later, and these days, Khosrowshahi is quick to praise "Mayor Khan's vision" and stress the strong relationship Uber has with the city. Khosrowshahi met with Khan in November, and in March the city granted Uber a new two-and-a-half-year license to compete with the black cabs that ply the streets of the British capital.

The two men have discovered they can be allies as they chase an elusive goal: getting more electric vehicles on the road. Like local leaders worldwide, Khan is concerned about air quality. And Khosrowshahi, sensing a way to burnish Uber's green credentials, has set a goal of eliminating carbon emissions from every trip booked on its platform in Europe and North America by 2030 and worldwide a decade later. "When you share a common goal, a lot of other things fall into place," he says. "We're doing the work on the ground in concert with the city."

Meeting Uber's 2030 target will require politicians to bar polluting cars from their roads, automakers to manufacture sufficient numbers of EVs, and, most important, drivers to purchase them. While the company can offer incentives, its drivers are independent contractors responsible for buying and maintaining their own vehicles. To help persuade manufacturers to build more EVs and to get more of its British drivers to adopt them, Uber has arranged discounts on battery-powered cars from Hyundai, Kia, and Nissan.

Yet it is Khan who has arguably given Uber the biggest boost. In 2017 the mayor tacked a surcharge on older and more polluting cars on top of congestion fees levied during weekdays in central London. The £15 ($19) daily toll has since come into effect 24/7 across a wider area, and next year Khan will extend it to all of greater London.

But EVs are exempt, dramatically changing the calculus for Uber drivers, who must pay the congestion and pollution charges just like everyone else. "These everyday economics that drivers experience on the road in London are such a powerful signal to suggest that the time for fossil fuels is done," says Adam Gromis, Uber's public policy manager for sustainability. "You're going to feel that in your pocketbook every day."

Uber has done some signaling of its own, with a 15-pence-per-mile surcharge paid into savings accounts that drivers can use only to buy or rent an EV. As of February, there was £148 million in

Edited by David Rocks

UBER DRIVER: NATHAN LAINE/BLOOMBERG. KHOSROWSHAHI: DAVID PAUL MORRIS/BLOOMBERG. *AMSTERDAM, BERLIN, BRUSSELS, LISBON, LONDON, MADRID, AND PARIS. **ATLANTA, BOSTON, CHICAGO, LOS ANGELES, NEW JERSEY, NEW YORK CITY, SAN FRANCISCO, TORONTO, WASHINGTON. DATA: UBER

the accounts—an average of about £3,000 per driver—but less than 10% of those funds had been redeemed as prices climb, making this a lousy time to buy a car. Nonetheless, Uber says more than 90% of new vehicles joining the app in London are fully electric, and about 5,000 of its drivers there now pilot EVs, a number it expects to double by yearend.

Another big concern has been where to plug vehicles in, because few drivers have a garage or even a private driveway, and their livelihoods depend on being able to hit the road with a fully charged car. Uber studied the issue and discovered that Newham—the London borough with the greatest concentration of drivers for the app, and the city's second-lowest median salaries—was a veritable charging desert. So in March the company announced it would spend £5 million building 700 fast chargers in Newham and two other boroughs that are home to many of its drivers, expanding London's overall charging network by 7%. To help drivers needing a quick top-up during the day, it has contracted with BP Plc to reserve spaces at a charging station along the western edge of Hyde Park, and more such deals are in the works.

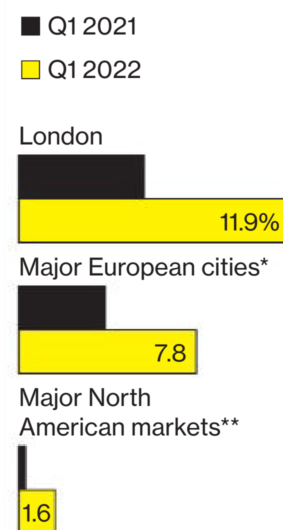
Across the English Channel lies another city where Uber has managed to smooth over its relations with local officials. In Paris, Mayor Anne Hidalgo has aggressively sought to reduce traffic and give the streets back to pedestrians and bikers, cutting the speed limit to 50 kilometers per hour (31 mph) citywide. Diesel engines will be banned in 2024, followed by all other combustion engine vehicles in 2030, and Hidalgo is spending €250 million ($263 million) to create more than 1,000km of bike lanes.

All this would seem to be at odds with Uber's business, but the company has embraced the changes as it seeks to move beyond ride hailing. In Paris, customers can check the Uber app to see the time-cost trade-offs of various modes of transportation. Is traffic on the Rue de Rivoli so bad that taking the Metro would make more sense? Uber will show you how. Would an e-bike or scooter be a faster and cheaper way to make it to the Place de la Concorde? Book one via Uber.

That shift has made the French capital—where the company's use of unlicensed chauffeurs sparked violent protests by taxi drivers in 2015, culminating in the arrest of two Uber managers—its No. 1 market for car-free trips, on scooters, bikes, mopeds, and public transit. And Paris was the second city, after Lisbon, where the company introduced what it calls Uber Green—the ability to book a hybrid or EV. Although the uptake was slow, today 45% of the vehicles on the platform in Paris are hybrid or fully electric, vs. 15% two years ago.

Paris and London illustrate Uber's evolution from a bro-led startup to a grownup company aiming to clean up the less salubrious aspects of its business. The cities have become models for its managers worldwide on how to steer the way into local authorities' good graces while bolstering its reputation, says Jamie Heywood, Uber's general manager for the U.K. and much of Europe. The company leans heavily on its experiences in both ▶

▼ Share of Uber trip miles driven by zero-emission vehicles



● Khosrowshahi

◀ capitals in a 68-page report that serves as something of a road map for electrifying its ride-hailing business and partnering with industry and policymakers. "We've gone from being tone-deaf and not really listening to what our regulator and the mayor expected of us to now," Heywood says. "The relationship is just in much better shape." *—Craig Trudell, with Jackie Davalos*

THE BOTTOM LINE By working with local officials, sealing deals with automakers, and creating a fund for new-car purchases, Uber has managed to repair its reputation and get more drivers into EVs.

U.S. Steel's Maxi Bet on Mini Mills

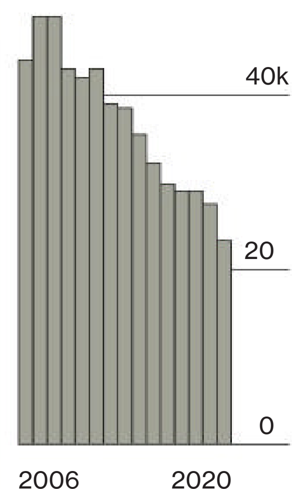
● The metallurgical giant is betting on a new technology—and region—to survive

On a winding country road about 45 minutes north of Memphis, a series of hulking, blue, almost windowless buildings suddenly appear at a bend in the Mississippi River. The facility is Big River Steel, which can produce 3.3 million tons of raw metal a year. That's almost 15% more than the mill's new owner, U.S. Steel Corp., can make at its venerable Mon Valley Works just outside Pittsburgh. Even more important, Mon Valley employs about 3,000 unionized workers. Big River has fewer than 700 employees; none are in a union. "This could be the beginning of the end of Mon Valley," says Tom Conway, president of United Steelworkers.

U.S. Steel, which completed its purchase of the mill last year for almost $1.5 billion, has big plans for the site: It aims to pour an additional $3 billion into the operation by 2024, doubling capacity. That would make the steel plant the country's biggest—and the heart of the company's operations. The area "is becoming the steel capital of the United States," says Dan Brown, the plant's chief operating officer. "We're a much different company today, and we're headed in my mind in the right direction."

Key to the facility is the technology it uses. Unlike Mon Valley and U.S. Steel's two other big U.S. mills, in Gary, Ind., and near St. Louis, Big River uses electric arc furnaces, which remelt scrap and turn it into new steel rather than create metal from iron ore. Steelmakers have embraced these so-called mini mills—typically sprawling plants that seem "mini" only when compared with the vast complexes that dominated the industry in the last century—for their efficiency and cost savings. They use 30% less energy than traditional mills, and they're much easier to temporarily shut down when demand ebbs. Their input costs are lower because they don't require coking coal, limestone, and fresh iron ore. And their emissions are as much as 90% below legacy facilities, according to Columbia University's Center on Global Energy Policy. "If the industry is going to decarbonize," says Curt Woodworth, a steel analyst at Credit Suisse, "traditional producers are going in this direction."

Even as mini mills have grown to account for about 70% of domestic supply, up from 45% in 2000, U.S. Steel had for years proudly refused to adopt the technology. But in 2019, Chief Executive Officer Dave Burritt decided to buy half of Big River. A year later, citing gains from enhanced access to the growing automotive business in the South and in Mexico, Burritt bought the rest of the facility and opened another mini mill in Alabama that makes steel tubes for the oil industry. ▶



◀ Big River can make steel for the auto industry because it uses higher-grade scrap

PHOTOGRAPH BY HOUSTON COFIELD FOR BLOOMBERG BUSINESSWEEK. DATA: COMPANY REPORTS

Art Basel
Hong Kong

Nile Koetting, *Remain Calm (Air)*, 2021. New commission by Tai Kwun Contemporary, Hong Kong. Image by anothermountainman.

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◀ Earnings for the Pittsburgh-based producer have been volatile over the past decade, and after combined losses topping $1.8 billion in 2013 and 2015, investors feared it could be on the path to bankruptcy. In 2000, U.S. Steel was the largest American steelmaker, but it's fallen to No. 3 or 4, and Nucor Corp. has moved into the top slot, with five times its market value. U.S. Steel's stock, though, is up more than 140% since October 2019, indicating that investors approve of Burritt's strategy of shifting the company's center of gravity to the South.

At the time of the Big River purchase, many industry players said U.S. Steel overpaid. But the company insists it needed a foothold in mini mills to compete, and Big River was a good fit because it makes high-grade sheet used by automakers, a market U.S. Steel dominated for decades. Critics had long said mini mills weren't capable of producing the metal needed for cars and home appliances by remelting old steel. Big River proved them wrong by using only higher-quality supplies–typically clean scraps from auto factories rather than crushed metal from junkyards.

Three months after completing the purchase of Big River, Burritt told shareholders he would cancel a $1.3 billion plan to upgrade Mon Valley, the company's flagship plant, where founder Andrew Carnegie built his first mill in the 1870s. The company says Big River isn't meant to replace operations farther north–though executives these days frequently say the goal is to get "better, not bigger."

For union boss Conway, that doesn't quite add up. The company has shuttered or scaled back at

▲ Big River can produce 3.3 million tons of steel a year

◀ Unlike older U.S. Steel facilities, none of the site's 695 workers are union members

least a half-dozen sites across the U.S. in the past 10 years, and he fears Mon Valley may be next. "To lose that facility would be devastating," Conway says. While U.S. Steel denies the purchase of Big River and canceling improvements at Mon Valley have anything to do with unions, Conway insists Burritt's ultimate goal is to weaken the unionized workforce–which he pledges to fight with everything he's got. "This company is certainly not the steelmaking leader they have been historically," he says. "And that's unfortunate." —*Joe Deaux*

THE BOTTOM LINE The steelmaking giant says it plans to double Big River's capacity, bringing its total investment to $4.5 billion as its center of gravity shifts to the South.

PHOTOGRAPHS BY HOUSTON COFIELD FOR BLOOMBERG BUSINESSWEEK

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How to Stop a Cyberwar

The escalating conflict with Russia has added urgency to a debate over U.S. policy

A common explanation for why the Soviet Union never used nuclear weapons during the Cold War was the expectation that any attack would likely prompt a devastating nuclear response. The fear of mutually assured destruction was enough to keep both the USSR and the U.S. from launching a nuclear attack, even as they spent decades building huge stockpiles of weapons.

Cyberweapons are different. Cyberattacks by both governments and private hackers have exploded in recent years. Many of these are financially motivated, but others involve espionage or, in

Edited by Joshua Brustein

ILLUSTRATION BY INKEE WANG. *IN SOME CASES, MULTIPLE STATES SPONSORED THE SAME INCIDENT. DATA: COMPILED BY THE COUNCIL ON FOREIGN RELATIONS FROM PUBLICLY AVAILABLE AND LARGELY ENGLISH-LANGUAGE SOURCES

several high-profile cases, the sabotage of physical infrastructure. There's broad agreement that at some point a cyberattack would be considered an act of war. Yet no one knows quite where the line is.

The situation is more dangerous than ever. Russia's bloody invasion of Ukraine raises the specter of cyberattacks starting an escalatory spiral that results in an all-out war with the U.S. The Biden administration has already warned Russian President Vladimir Putin against targeting 16 sectors at the heart of U.S. economic and national security, including energy and finance. "We will respond with cyber," Joe Biden told reporters last summer after meeting Putin face to face in Geneva. The president didn't lay out exactly what that would entail but added, darkly, "he knows."

On May 4-5, cyber experts from the Biden administration, the military, and academia gathered at Vanderbilt University in Nashville to discuss the new contours of modern conflict at an event organized by Brett Goldstein, a former senior Pentagon official and computer scientist who's now special adviser to Vanderbilt's chancellor. Goldstein says that in the next 5 to 10 years the U.S. should develop a strategy of cyber mutually assured destruction—or cyberMAD—as a form of deterrence. "It is essential that we take lessons from the success of nuclear MAD concepts," he says, warning that U.S. vulnerabilities are only going to grow.

The Department of Defense is preparing a new cyber strategy this year that's likely to include a more prominent role for deterrence. U.S. officials and policy experts have been debating whether it's better to dissuade attacks with the promise of retaliation in cyberspace or elsewhere, or to try to prevent them by taking offensive cyber measures that cut off rivals' ability to carry them out. The Biden administration's strategy will be based on integrated deterrence—the concept that attacks can be prevented by threats of economic penalties or other responses that rely on various levers of U.S. power.

Lawmakers from both parties and experts from outside government are pushing for their own vision of deterrence. A two-year, congressionally mandated bipartisan effort that concluded last year, the Cyberspace Solarium Commission, favors a variation of the theme "layered cyber deterrence," which combines a focus on hardening technical defenses against attacks with the promotion of international norms against, say, cyberattacks targeting civilian infrastructure.

Goldstein's faith that the threat of a catastrophic response could prevent state-sponsored cyberattacks makes him an outlier. Deciding when to respond would be fraught, because determining who's carried out any breach can be tricky. The best hackers often mask their identities. Russian hackers, for instance, have left breadcrumbs suggesting they're North Korean or Iranian, cybersecurity experts have said. Officials say they've become better in recent years at determining responsibility for attacks.

Unlike nuclear weapons, which haven't been used since World War II, the tools of cyberwarfare are widely available and used regularly for attacks of varying seriousness. "Redlines are notoriously difficult to define in cyberspace," Emily Goldman, a cyber strategist at U.S. Cyber Command, wrote in a 2022 paper for the journal *The Cyber Defense Review*. She argued that sanctions, criminal indictments, and other deterrent measures have proven ineffective: "More of the same will not produce different results."

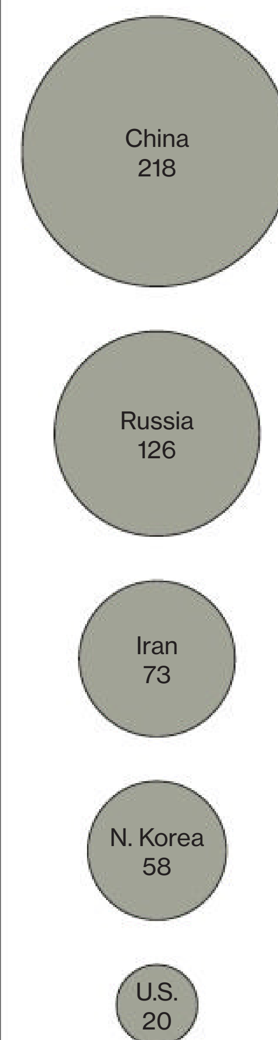
General Paul Nakasone, the leader of the U.S.'s 6,000-person military Cyber Command and one of the speakers at Goldstein's event, has dismissed the nuclear parallels. "Cyber deterrence is not nuclear deterrence," he told Congress in April. For the past several years he's overseen an increase in the Pentagon's continuous offensive cyber operations outside U.S. borders, under a strategy he's described as "defending forward."

The U.S. began changing its approach when Russian interference in the 2016 presidential election led U.S. leaders to overcome their reluctance for counteroffensive cyberattacks, according to Jonathan Reiber, who authored the government's 2015 cyber strategy when he was the chief strategy officer for cyber policy at the Department of Defense. In 2018, Congress changed the legal definition of offensive cyber operations, classifying them as traditional military activity. That same year the Trump administration issued a classified policy memo that some U.S. lawmakers said essentially delegated authority to the Defense Department to conduct them without the White House signing off.

Nakasone told Congress that both the legal change and the policy memo have been "very helpful." The Biden administration is reviewing the memo, and proponents of the "defend forward" strategy worry it could decide to restrict Cyber Command's ability to act effectively.

One problem with using the threat of cyberattacks as a deterrent is that cyber superiority is inherently ephemeral, according to Nakasone. While a nuclear arsenal's power is persistent, cyberweapons rely on exploiting vulnerabilities in code, which can be patched and disappear as quickly as they're found. So, unlike nuclear weapons, Nakasone's cyber arsenal and access routes ▶

▼ State-sponsored cyber operations, 2005-21, as tracked by the Council on Foreign Relations*



◀ must change all the time. The U.S.'s ability to find and exploit such vulnerabilities is significant, but its ability to carry out attacks on specific targets may ebb and flow.

Some academics argue that "defending forward" is a euphemism for the U.S. waging its own attacks. In a paper for the Atlantic Council in March, cyber coercion expert Jenny Jun argued that the strategy leaves "much room for misjudgment and misinterpretation" about how the U.S. will respond and that instead of being a deterrent, it could encourage adversaries to strike first rather than wait to be compromised themselves.

Amid such uncertainty over the nature of cyberwar, Erica Lonergan, a senior director on the Cyberspace Solarium Commission, says debates over deterrence have become unhelpfully "binary." The best way to prevent major cyberattacks may not be to threaten or execute cyber operations, she says, but to rely on other instruments of national power. In 2018 the Trump administration listed using nuclear weapons as a potentially appropriate response to a non-nuclear strategic attack, a category that could include a catastrophic cyberattack. The Biden administration reserves the right to choose how it responds, including with military force, and insists a cyberattack against any NATO ally could trigger a joint response from all 30 countries.

One challenge is that the lack of a clear definition of cyberwarfare has tempted countries to test the limits, carrying out smaller attacks under the assumption they won't be enough to provoke a major response. Some experts warn that the U.S.'s ability to establish norms surrounding such attacks has been undermined by its own history of cyberattacks, digital spying programs that targeted civilians—including allied leaders—and the Stuxnet attack that targeted Iran's nuclear facilities more than a decade ago, a campaign widely believed to have been carried out by the U.S. and Israel.

Michael Daniel, a former cybersecurity coordinator under the Obama administration, says the U.S. could do a lot more to deter the proliferation of cyberattacks that fall below the threshold of war in cyberspace. "The question is, can you use the government's national power to reduce the volume of malicious activity in cyberspace and reduce its impact on the United States?" he says.

A small, and potentially temporary, comfort is that Russia's war with Ukraine has so far resulted in less cyberwarfare than many experts expected. One theory as to why, put forth by Lennart Maschmeyer, a cybersecurity researcher at ETH Zurich, is that they aren't as effective as many people believe. He's studied the impact of Russian cyberattacks against Ukraine since 2014. "They have really achieved almost no measurable strategic impact," he says.

Another explanation could be that Russia didn't plan any, because it anticipated swift military victory. That could change as the war grinds on, and recent research from Microsoft Corp. indicates Russia has been using "destructive and relentless" cyberattacks against Ukrainian services and institutions.

It's also possible deterrence is working and Russia has been fearful of carrying out cyberattacks outside of Ukraine because that could trigger NATO's Article 5, the collective defense clause, and draw other nations into the conflict. For Goldstein, this hesitance points to a strategic opportunity. "We may be seeing the early bones of what deterrence could look like," he says. *—Katrina Manson*

THE BOTTOM LINE Experts are split on whether to try to prevent state-sponsored cyberattacks with the threat of retaliation or with active sabotage of rival capabilities.

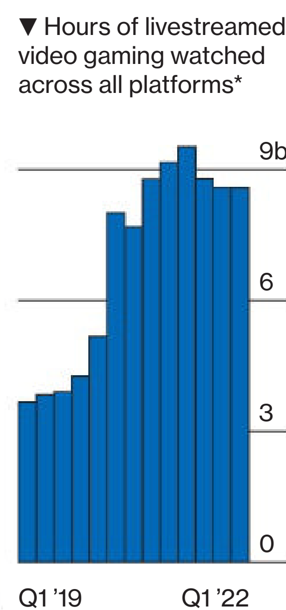
Stepping Off the Streaming Treadmill

● Top game streamers are developing businesses that don't require constant performance

Nobody making a living on an online platform is immune to volatility—not even Ludwig Ahgren, who in April 2021 set a record for the most subscribers ever on Twitch, Amazon.com Inc.'s streaming platform for gamers. After years of using Twitch to broadcast himself playing *Super Smash Bros. Melee* and chatting with fans full time, Ahgren committed himself to a punishing monthlong period of around-the-clock streaming he called a sub-a-thon. He peaked at 283,066 subscribers, each paying from $5 to $25.

The numbers were fleeting—by the next month, he'd lost all but about 42,000 subscribers. "I went right back down to where I was before the sub-a-thon," he says. "You reach a level of success, and then you see it start to go away. It's how streaming works."

Twitch, YouTube, and other streaming services



▼ Hours of livestreamed video gaming watched across all platforms*

PHOTOGRAPH BY MICHELLE GROSKOPF FOR BLOOMBERG BUSINESSWEEK. *INCLUDES TWITCH, YOUTUBE, FACEBOOK, AFREECATV, TROVO, NAVER TV, MILDOM, NONOLIVE, OPENREC, DLIVE, VK, BOOYAH, GARENA LIVE, AND KAKAOTV. DATA: STREAM HATCHET

have given livestreamers such as Ahgren the chance to build audiences and make media careers in ways that would've been impossible until about a decade ago. But performers have to produce videos constantly to keep viewers engaged. What Ahgren did after his record-breaking subscriber base evaporated shows how a handful of celebrity game streamers are looking to detach from this exhausting cycle and build more sustainable careers.

In November, Ahgren leveraged his Twitch fame into a multimillion-dollar exclusive deal with its main competitor in game streaming, Alphabet Inc.'s YouTube. He employs about a dozen people, who produce his content, handle merchandising, and perform other tasks. This month, Ahgren is starting his own company to provide technical infrastructure to other streamers. Called Truffle, it will enable a streamer to offer custom emoticons to fans and allow them to wager digital points on the outcomes of events within the live videos. The company will also eventually facilitate the creation of custom apps by third-party developers.

Many prominent Twitch streamers are also looking to seed entrepreneurial ventures that rely less on the daily grind. Hanako Tjia, a United Talent Agency agent who works with several top Twitch stars, is seeing more of them form game development studios, production companies, brand consulting firms, and direct-to-consumer brands. "The gaming landscape has dramatically evolved from where it was five years ago, and there are more opportunities for content creators now than ever before," she says.

Game streamers often struggle with burnout and other maladies of overwork and end up looking to diversify. "You've seen countless streamers go through breakdowns, depressions, or worse," says top Twitch streamer Asmongold, who doesn't share his full name publicly. "It's obvious that for many people, streaming is not a 20-year career." In 2020, Asmongold, whose career has been marked by periodic burnout-inspired breaks, co-launched a network of influencers who collaborate on video content. Called One True King, or OTK, the company negotiates sponsorship deals between brands and its members.

Long infamous for young, male performers engaging in sexist, racist, or homophobic behavior, game streaming has become tamer, at least compared to its recent past. Its audience has also exploded since the beginning of the pandemic. That's created an opening for veteran performers to start companies like OTK to capitalize on their knowledge of the space in ways they couldn't do by streaming alone. These startups connect the idiosyncratic and fast-paced streaming business with brands such as the Hershey Co., MAC Cosmetics, Red Bull, and UberEats, which are eager to reach young, digitally native audiences.

The entrepreneurs say they're often charting their own course rather than following patterns set by previous generations of media stars. In October, Imane "Pokimane" Anys, 25, co-founded RTS (named for the video game genre "real-time strategy"), a company that manages game-streaming talent. Anys, who's been streaming on Twitch since she was in high school, had few role models. "If I were ever facing a new obstacle, there wasn't a set structure or rulebook for me to turn to," she says.

▲ Ahgren at his home in Los Angeles

Performers who feel they've reached the ceiling on their preferred platforms are managing others and looking beyond entertainment. Kaitlyn "Amouranth" Siragusa, a superstar on both Twitch and the subscription-based platform OnlyFans, where she posts adult content, said last month on Twitter that she was launching an agency for female content creators on both platforms. She has also diversified outside of entertainment, buying gas stations, investing in a 7-Eleven, and even sinking $7 million into an inflatable pool-toy company.

Tjia says the entertainers she works with are now ready to leverage their success into entrepreneurship. However, she says, "building a business as a true CEO is not for everyone, and there are risks and opportunity costs that come with entrepreneurship." While some might move on to become chief executive officers, she adds, others "will take more strategic, behind-the-camera roles in shaping the gaming industry." —*Cecilia D'Anastasio*

THE BOTTOM LINE Twitch and YouTube have created new paths into high-profile media careers, but the relentlessness of daily streaming comes with a high risk of burnout.

Bottom-Fishing Can Be Scary

● In a rough year for stocks, it's tempting to try to grab bargains now. Just be careful

With U.S. stock market indexes taking some nasty dips in recent weeks and the S&P 500 down about 10% for the year even after a May 4 rally, it's open season for one of the most popular—and most dangerous—sports on Wall Street: bottom-fishing.

As the phrase implies, bottom-fishing entails trying to spot the low point of a market selloff to make some big stock purchases and reap outsize rewards from a quick rebound. It should be stated upfront, and in boldface type, how risky it is to attempt to time the market like this. It's a matter of luck as well as skill, so even those who get it right find it hard to repeat their success. Anyone who listens to sober-minded financial advisers will know to avoid big moves in and out and be content knowing that, as a regular saver trickling cash into investment or retirement accounts slowly—week by week or month by month—you're probably already doing a little bottom-fishing, anyway.

Still, it's easy to appreciate the allure of this sport: It's like shopping in a store where prices have suddenly been cut. The key question is whether this weakness in markets is just a routine correction or the start of a bear market plunge, which is defined as a loss in excess of 20%. If it's the former, the rebound from the low can be very strong.

Edited by Pat Regnier and David Rocks

Following the end of non-bear-market corrections since 1970, the S&P 500 has surged an average of 14% in the subsequent three months and posted an average gain of 27% in 12 months, according to strategists at BMO Capital Markets.

Rebounds from non-bear-market corrections can be fast, too. Of the 23 in the S&P 500 since 1945, the average decline has been 14% and the market recovered to its highs in an average of four months, according to Sam Stovall of CFRA Research. On the other hand, in full-on bear markets, prices took an average of 27 months to recover, he found. The catch, of course, is that we won't know which kind of downturn this is until it's over.

Adding to the allure is that some of the greats of the investment world appear to have cast their lines. Warren Buffett's Berkshire Hathaway just went on its biggest stock-buying spree in at least a decade. There are also reasons to believe the recent selloff has gone too far. For one thing, the market has just gone through the bulk of the first-quarter earnings season. Corporations typically suspend repurchases of their own shares a few weeks before reporting quarterly results, in what's known as the buyback blackout period.

Although research by State Street Corp. in 2019 suggested blackout periods don't typically have a negative impact on the market as a whole, a lot has changed since then. With various measures of investor sentiment at the weakest they've been in more than a decade, the importance of corporations' purchases of their own stock arguably has grown. Goldman Sachs Group Inc. analysts expect buybacks from S&P 500 companies to grow 12% in 2022 and remain the largest source of demand for U.S. equities. Buyback authorizations by corporate boards are running 22% above 2021's record pace, when they totaled $1.2 trillion for the full year, Goldman noted recently.

So what exactly do investors look for to identify a bottom that's worth fishing? For some, it's a sign that investors have capitulated—selling stocks for whatever price they can get, causing massive declines in benchmark indexes, with stock market volume composed almost entirely of declining shares. That made April 29, the day the S&P 500 plunged 3.6%, look like a possible signal for value hunters.

Others want to wait a little longer until they think all possible bad news has already been reflected in share prices. "This earnings season has seen certain stocks rally on results that fell short of consensus expectations, suggesting we might be near a bottom in some sectors," says Saira Malik, chief investment officer at Nuveen. A similar dynamic was at work on May 4 when the Federal Reserve raised interest rates half a percentage point: Stocks rose because Chair Jay Powell didn't speak as hawkishly as many feared.

But all this chum in the water could still hide risks. For one thing, the market is coping with a long list of fundamental problems, including rising interest rates, inflation, and slowing economic growth. On top of that, the S&P 500's annual returns have averaged more than 26% for the past three years, more than twice the historical norm, and the process of reversion to the mean can be ugly. "Anyone who tells you we are in a bull market has got a lot of explaining to do," Morgan Stanley's Mike Wilson, the most bearish strategist tracked by Bloomberg, wrote in a note to clients recently.

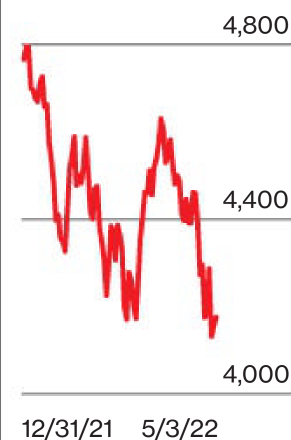
The U.S. economy has already suffered an unexpected contraction of 1.4% in the first quarter. That was quickly dismissed by many economists as the result of a surge in imports, a drop in exports, and slower buildup in business inventories, rather than a sign of weakness in the all-important consumer economy. That may be true, but it could mean Fed policymakers won't see the negative gross domestic product reading as a reason to cancel planned interest-rate hikes meant to tame the fastest inflation in 40 years. And prospects of rising rates are almost always bad for stocks.

Yields on U.S. Treasuries maturing in five years are near 3%, the highest since 2018, as are 10-year yields. Those yields influence all kinds of borrowing costs for companies and consumers. Thirty-year fixed mortgage rates are already near an almost 13-year high of 5.5%, according to Bankrate.com.

And Treasury yields affect more than just borrowing costs. They also serve as the "risk-free rate," a sort of yardstick by which all other investments are measured. When they rise, it lifts the hurdles for expected returns that other investments must clear. If you can earn 3% or more for 10 or 20 or 30 years in the unrivaled safety of the Treasury market, the thinking goes, you'll be much less inclined to take on the risks of the stock market than you were when 10-year bonds were yielding half that last year, or a scant 0.5% during the lockdown phase of the pandemic. The effect is the most acute when it comes to the speculative corners of the market, where both the potential rewards and risks are higher. That helps explain why the ARK Innovation ETF, which invests in disruptive companies such as Tesla, Coinbase Global, and Teladoc Health, has lost almost 70% from last year's peak.

Anyone deciding whether to engage in bottom-fishing also needs to ask themselves what exactly they're angling for. It's understandable that ▶

▼ S&P 500



● Malik

FISH: ALAMY. MALIK: COURTESY NUVEEN. DATA: COMPILED BY BLOOMBERG

◀ professional investors who are tasked with beating the market would be tempted to make big timing bets. Even within a nasty bear market, there are theoretical opportunities to make money: The crash in the stock market that followed the bursting of the dot-com bubble two decades ago included six different rallies of at least 10% in the S&P 500 before a final bottom was set in October 2002. But that also means there were six false bottoms. For the rest of us just trying to save enough for retirement, the boring strategy of regular investment in good markets and bad ones–which still catches some bargains on the way down–is likely to be more nourishing. Even if it means the fishing stories won't be as good. *—Michael P. Regan, with Vildana Hajric and Cameron Crise*

THE BOTTOM LINE Historically, rebounds from stock market corrections can be fast and rewarding. But rising interest rates could make things more difficult this time.

A Crackdown Is Coming

● Federal investigators are looking all over Wall Street for evidence of market rigging

Bill Hwang's lawyers couldn't believe it. The fallen billionaire investor was sitting in federal custody in New York, less than 48 hours after his legal team had visited prosecutors to talk them out of criminal charges. The effort seemed to be going well until the feds scooped up Hwang at daybreak on April 27 to face 11 felony charges–and potentially the rest of his life in prison. "In no event was an arrest necessary," his attorneys said in a statement expressing frustration that morning, noting that Hwang had been voluntarily answering the government's questions for months.

All of Wall Street should pay close attention. The Hwang case marks an upswing of federal investigations into a slew of suspected trading abuses. Three other broad inquiries have emerged in recent months to examine so-called block trades, short sales, and well-timed wagers. The probes go into corners of the market that historically haven't faced much scrutiny, and they all center on the same question: Are markets rigged?

Biden administration officials have spent the past year laying groundwork to pursue white-collar crime more aggressively, rolling out policy changes–some disclosed, some not–that will make probes easier to start, faster to finish, and more punishing. "There's a perception that there are two sets of rules," says Gurbir Grewal, head of the U.S. Securities and Exchange Commission's enforcement division. "We want everyday Americans to have confidence when they invest in the market."

"There's a perception that there are two sets of rules"

Many Wall Street denizens don't seem to grasp what's afoot, even as Hwang's treatment underscores the shift. For months his legal team made the case that his family office, Archegos Capital Management, acted lawfully as it built massive positions on a small number of stocks, pushing their prices to record highs before they crashed. Archegos–and the banks that let it trade with borrowed money–had lost billions of dollars.

Then, on the very day Hwang's lawyers thought they were to have a further productive meeting with U.S. investigators, prosecutors filed a sealed indictment against him and Archegos's chief financial officer, Patrick Halligan, that included a charge under the Racketeer Influenced and Corrupt Organizations Act, known as RICO. Authorities alleged that the pair lied to banks and manipulated stock prices. When officers pulled up to their homes without warning two days later, Halligan was already on his train commute into Manhattan. His mobile phone rang: Agents were outside his front door, looking to arrest him. Halligan grabbed a taxi back to meet them.

Deputy Attorney General Lisa Monaco commended prosecutors in the Southern District of New York for the speed of their 13-month investigation–unusually fast on Wall Street. "This is exactly the kind of criminal case that the Department of Justice should prioritize," she said at a press conference. Then came a hint: "And we will continue to do so."

Behind the scenes, the feds have been gathering information on dozens of banks, investment firms, and their executives as part of other sweeping probes. Many elements of these inquiries–as well as the tactics the government is using–were described by U.S. officials, industry professionals, and lawyers who asked not to be named because they weren't authorized to talk publicly.

The first sign of trouble beyond Archegos came in November, when Morgan Stanley abruptly placed on leave a key executive handling large transactions known as block trades. It later emerged that the Justice Department and SEC were digging into communications among a roster of Wall Street firms and executives, checking whether any bankers tipped off hedge funds to deals that

MICHAEL NAGLE/BLOOMBERG. DATA: COMPILED BY BLOOMBERG

were big enough to move prices. Morgan Stanley has said it's cooperating. Neither the bank nor the executive has been accused of wrongdoing.

Then in December, Bloomberg broke the news on a probe into the who's who of the world of short sellers, or investors who actively bet on declines in the prices of stocks. In that case the Justice Department has been amassing a trove of information on dozens of investment and research firms, plus some of their executives, as investigators try to map alliances and determine whether anyone manipulated stocks or engaged in insider trading.

Last month, Bloomberg reported that the SEC is digging into a pattern of well-timed bets in a more arcane corner of Wall Street. Those inquiries focus on stock warrants issued by an army of special purpose acquisition companies, or SPACs, that have flooded into markets in recent years in search of private companies to buy. A *Bloomberg Businessweek* analysis showed that in dozens of cases, big spikes in warrant trading preceded announcements by SPACs that they'd reached an agreement to buy a business, sending their shares—and the warrants—soaring in value.

Crackdowns on Wall Street are somewhat cyclical. Some of the seeds for this one were planted in the fall of 2021 when Monaco gave a speech to white-collar defense lawyers, saying prosecutors will lean harder on banks and other companies to inform the government of wrongdoing within their ranks or among their customers.

To a degree, that's what banks have always been expected to do. But Justice Department officials have gained more leverage in recent years. A number of banks entered into settlements known as non-prosecution or deferred-prosecution agreements that let them avoid criminal convictions, but with a catch. The deals require banks to "cooperate" with ongoing and future probes—which has long meant responding quickly to requests. Around the time of Monaco's speech, the Justice Department warned a handful of firms that they were at risk of breaching deferred-prosecution agreements.

Monaco also said that for some firms, it may be more difficult to avoid convictions in the future. The department will consider a company's entire rap sheet—criminal, civil, and regulatory—when deciding whether to accept agreements to resolve new misconduct, a departure from past practice that mostly looked at recent or related behavior.

The Justice Department's use of RICO was long focused on taking down Mafia bosses and drug gangs. It was used sparingly in prominent Wall Street cases in 1989 and the early '90s, and then it seemed to be off the table. In 2019, Washington prosecutors dusted off the law to use against bank employees, ▶

▼ Hwang outside a federal courthouse

◀ accusing members of JPMorgan Chase & Co.'s precious-metals trading desk of operating a criminal enterprise with transactions designed to deceive other market participants. To settle its part of that case, JPMorgan reached a deferred-prosecution agreement for wire fraud. The decision to wield the statute again so soon—this time over Archegos—shows the Biden administration sees it as useful.

JPMorgan recently stumbled onto a different policy shift, this time inside the SEC. Late last year the bank found itself unexpectedly cornered. The SEC was demanding it pay dearly to settle an investigation into its failure to archive business-related communications. JPMorgan's attorneys arrived at a meeting in December armed with a list of past precedents, pointing out that the heftiest penalty ever levied was less than $20 million. Shoving that aside, the SEC demanded more than $100 million.

The confrontation says a lot about the newly energized SEC under Chair Gary Gensler, who arrived just over a year ago. After the comparatively lax Trump years, the agency's enforcement division is seeking larger penalties and, in some cases, outright admissions of wrongdoing, according to interviews with more than a half-dozen defense lawyers, who asked not to be named discussing negotiations with the regulator. The SEC has also been focused on speeding up inquiries, shortening the time it takes to decide whether to sue or drop a case.

Grewal, the division's new head, told JPMorgan he wasn't budging because past fines apparently hadn't caused banks to take their record-keeping obligations seriously, according to people familiar with the matter. In December, JPMorgan paid $125 million, a record penalty, and made a rare admission that it had broken laws by failing to capture employee communications on WhatsApp and personal email and text messages from January 2018 to November 2020. The Commodity Futures Trading Commission imposed an additional $75 million fine, bringing the total to $200 million.

Those deals stunned many defense attorneys because regulators typically extract far less for negligent or nonfraudulent conduct. The SEC is investigating whether more banks, including Goldman Sachs Group Inc. and Citigroup Inc., committed similar lapses. "It's a different tone at the top," says James Cox, a professor at Duke University School of Law, who's an expert in securities regulation. "The staff feels the chair has their back. It's a pro-regulatory, pro-enforcement environment." —*Tom Schoenberg, Matt Robinson, and Sridhar Natarajan*

THE BOTTOM LINE The Justice Department and SEC have been moving to make their investigations into financial companies faster and potentially more punishing.

The Oxymoronic Life of ESG ETFs

● Passive funds with a do-good focus have become one of the hottest corners of finance

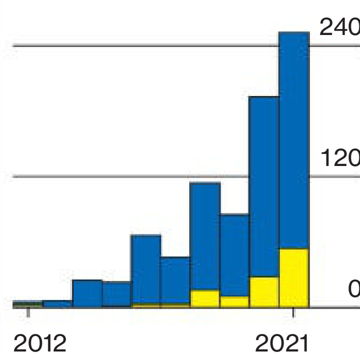
Over the past 15 years, two accelerating trends have reshaped finance: passive investing via funds that track broad indexes, and a focus on enterprises deemed sustainable, using so-called ESG—or environmental, social, and governance—criteria. These days the two frequently come together in the form of ESG exchange-traded funds that aim to marry sustainability considerations with the risk-balanced advantages of index investing. Last year almost two-thirds of new ETFs had ESG ambitions, says David Hsu, an ETF specialist at Vanguard. Such funds are "by far the largest category of product being launched," he says.

Passive ESG investing seems oxymoronic: Picking stocks—based on whatever standards—can't be considered passive. But if done right, ESG ETFs can offer an affordable option to invest more sustainably; once the constituent companies have been selected, day-to-day management can be largely hands-off. The investments fall into three broad groups: exclusionary funds, which simply avoid certain "sin" stocks; integration funds, which use similar criteria but also take into account assessments by groups that rate companies for their adherence to ESG standards; and thematic funds, which aim to capture companies in a specific line of work, such as clean energy.

A Hot Niche

Number of ESG ETFs, by year of inception

■ Active ■ Passive



Total assets under management in ESG ETFs globally, at yearend

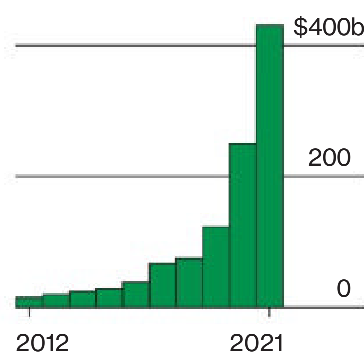


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ILLUSTRATION BY TOMI UM

EXCLUSIONARY
Weapons, tobacco, and thermal coal stocks are commonly excluded. Most funds also avoid shares of companies deemed noncompliant with sustainability principles established by the United Nations. Some might steer clear of industries including alcohol and adult entertainment or perhaps oil and gas, in addition to coal. Most exclusions are done on a sales or ownership basis, so even when arms makers are meant to be out of the mix, a company deriving less than, say, a quarter of its revenue from weapons might make the cut—meaning armaments producers could lurk in your supposedly weapons-free ETF. "It's not easy when companies are complex," says Eric Balchunas, senior ETF analyst at Bloomberg Intelligence. "You can't just pick the good ESG parts of the company and throw the rest out."

Funds can sometimes be caught out inadvertently. Exclusions are typically reviewed quarterly, so if a company engages in human-rights violations days after the assessment, you'll continue bankrolling it for the next three months. Last winter asset managers at Vanguard and Northern Trust increased holdings in Russia's state-owned Sberbank as Vladimir Putin amassed troops on Ukraine's border—not because someone made a decision to invest but because the funds automatically bought shares to rebalance their holdings or to account for cash inflows. "Sometimes the label will match the contents in the tin every bit as well as paisley matches plaid—which is to say, not at all," says Ben Johnson, director of passive funds research at Morningstar.

INTEGRATION
This bucket can be split in two. The first category comprises funds with a market capitalization weighting, meaning bigger companies will account for a larger proportion of the fund. These funds also assess a company's ESG rating vs. its peers, featuring those with higher scores more prominently or excluding the lowest-rated companies in each sector. The second category consists of funds based entirely on ESG assessments with the market cap weighting removed, so the top securities in the fund will be the best performers by ESG rating, rather than the biggest companies.

The problem with both variants is that ESG ratings are typically done by the same groups that create indexes. Ratings are unregulated, their underlying methodologies aren't always public, and companies have complained that they aren't told how to do better. Furthermore, assessments often don't evaluate a company's impact on the world but focus on the risks that ESG factors pose to the business. So a company might score well on the E not for its smart management of scarce water resources but because its factories are near ample sources of water. "There's sometimes a disconnect between what the financial community is doing in terms of ESG and what ESG means to consumers," says James McManus, chief investment officer at JPMorgan Chase & Co.'s digital unit Nutmeg.

THEMATIC
The upside here is that such funds create baskets of securities tailored to, say, clean water or equity. The downside: Strength in one category doesn't necessarily mean much for the other two boxes. For example, a low-carbon fund led by Tesla Inc. might do well on the E but poorly on the G because of outsize executive pay and subpar shareholder rights. Most funds in this group tend to address environmental concerns: There's an ETF purely made up

of companies that derive at least one-third of their revenue from solar energy (TAN); another (ICLN) focuses on clean power via stocks of renewable energy companies. Plenty of niche ETFs, though, appear thematic by name but are really exclusionary funds with a slightly more tailored list of stocks they avoid.

Take VEGN, a "vegan" fund, or SHE, focused on gender diversity. The former seeks to avoid companies that mistreat animals, while the latter favors those with a lot of women in the executive suite—but in both instances, top holdings include UnitedHealth Group, Visa, and Salesforce.com. "You may need to do a bit more homework if you want to invest in an ESG fund," says Laith Khalaf, head of analysis at brokerage AJ Bell. "Look under the bonnet and make sure it's aligned with your own personal preferences." —*Natasha White*

THE BOTTOM LINE When done right, funds can offer an affordable option for ESG-driven investment, with day-to-day management largely hands-off.

Qatar's Moment

▼ Ras Laffan Industrial City, the locus of Qatar's LNG industry

● One of the world's richest countries is poised to become even richer

As planes begin their descent into Doha, passengers can look down at the new 80,000-seat stadium rising from the desert that will host the final of the World Cup in December. They may also notice another striking image: tankers lining up in the Persian Gulf, waiting to be loaded with liquefied natural gas.

Soccer and superchilled gas are coming together to give a country of only 3 million people an outsize influence on the global stage. The world sat up and took notice when, in 2010, Qatar beat Japan, the U.S., and others in bidding for the rights to host one of the highest-grossing sporting events on the planet.

Now Qatar, which boasts the third-largest reserves of natural gas, stands to reap another windfall. Its energy exports were already on track to reach $100 billion this year for the first time since 2014, according to Bloomberg News calculations. Then Russia invaded Ukraine, setting off a scramble across much of Europe for alternative supplies of gas to replace what's piped in from Russia. Several of the European Union's most senior officials have jetted into Doha in recent weeks, all with a clear message: We need your LNG. Moscow's move at the end of April cutting off exports to Bulgaria and Poland only added to the sense of urgency.

Qatar has begun a $30 billion project to boost its LNG export capacity 60% by 2027. The extra demand means more competition among buyers

Edited by Cristina Lindblad

looking to sign long-term supply contracts and, most likely, better terms for Qatar.

Before Russia's invasion of Ukraine, some analysts doubted there'd be enough business to justify the project's big price tag. Now, Qatar is sounding out customers about an even bigger expansion. "It's an incredible opportunity," says Karen Young, senior fellow at the Middle East Institute in Washington. "Qatar will be one of the most important exporters of gas, the market for which will probably be very strong for years to come."

Saudi Arabia, the United Arab Emirates, and their allies spent years trying to punish Qatar economically for being too close to regional Islamist groups and Iran. The coronavirus pandemic depressed the price of gas to record lows, accelerating the trend of consumers switching from fossil fuels to cleaner, renewable energy. Human-rights activists were slamming Qatar for its treatment of foreign workers building the infrastructure for the World Cup. At least 50 of them died in 2020 alone, according to the International Labour Organization.

Now the economic boycott by neighboring states has ended and European gas prices sit near all-time highs. Qatar's emir, Sheikh Tamim bin Hamad Al Thani, is in demand in the U.S. as well as Europe. At a White House meeting with President Joe Biden in late January—weeks before the war started—the two discussed "ensuring the stability of global energy supplies." A couple of months later, Biden formally designated Qatar "a major non-NATO ally," partly as thanks for Doha assisting the U.S. with evacuations from Afghanistan. That relationship contrasts with the tension between the White House and Saudi Arabia and the UAE because of their refusal to hike oil production to help bring down prices.

Qatar's $200 billion economy is set to grow 4.4% this year, the most since 2015, according to Citigroup. Gross domestic product per person will climb to almost $80,000, back up toward levels in places such as the Cayman Islands and Switzerland.

The start of what could be a gas "supercycle" comes just as the World Cup construction boom that powered the economy in recent years is ending, says Ziad Daoud, chief emerging markets economist at Bloomberg Economics. "The timing is fortunate for Qatar, which could see a new driver of growth for this decade," he says.

The question now is what Qatar will do with its LNG-fueled jackpot. Much of the money will be used to bolster Qatar's sovereign wealth fund, according to a person familiar with the matter who asked not to be named because they were not authorized to speak publicly on the matter. That funding would enable the Qatar Investment Authority (QIA), already a major investor in companies such as Barclays Plc and Volkswagen AG, as well as in New York and London real estate, to accelerate its push into technology stocks.

Qatar could also use the proceeds from energy exports to further geopolitical goals. Last month the government pledged $5 billion worth of investments in Egypt, part of a plan by Gulf States to support the North African country, which has been battered by a rise in food prices since the war in Ukraine started.

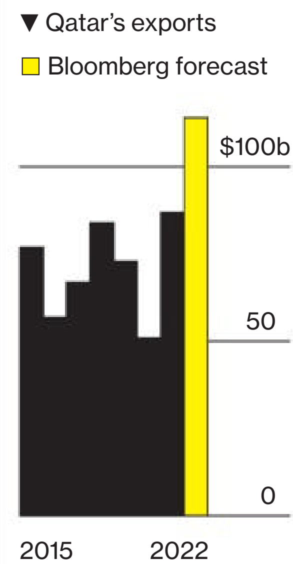
Previous investments linked to foreign policy haven't always paid dividends. The QIA sank billions of dollars into Russian assets including state-run Rosneft Oil Co. in the past decade. The value of those has now plummeted.

Another bet that went south: Qatar, under Tamim's father, Sheikh Hamad bin Khalifa al Thani, funneled $8 billion to Egypt after the Arab Spring protests lifted the Muslim Brotherhood into power in 2012. The Egyptian military ousted President Mohamed Mursi a year later. Qatar's support for Mursi drew criticism from fellow Gulf States and was among the reasons they cited for their boycott years later.

Hamad also invested in Gaza after its takeover by Hamas, designated a terrorist organization by the U.S. Hamad, who transferred power to his son in 2013, backed initial revolts in Syria to overthrow Bashar al-Assad, who remains in power. "Qatar can play an interesting regional role, but it comes with a lot of risk," says Young at the Middle East Institute. "Being friends and interlocutors for the region's problem cases comes with unpredictable baggage."

Qatar's natural gas reserves are mostly contained in the North Field, an offshore behemoth extending into Iranian waters. Shell Plc discovered it in 1971, yet soon abandoned it. Gas had little value, especially if it was too far away to be piped to major markets.

By the 1990s, Qatar's finances were under strain as oil output declined. Abdullah bin Hamad Al Attiyah, the energy minister at the time, said gas was the future. Consumption was rising, and engineering advances had brought down the cost of turning gas into a liquid, allowing it to be shipped all over the world. By 2012 the country had become the world's biggest exporter of LNG, thanks to demand in Japan and Taiwan. Europe, though, proved a tougher market to crack. "In 1997 or 1998, I went to Germany, I met German officials, and we discussed whether Qatar could be a supplier," recalls Al Attiyah in an interview. "They replied: 'Oh, we don't think we need your ▶



● Tamim

LNG: WAYNE EASTEP. TAMIM: THAIER AL-SUDANI/REUTERS. DATA: BLOOMBERG, QATAR'S MINISTRY OF DEVELOPMENT PLANNING AND STATISTICS HYDROCARBONS AND DERIVATIVES ACCOUNT FOR OVER 90% OF QATAR'S EXPORTS.

◀ LNG, because we will get a lot of gas from Russia through pipelines, and it's cheaper.'"

More than two decades and one Vladimir Putin later, European nations need no coaxing. The EU has embarked on a multipronged strategy to take on much more LNG and piped gas from outside of Russia. Germany, whose economy minister, Robert Habeck, traveled to Doha to meet the emir in mid-March, has pledged to build its first LNG import terminals.

◀ One of the new stadiums built for the 2022 World Cup

For the moment, Qatar can't produce enough to meet the needs of Europe, which gets around 40% of its gas from Russia. State producer Qatar Energy is pumping at full capacity, and more than 80% of its cargo goes to Asia. A lot of those shipments are sold under multiyear contracts that Doha has said it won't cancel to divert supplies to Europe.

The potential is clear, though. Morgan Stanley expects Europe's pivot from Russian energy to spur a 60% increase in global LNG consumption by 2030. Goldman Sachs Group Inc., meanwhile, forecasts that gas spot prices in Asia and Europe will be as high as $25 per million British thermal units through at least next year. That's more than six times the break-even price for Qatar's expansion project.

This year's edition of the Doha Forum foreign policy conference in March was attended by almost 4,000 people, including the EU's chief diplomat, Josep Borrell. Ukrainian President Volodymyr Zelenskiy got a long round of applause for a video address in which he said Qatar could prevent Russia from using energy as "a weapon to blackmail the world."

As Elan Habib, Middle East director at commodities analysis company ICIS, puts it, "Russia's invasion and the uncertainty of gas supply to Europe have changed the game for Qatar." —*Paul Wallace and Simone Foxman, with Fiona MacDonald and Verity Ratcliffe*

THE BOTTOM LINE European demand for Qatar's LNG will create a lucrative revenue stream for the tiny sheikdom just as its windfall from hosting the 2022 World Cup tails off.

The Gravity-Defying Housing Market

● Pent up demand for homes coupled with low inventory could complicate the Fed's inflation fight

Federal Reserve officials are counting on higher mortgage rates to throw cold water on the frenzied housing market as they work to tame the highest inflation in decades. But the market may not cool fast enough.

While rising rates and higher home prices are starting to lock some buyers out and weaken sales, pent up demand for housing, combined with a stark shortage of homes on the market, is still putting upward pressure on prices. A dearth of inventory also means rising rates may not slow homebuilding activity as much as they have in the past.

The Fed, which is raising interest rates to curb inflation, is relying on higher borrowing costs on homes, cars, and other big-ticket items to put a damper on demand. Rising home prices boost construction and can lift consumer spending, by making homeowners feel wealthier. The median selling price of an existing home rose 15% in March from a year earlier, setting a new record, according to the National Association of Realtors.

"They're not going to get the decline in economic activity through housing that they typically get, at least not as quickly as they typically get it," says Mark Zandi, chief economist for Moody's Analytics. "They may have to press on the brakes even harder."

● Median selling price of an existing home in March

$375k

Fed Chair Jerome Powell and his colleagues on the Federal Open Market Committee elected to raise interest rates by 50 basis points at their May 3-4 meeting and signaled they're on track to lift them to around 2.5% by the end of the year. But it's not clear if that'll be enough to tame inflation, which is running at more than three times the Fed's 2% target. ▶

DAVID RAMOS/FIFA/GETTY IMAGES

LONDON & VIRTUAL

MAY 17, 2022

Bloomberg Invest Focus on Africa

Every crisis creates an opportunity. Even though the pandemic put the brakes on social and economic progress in Africa, as the continent rebuilds, it has a chance to pursue a growth path that is responsible, inclusive and sustainable.

What are actionable solutions for Africa to reimagine its future, and what will it take for investors to deploy their capital in the continent? This event convenes corporate leaders, policy makers, innovators and thinkers to explore key issues around investing so that the Africa that emerges from the pandemic is stronger than the one that went into it.

Themes:

Tech's New Frontier
Infrastructure Development
The Energy Transition
The Debate Over Debt
Free Trade

Speakers include:

CINA LAWSON
MINISTER FOR DIGITAL ECONOMY, TOGO

SERGIO PIMENTA
REGIONAL VICE PRESIDENT FOR AFRICA, IFC

YEMI LALUDE
PARTNER, HEAD OF AFRICA, TPG RISE

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◀ That could make the housing market a barometer of whether the central bank has done enough or needs to go further. Several Fed officials have pointed to the increase in mortgage rates as a sign that their forward guidance on rates has already had an impact on housing. "Mortgage rates have come up," New York Fed President John Williams said during an interview with Bloomberg Television on April 14. "That's going to help bring down that excess demand for that sector relative to supply."

The average rate for a 30-year fixed-rate mortgage reached 5.1% for the week ended April 28, up two percentage points from the start of the year, according to Freddie Mac. That translates to an increase of $325 a month for someone buying a $350,000 home with a 20% down payment, according to the agency's mortgage calculator.

Those costs are weighing on borrowers. The share of U.S. adults who say it's a good time to buy a house dropped to a record low of 30% in April, down 23 percentage points from a year earlier, according to Gallup. Existing home sales, which account for about 90% of the U.S. housing market, declined by 2.7% in March to the lowest level since June 2020, according to NAR. They're expected to fall further as borrowing costs tick higher.

But demand would typically drop off even more in response to such a steep rise in interest rates—were it not for some pandemic-related factors boosting demand, including interest from people who now work remotely, says Bloomberg economist Eliza Winger. And those weaker sales don't necessarily translate into better conditions for buyers. "The pendulum might be starting to swing back toward a bit more balance, rather than the most unbalanced sellers' market ever," says Jeff Tucker, a senior economist for Zillow. "But we've only taken a couple of small steps."

▲ New homes going up at a subdivision in Riverview, Fla.

LUIS SANTANA/TAMPA BAY TIMES/ZUMA PRESS

Determining whether competition among buyers will ease and how home prices will react all comes down to what happens to housing supply, which is hovering near record lows because of supply-chain challenges, soaring materials costs, and difficult hiring conditions.

After the burst of the housing bubble in the last recession, builders have also been hesitant to break new ground, contributing in part to the current lack of supply. If more homeowners are enticed by rising prices to list their properties for sale, that may help to temper price increases, Winger says.

Yet many homeowners who locked in low mortgage rates in the past two years could be reluctant to sell and take on a higher rate for a new home, says Daryl Fairweather, chief economist for Redfin. If sellers and buyers both pull back from the market at similar rates, there may not be a noticeable impact on competition or prices, she says.

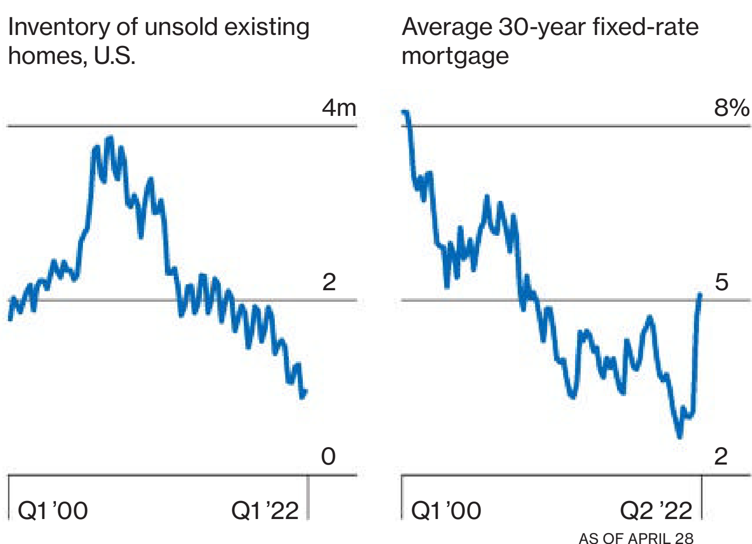
Housing inventory is starting to rise as some homes take slightly longer to sell and new ones are built. But the shortage is so large that it could take as long as a year for homebuilding to fill the gap and tilt the market in favor of buyers, assuming there is no new demand, Zandi estimates. That suggests home prices may not fall by much, he says.

"We're behind in terms of building—the pandemic didn't make that better—and so we've got this sort of perfect storm in the housing markets that's just pushed prices up even again," San Francisco Fed President Mary Daly said during an economics conference in Las Vegas on April 20. "What the rising interest rates will do, in part, is slow that path."

But just taking any steam out of the housing market may be a victory for the Fed if it means avoiding a bubble fueled by further double-digit price increases, says Fairweather. "I think even without prices falling, having prices stabilize is a win for the Fed." —*Jonnelle Marte, with Catarina Saraiva*

THE BOTTOM LINE Although mortgage rates have already started rising, the housing market may not cool fast enough to meaningfully help the central bank in its quest to tame prices.

Opposing Forces



DATA: NATIONAL ASSOCIATION OF REALTORS, FREDDIE MAC

There is no them. There is only us.

Photo by Maksim Levin. In memory of our brave friend and photojournalist partner who was killed in Ukraine, March 2022.

Since 2005, HealthRight has been in Ukraine helping those most in need. Today, our workers – all Ukrainian nationals themselves – have also become victims of the violence of war. Please help us continue our mission.

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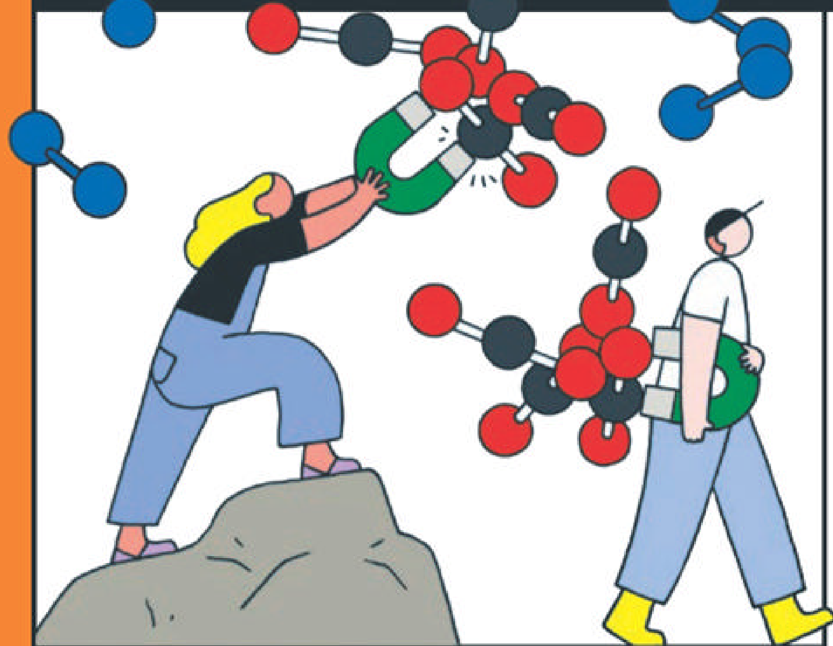


Carbon Capture Comes Of Age

Delays in cutting emissions have opened opportunities for technologies promising to undo climate damage

The path to tackling climate change used to be fairly straightforward: Cut greenhouse gas emissions to zero, and global temperatures would start to stabilize. But straightforward doesn't mean cheap, convenient, or politically expedient, and nations have dragged their feet so much that scientists now say we risk a climate catastrophe even if we reach zero emissions in the next couple of decades. That's why, after years of discussion and development, the idea of removing carbon dioxide from the air and storing it where it can't reenter the atmosphere is gaining momentum.

The need for carbon removal—a task that's far more difficult than trapping gases at the top of smokestacks—is "unavoidable" if the world is to reach global temperature targets, according to an April report by the United Nations' Intergovernmental Panel on Climate Change. And the European Union has set a goal of increasing use of the technology a thousandfold within a decade. "We need to get to zero emissions globally and then go negative by a significant amount," says Niall Mac Dowell, an energy systems engineer at Imperial College London. "To fully compensate for the damage to the planet, you need to permanently remove the CO_2 from the atmosphere."

In the past month, Google's parent company, Alphabet Inc.; Elon Musk, chief executive officer of Tesla Inc.; and several groups of private equity investors have committed a total of more than $2 billion to startups that propose solutions such as vacuuming CO_2 out of the sky, crushing minerals to trap carbon like a magnet attracts iron filings, or planting vast seaweed forests on the ocean floor. That's on top of the $3.5 billion the Biden administration earmarked to set up four carbon removal hubs where various technologies can be developed and tested. "This is a watershed moment," says Erin Burns, executive director at Carbon180, a climate protection group in Oakland, Calif. "We are seeing massive amounts of private-sector and federal investment, with bipartisan support."

Carbon removal is similar to carbon capture and storage, which involves catching greenhouse gas emissions from smokestacks and pumping them into the Earth. That technology will also be needed to reduce emissions from factories such as steel mills and cement plants. But so far it has had a limited effect, because most of the captured gas has been simply injected back into oil wells to squeeze the final barrels of crude out of almost-depleted reservoirs.

Because CO_2 makes up more than 10% of exhaust gases but only 0.04% of air, carbon removal machines require a lot more energy to gather the same amount of greenhouse gas. So while grabbing carbon from a factory smokestack runs about $60 per ton of CO_2, removing it from ambient air can cost more than 15 times that.

ILLUSTRATION BY CHARLOTTE POLLET; ARNALDUR HALLDORSSON/BLOOMBERG

Edited by Rebecca Penty and David Rocks

Today's new entrepreneurs, hailing from businesses as diverse as forestry and soil management, software, and cryptocurrencies, say they can make the idea work. Swiss startup Climeworks AG—which in April raised $650 million from the likes of insurer Swiss Re and Baillie Gifford, an early backer of Tesla and Amazon.com Inc.—has built a machine in Iceland with giant fans that can suck 4,000 tons of carbon from the atmosphere annually by trapping it in a special filter. The captured CO_2 is then mixed with water and pumped underground, where it reacts with Iceland's basalt rock and turns into stone within a few years.

U.S. startup Verdox Inc. has developed a plastic that can pull CO_2 out of the air when charged with electricity. The spinoff from Massachusetts Institute of Technology says its methodology is more efficient and cheaper than running huge vacuumlike machines. The company is one of 15 winners of million-dollar grants in a carbon removal competition bankrolled by Musk that will ultimately distribute $100 million to promising technologies. Although the method has been proven only in the lab, Verdox says a recent breakthrough with its key material will help it operate at an industrial scale with costs of $50 a ton or less. In February the company raised $80 million from investors including Breakthrough Energy Ventures, a fund led by Microsoft Corp. founder Bill Gates.

Other companies combine technology with the power of nature, using plants to gather the carbon—they consume CO_2 as they grow—and then storing it so the greenery doesn't re-release the gas as it rots or burns. Australian startup InterEarth harvests trees in a way that allows them to grow back, and it buries the wood in soil that's as much as 10 times saltier than seawater, effectively pickling it. The salt and the absence of oxygen keep microbes from breaking up the wood, so the CO_2 will stay underground. InterEarth, which has raised about $500,000 and aims to get $30 million, says there's enough salty land around the world to bury as much as 1 billion tons of carbon every year.

Charm Industrial in San Francisco gathers green waste from cornfields, breaks it down in chemical reactors to produce a gooey black mixture that looks like crude oil, and injects the carbon-rich gunk into closed oil and gas wells, where it solidifies. The company says it captured more than 5,000 tons of carbon at a cost of about $600 per ton last year, but it expects to bring down the price sharply as the technology develops. Charm, which researcher PitchBook says has raised roughly $25 million, aims to deploy dozens of mobile units that roam the U.S. turning cheap biomass into ready-to-bury bio-oil.

There's still the problem of paying for these new technologies. Carbon cap-and-trade schemes have created markets for CO_2 emissions, but prices remain well below the cost of carbon removal today. So Alphabet, McKinsey, Shopify, Stripe, and Meta Platforms (previously Facebook) have contributed to a $925 million fund that will pay companies to take carbon out of the atmosphere. The fund, called Frontier, aims to sign up other donors and spread the money among as many startups as possible in hopes of reducing prices by backing a variety of technologies, including Charm's. "We need to buy down the cost curve just like we've done for solar and wind, and Frontier is a huge step," says Charm CEO Peter Reinhardt, a former software executive who studied aerospace engineering at MIT.

A Climeworks site in Iceland. Captured CO_2 is mixed with water and pumped underground, where it reacts with basalt rock and solidifies

The challenge remains tremendous. Last year, global CO_2 emissions increased to more than 36 billion tons, ending a brief pandemic respite. And that's after years of pledges by governments and companies to reduce carbon output. Even the most ambitious technologies aim to store perhaps a few million tons of carbon annually, but that's like trying to empty a lake with a teacup. The industry must remove tens of billions of tons from the atmosphere this century, which will require growth that eclipses even that of the computer and software sectors in recent decades. "We are scaling by tons of steel," says Climeworks CEO Christoph Gebald. "The trillions required to make this industry really big is still a journey." —*Akshat Rathi and Stefan Nicola*

THE BOTTOM LINE Investors have committed more than $2 billion to carbon removal startups, and the White House has pledged $3.5 billion for development and testing of the technology.

Flipping a Switch On Heart Attacks

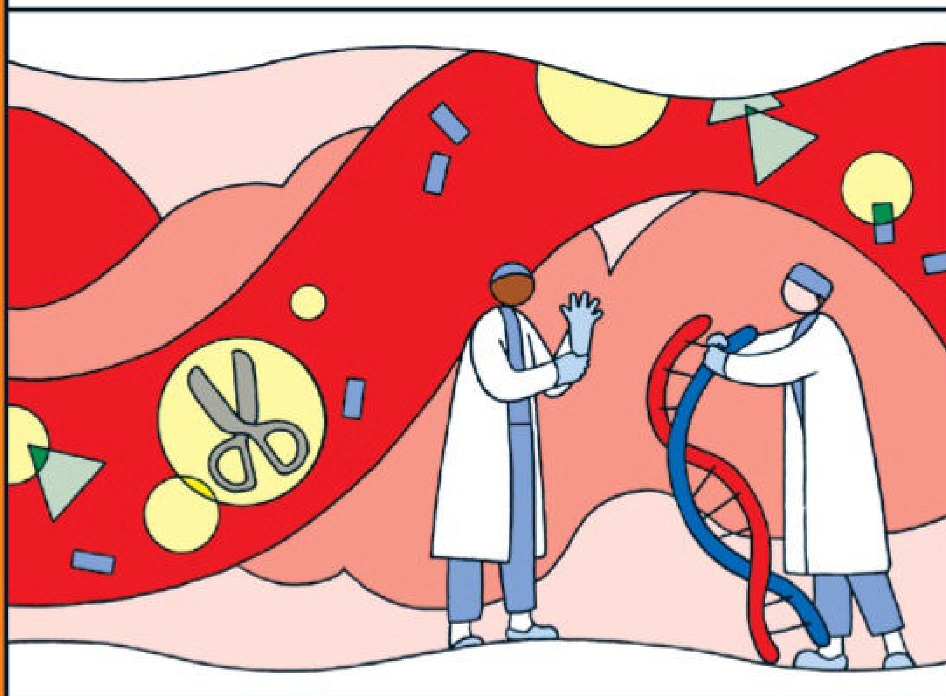
Verve Therapeutics proposes a genetic therapy to stop the buildup of bad cholesterol

Even after decades of drug breakthroughs aimed at preventing heart attacks, they remain the world's leading cause of death. The pills and injections on the market do the job of lowering the cholesterol that clogs blood vessels and puts people at risk of a heart attack. But not everyone has access to them, and some won't stick to treatment plans that can last the rest of their lives. Verve Therapeutics Inc. is proposing a radical solution: altering a person's genome—the body's instruction manual—to stop the buildup of bad cholesterol. "We're on the cusp of potentially transforming that model to a one-and-done treatment," says Sekar Kathiresan, chief executive officer of the Cambridge, Mass.-based company.

Verve plans to initially target those who've already had a heart attack because of extremely high cholesterol caused by a hereditary condition known as familial hypercholesterolemia, which affects 31 million people globally. If it works to reduce low-density lipoprotein (LDL), or "bad," cholesterol in that group, the company would look to widen the treatment pool, eventually aiming to give it to young people as a preventive measure, though it's too early to say when that could happen.

The company is backed by Google Ventures (now known as GV) and prominent biotech investors Arch Venture Partners and F-Prime Capital. It went public in June, reaching a market capitalization of $2.89 billion that month. (Its value has since dropped to about $700 million, falling along with the rest of the biotech sector.)

Kathiresan helped found Verve when he was an acclaimed cardiologist and geneticist at Harvard, where he discovered genetic mutations that caused people to have low levels of cholesterol, offering them protection from heart attacks. Now he's trying to replicate that phenomenon by turning off cholesterol-raising genes. Verve is developing medicines focused on two genes. The first treatment will go after PCSK9; the second will be directed at ANGPTL3. Some patients will need only one of the drugs; others will need both. The company uses the Crispr DNA-editing tool to change a single letter of a person's genome. A lipid nanoparticle encases the editing system to protect it on its journey to the liver, where it turns off the desired gene.



The treatment showed encouraging signs in monkeys, cutting bad cholesterol levels by 59% after two weeks and sustaining the effect six months later. Verve is set to begin testing in humans within months; it will then be years before it has enough evidence of the drug's safety and efficacy to consider seeking approval from regulators.

Verve will face plenty of hurdles in its attempt to treat the masses. It's one of the first tests of using Crispr to edit DNA inside the human body, and patients and doctors could be wary of making a permanent change without knowing much about long-term safety, says Elizabeth McNally, director of the Center for Genetic Medicine at the Northwestern University Feinberg School of Medicine. Reluctance to take Covid-19 vaccines suggests some people may be loath to alter their DNA, she says.

Even if Verve can prove the drug is safe and effective at slashing levels of bad cholesterol in humans, it will then need to convince insurers it's worth covering when it will almost certainly be more expensive than other available options, says Michael Sherman, chief medical officer at Point32Health Inc., a health insurance company based in Canton, Mass. "There has to be a reason to do the gene therapy to allow it, as opposed to it's just newer and cooler," he says.

Statins, the pills that became available some 35 years ago to reduce cholesterol, now cost as little as $9 for a month's supply. The self-injectable medicines that emerged a few years ago, known as PCSK9 inhibitors—while better at lowering cholesterol than statins and requiring administration only every few weeks—haven't reached many patients in part because they cost thousands of dollars a year. Amgen Inc. and Regeneron Pharmaceuticals Inc., the makers of the injections, haven't been able to sway insurers even when targeting

ILLUSTRATIONS BY CHARLOTTE POLLET

the highest-risk people with familial hypercholesterolemia, despite cutting prices by more than half, to $6,000 a year. Also, some people are wary of administering self-injections.

So far, analysts forecast that Verve's therapy will cost from $50,000 to $200,000 per patient. Companies rarely reveal much about pricing before their products hit the market, but Kathiresan says the estimated range is "a reasonable starting point."

Kathiresan says millions of people don't take advantage of existing treatments and an infusion given to a young person could fundamentally alter their risk for the rest of their lives. It's something that might have helped his own brother, who unexpectedly died of a heart attack at age 42. "What excites me is this is the answer to heart attack," Kathiresan says. "If it works." ——*Angelica Peebles*

THE BOTTOM LINE Many available treatments help prevent heart attacks, but they must be taken regularly, often for decades. Verve's proposed "one-and-done" infusion could shake up the industry.

Digitizing Public Notices

A startup helps papers bring government disclosures online to fend off rivals

Without public notices, the *Mercury*, a 138-year-old newspaper in Manhattan, Kan., would have lost money in 2021. Instead, it eked out a tiny profit. The state-mandated publication of zoning changes, foreclosures, government bidding processes, and the like by newspapers has become crucial for the industry amid falling circulation and ad sales moving elsewhere. But that lifeline is under threat, and the *Mercury* is playing an important role in the fight to hold on to the business.

The paper is testing Column, a service that helps publications digitize notices to run them on their websites as well as in print, so they can head off political efforts to move the disclosures to government sites. The *Mercury* is also funding the startup, which was founded by Jake Seaton, 27, whose great-great-grandfather bought the paper in 1915 and whose father, Ned Seaton, is now publisher.

The younger Seaton delivered the paper as a kid—when circulation was double its current 5,000—and watched Craigslist grab its classified ad business. He didn't want the same thing to happen to its public notices, he says, and long considered: "How do I bring my family's business into the next generation?"

Column is part of a handful of industry efforts to retain public notices, which represent several hundred million dollars of annual revenue for U.S. papers, according to a 2010 report from the Annenberg School at the University of Southern California. A similar service run by the Illinois Press Association helps newspapers in several states provide central websites for public notices. "For many newspapers, it's the difference between being profitable and having to close," says Penny Abernathy, a visiting professor at Northwestern University's Medill School of Journalism.

Many states still require public notices to run in print. Several states are moving to allow them to run on newspaper websites, but some are trying to push out the papers entirely. The Florida Senate in March passed a bill—due to take effect next year—that would allow local governments to publish their notices on websites run by Florida's 67 county governments.

Some politicians and local organizations say it would be cheaper to publish public notices on county court sites. But news groups argue that could mean fewer people see the information. And they make the case that politicians who don't like what newspapers write about them are using public notice laws as a weapon, trying to eliminate that revenue in an attempt to hurt or shut down the newspapers.

Seaton says publishing them on newspaper sites can allow journalists to search the text and uncover government overspending and wrongdoing. His startup also provides tracking, proof of publication, and other services related to public notices.

Column has raised an undisclosed amount from a handful of angel investors and signed up clients including the *Washington Post* and the McClatchy Group. "We have a very clear path to profitability with our partners," Seaton says, and "an opportunity to build something really big here." ——*Sarah McBride*

THE BOTTOM LINE Holding on to public notices is a life-or-death matter for many U.S. papers. Column wants to protect that revenue stream.

Gentlemen, Start Your REVENUE STREAMS

New owners have given stodgy F1 an American makeover. Can the racing series and its photogenic stars finally crack the world's biggest sports market?

By *Austin Carr*
Photographs by *Muir Vidler*

Off Exit 2X of the Florida Turnpike, Hard Rock Stadium's parking lots are getting a Monaco-esque makeover. With six weeks to go before Formula One's newest U.S. grand prix on May 8, the vast expanse is being outfitted with a 3.36-mile circuit, palm-tree-shaded villas, and VIP clubs that'll cost upwards of $9,000 for a weekend pass. The home of the Miami Dolphins may not ooze the aristocratic decadence of Monte Carlo, where F1 drivers whip their multimillion-dollar machines through picturesque streets overlooking harborside yachts. But at Turn 7, where a line of port-a-potties sits amid the construction, a "marina" will host deep-pocketed fans aboard small boats trucked in and "docked" on stands surrounded by planks painted to look like water. The whole event is sponsored by Crypto.com. "The idea is that this is going to turn into an almost Disneyland map," says Tom Garfinkel, chief executive officer of the Dolphins, pointing at a blueprint of the track at his office. "It's kind of like, 'Do you want to go to Space Mountain? Do you want to go to Pirateland?' "

Not too long ago, the thought of Disney-fying F1 would have sent Ferrari fanatics careening off the autobahn. For decades, the Fédération Internationale de l'Automobile-sanctioned series has been considered the pinnacle of motor sports, a rich fondue of exorbitant engineering and wheel-to-wheel speed. A posh international audience, mostly from Europe and South America, obsessed over circuits where Rolex, Shell, and other big brands craved association with the most epic cars on the planet. Stirring the pot was Bernie Ecclestone, the British tycoon who started building F1 into an empire in the 1970s and controlled it with monarchical power through 2016. Bernie, as he's universally referred to, once said he managed F1 like a "Michelin restaurant, not a hamburger joint." If F1 was synonymous with Moët, he believed it wouldn't appeal to McDonald's-loving Nascar fans.

But since U.S.-based Liberty Media Corp. acquired F1 in 2017 in a $4.4 billion deal, the sport has undergone a stateside surge. ESPN reported that average American viewership was up 56% last year compared with the 2020 season. Austin's 2021 race saw a record 400,000 attendees, almost 70% of them first-timers. And Miami's three-day suite and grandstand presale tickets, the cheapest going for more than $600, sold out within 24 hours, with top tickets fetching $32,000 on secondary markets. Then, on March 30, Liberty announced a Las Vegas grand prix for 2023, making the U.S. host to more races than any other country.

The surprising ascent has been attributed to a range of moves, from Liberty transforming race weekends into Super Bowl-like spectacles to the popularity of Netflix's *Formula 1: Drive to Survive*, a soap-operatic docuseries that turned F1 drivers into celebrities for an entirely new audience. But Liberty's overhaul isn't just about the theatrics. In the last five years the Colorado conglomerate, which also owns SiriusXM and baseball's Atlanta Braves, has reengineered the formula of Formula One, risking in the process both its longtime business model ▶

Daniel Ricciardo (left) and Lando Norris, drivers for McLaren, at the team's Technology Centre in Surrey, England

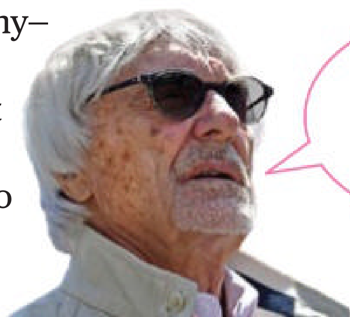
◀ and its oldest devotees. "They're producing Formula One: American Style," says Ecclestone, who worries that Liberty's changes will spoil F1's cachet. "It may well be that it's good, because so many stupid things come out of America and everyone's happy, but it wasn't the way I ran things."

Then again, some Liberty supporters contend that Ecclestone's tightly gripping, almost paranoid management style was dragging F1 toward irrelevance. It seems the more Americanized F1 becomes, the more global spectators are drawn in. Last year its cumulative television audience reached 1.6 billion worldwide, up 11% since the takeover, with the season finale drawing 108.7 million viewers—about what the Super Bowl attracted when Hard Rock Stadium hosted it in 2020. Meanwhile, the share price of F1, which trades as a subsidiary of Liberty, has more than tripled, hitting new highs last month. "Bernie can mouth off all he wants," says Liberty CEO Greg Maffei. "But the reality is, everybody wants in now."

For the uninitiated, F1 may not seem so different from other types of auto racing. Which is sort of like saying an F-35 fighter jet is not dissimilar to a Spirit Airlines plane. The 1,000-horsepower engines don't so much purr or roar as threaten to rip your head off. Teams, called "constructors," build open-cockpit cars that are feats of aerodynamics and materials science. Whereas the respective machinery of IndyCar and Nascar vehicles are largely similar, F1 cars, which share some league-mandated design specs and componentry, live or die by the absurdly expensive factory innovations of hundreds of engineers. These might include enhancing the airflow geometry of engine-cooling systems and wings to eke out millisecond advances. Some F1 parts alone cost about as much as an entire Nascar vehicle. There's a reason the latter, built mostly for oval tracks, would get smoked on a twisty circuit against even the slowest F1 car—by about a half-hour across a full race.

The goal, obviously, is to go faster than your opponents. But even that's a matter of complex analytics, with some 200 onboard sensors beaming real-time data to sideline strategists, who scrutinize everything from tire degradation to corner-by-corner splits and weather conditions. Currently there are 10 teams, each with two drivers in single-seater cars who often compete against each other as intensely as they do their rivals. (Job security is forever iffy.) Races themselves are usually 50 to 70 laps, with the top 10 finishers collecting points that translate to tens of millions of dollars in prize money. A perennial favorite like Mercedes might deem a finish outside a top-three podium position disastrous, whereas a lower-budget constructor such as Williams Racing will pop corks for snagging 10th—the cutoff for earning points. At the end of the season, which last year boasted 22 races, the team and driver with the most points each win a championship trophy—and a lot more money.

The danger involved in reaching that achievement is impossible to fathom. It's face-flattening enough to zoom to 220 miles per hour in seconds, but braking hard into a hairpin apex, a mere flinch away from severe injury and millions of dollars in damage, requires a healthy amount of insanity. Even more so when you realize the drivers have to manage those turns while simultaneously shifting gears about 50 times a lap, or 3,600 times a race. Between the fuming heat and yanking go-stop-go gravitational force, an F1 driver's neck can bulk up like an English roast. Nascar icon Jeff Gordon once tested an F1 car and said he couldn't handle the braking—it strained his neck too much. Mercedes's Lewis Hamilton has said he loses between 5 and 10 pounds per race from sweat and stress on his body.



"So many stupid things come out of America and everyone's happy." —*Ecclestone*

Dense rules and indecipherable jargon—*parc fermé*, drag-reduction system, etc.—have historically kept out newcomers. Even team sponsors aren't typical: Brands like Red Bull don't just pay to splash their logo on a car; they employ their own world-class engineers to actually build it.

None of this complexity came by accident. Ecclestone, a former motorcycle and car salesman, always knew exclusivity was essential to throwing what he describes as a "glamorous Champagne event." There were no behind-the-scenes TV series, no all-access corporate passes to the team paddocks and pit lanes, territory Ecclestone considered sacred to F1's purity and mystique. He got involved in motor sports following World War II, first as a driver and later as an F1 team owner, gaining power after organizing an association of constructors. He's credited with commercializing what was then a ragtag league with blockbuster TV distribution deals and eight-figure grand-prix-hosting fees.

Ecclestone, who served as CEO of F1's management group, had a reputation as a ruthless boss who protected the series' financial interests, and his own, above all else. He reveled in negotiating new track locations with

AUSTIN: CHRIS GRAYTHEN/GETTY IMAGES. ECCLESTONE: ANDREJ ISAKOVIC/AFP/GETTY IMAGES. MAFFEI: ETHAN MILLER/FORMULA 1/GETTY IMAGES

Drivers face off during the F1 Grand Prix on Austin's Circuit of the Americas in October

Middle East princes and Russian President Vladimir Putin and mostly dismissed the internet as a distraction. After private equity firm CVC Capital Partners bought a controlling stake in 2006—a deal that allegedly involved Ecclestone paying a $44 million bribe to a German banker to approve the sale—F1 teams grew furious that investors would reap huge profits while they struggled with annual operating expenses of $80 million to $300 million. (Ecclestone, who remained in power under CVC, settled the bribery case with a Munich court for $100 million, with no admission of guilt.) Adam Parr, then head of the Williams team, says Ecclestone treated revenue-sharing like budgeting his children's allowance. "If there was any pie left on the table, then he'd lost," Parr says. A CVC spokesperson says prize money quintupled during its ownership, and that the majority of revenue growth went to the teams.

The poor economics kept constructors under Ecclestone's thumb, but it also meant they were constantly teetering on the edge of bankruptcy. Teams operated at breakeven or with losses that an NFL owner like Jerry Jones or Robert Kraft would never stomach. The calculus, particularly for the car brands, was that the lavish marketing and extreme engineering—which could transfer to the design and mechanics of the models they sell to consumers—justified the cost. Yet in the aughts alone, big automakers such as BMW, Toyota, and Ford-owned Jaguar left the sport. "Ford has decided it can no longer make a compelling business case for any of its brands to compete in F1," Jaguar's then-chairman, Joe Greenwell, said at the time.

Ecclestone orchestrated races in Abu Dhabi, Azerbaijan, Bahrain, and Russia, each estimated to bring F1 fees of $50 million or more annually. But that barrier to entry proved too tall for major markets in the U.S. Michael Payne, a former strategic adviser to Ecclestone, remembers Bernie pushing for a New York race, to no avail, due to F1's cost and complexity. "Forgive me, but the staging of an F1 race is ever so slightly more complicated than an American football match," Payne says.

"Bernie can mouth off all he wants. But the reality is, everybody wants in now." *—Maffei*

There had been at least half a dozen attempts to build an audience for F1 in the U.S., though as with soccer, American fans didn't seem to have much patience for the pretensions of the sport. A slapdash 1989 grand prix in Phoenix drew disappointing ticket sales and scorching June heat that likely played a role in the majority of cars retiring early. A farcical 2005 dispute over tire (er, tyre) issues at the Indianapolis Motor Speedway saw 14 of 20 cars boycott the race. Many in the crowd of 120,000 booed and flipped the bird, threw beer cans on the track, and headed for the exits. A 2012 Texas race, at the Circuit of the Americas in Austin, was more successful, but struggled financially. COTA Chairman Bobby Epstein recalls Ecclestone telling him, "Frankly, I don't care where we have it. I only care if the check clears."

Critics say F1 grew too stale and unwelcoming to any changes that might have threatened Ecclestone's precious fees from track promoters and TV broadcasters, whose unique viewership (the number of individuals tuning in at least once during any point of the season) fell from a peak of 600 million in 2008 to about 400 million in 2015. Mercedes's Hamilton joked that Bernie sent him cease-and-desist letters whenever he posted clips on Instagram. ("All I wanted to make sure was that he wasn't producing images that other broadcasters had the rights to," Ecclestone clarifies.) Says Mercedes's team principal Toto Wolff of the pioneer: "Bernie was great at his time. He invented this sport. But the technology changed."

When YouTube co-founder and racing fan Chad Hurley funded an American constructor, USF1 Team, with the aim of entering the 2010 season, it struggled to build a car in a former Nascar facility. Team leaders hoped to develop a cheaper model in America using repurposed Nascar machinery and less bespoke parts, but the operation ultimately collapsed from financial pressures. "One of the diseases of Formula One is having any kind of budget," says Ken Anderson, principal of the failed USF1 team. "If you ask the average person, the rich geniuses go to Formula One, and the dumbasses go to Nascar. Somewhere in between lies the truth."

In 2016, CVC put F1 up for auction. A string of suitors went after the league, but Liberty's bid won. It was an odd marriage. Chase Carey, an American who previously worked for Rupert Murdoch, had never even attended a grand prix before being appointed F1's new chairman. Still, Ecclestone remembers Carey summoning him the morning after the acquisition was completed in January 2017 ▶

18+

WHAT IS
AVAXHOME?

AVAXHOME -

the biggest Internet portal, providing you various content: brand new books, trending movies, fresh magazines, hot games, recent software, latest music releases.

Unlimited satisfaction one low price
Cheap constant access to piping hot media
Protect your downloadings from Big brother
Safer, than torrent-trackers

18 years of seamless operation and our users' satisfaction

All languages
Brand new content
One site

AvaxHome - Your End Place

We have everything for all of your needs. Just open https://avxlive.icu

“The environment when we entered was ‘Who are you Americans?’ It felt like we were landing on Mars”

◀ to relieve him of his CEO duties. “He really had no idea what he was doing,” Ecclestone says.

This was true and arguably an advantage: Liberty’s higher-ups were oblivious about what not to change. In F1, they saw one of the few truly global sports, on the scale of FIFA or the Olympics, that could still capture a gigantic live audience at a time when cord-cutting and social media were fragmenting consumer attention. Executives quickly learned that under Ecclestone the corporate structure didn’t even include a digital division, let alone a research department. “There really was no business to run,” says Sean Bratches, an ESPN veteran Carey hired as F1’s managing director of commercial operations. “Bernie ran F1 out of his house—a very nice house—but nonetheless F1 was not hitting on all cylinders.”

Focus groups revealed that fans around the world found the racing too dull and predictable. The spending gaps between the bigger and smaller teams made the sport uncompetitive. (Mercedes has won the constructors’ championship every season since 2014.) Yet even tiny changes were met with resentment. Drivers hated Liberty’s redesigned F1 logo. Others were aghast when the company had boxing-ring announcer Michael Buffer trumpet “Let’s get ready to rumble!” before a grand prix. “The environment when we entered was ‘Who are you Americans?’ It felt like we were landing on Mars,” recalls Maffei, Liberty’s CEO.

During Ecclestone’s reign, the teams were used to fighting each other for the crumbs that fell off Bernie’s plate rather than working together to bake a bigger pie. During an early strategy session where Liberty talked about pushing into digital areas such as e-sports, podcasts, and streaming, a person present, who requested anonymity to speak about the confidential meeting, recalls the team principals reacting harshly: “The perspective from the entire room was ‘What’s the point of all this stuff? How can I actually make money from doing any of this?’ ”

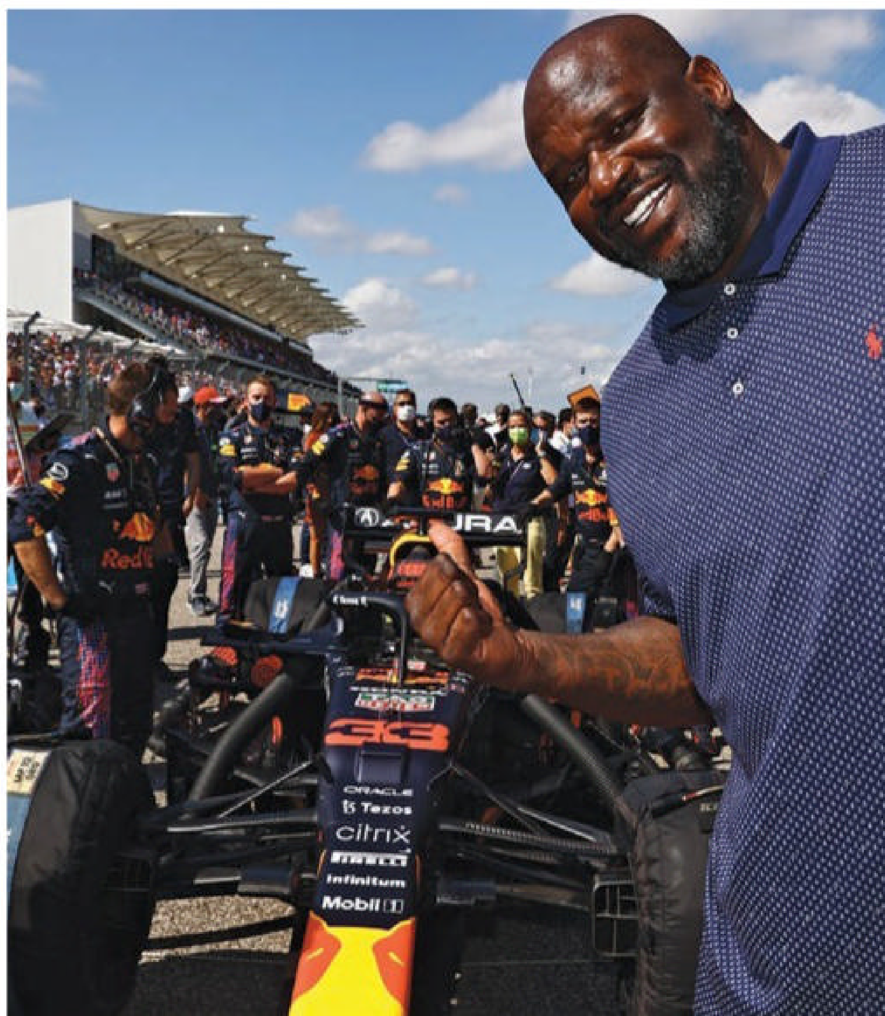
The awkward answer: You might not. To Liberty, the fixes seemed obvious to avoid obsolescence. The company loosened restrictive TV deals so clips could be shared on YouTube and other digital platforms, launched an overdue subscription streaming app and fantasy sports service, and licensed mounds of unused data to betting platforms. It also began discussions about an F1 show with Netflix, but even that was fraught with conflicting incentives. Mercedes, for one, had already pursued a solo docuseries with Amazon and chose not to participate.

This sort of tension became especially visceral as Carey pushed to revise F1’s rules and introduce a team cost cap to level the field. Why would Mercedes’s F1 team, which spent $442 million on its championship victories in 2019 and still reported a profit, agree to slash its budget so rivals had a shot at winning? Why would Red Bull agree to new race formats that would give underdogs a leg up? Carey, who eventually instituted the cost cap of $145 million, viewed these traditions as a “straitjacket,” noting that the NBA once resisted the 3-point shot. “With Bernie, who at the end of the day was a secondhand car dealer, there was always a deal to be done,” says Red Bull team principal Christian Horner. “Whereas Chase was ruthlessly boring in the way he dealt. He grinded everyone down to acceptance.”

Daniel Ricciardo first realized Liberty’s plan was working when he returned home to Los Angeles after being on the road. The 32-year-old Australian, who now races for McLaren, had become a breakout star of Netflix’s *Drive to Survive*, which charted drivers’ career highs and lows. Before its March 2019 premiere, he’d been virtually anonymous in Hollywood, estimating one or two people would recognize him during his weekslong visits. “At customs when I landed in the States, I’d be like, ‘Oh, I’m an F1 driver,’ and they’d ask, ‘Is that like Nascar?’ ” Ricciardo remembers. “After the first season, every day I was out somewhere someone would come up being like, ‘I saw you on that show!’ ”

The Netflix series was a hit in the U.S. and educated a new generation of fans about the sport’s technicalities and helmet-hidden personalities. (Seeing the show’s viral success, Mercedes pulled a 180 on its participation.) Ricciardo, who’s been an F1 driver since 2011, had long wished the sport would find inspiration in U.S. pro leagues, which he loved for their drama. He’d urged F1 to mimic Fox’s “Crank It Up!” feature, which replaced color commentary with Nascar’s roaring engine sounds and camera-shaking speed. “All the cars would flash by, and you’d literally feel the vibrations from the couch,” says Ricciardo. “Americans do sports right.”

Megan Thee Stallion (opposite) and Shaq at Austin’s F1 Grand Prix



Finally league bosses were listening, and Netflix was only the start of F1’s American adaptation. A new helmet camera, which looks like a GoPro strapped to a SpaceX rocket, would soon put “Crank It Up!” to shame. The Texas grand prix soared in popularity. Ricciardo showed up at last year’s race dressed as a cowboy and did pre-show donuts in a vintage

STALLION: CHRIS GRAYTHEN/GETTY IMAGES. O’NEIL: MARK THOMPSON/GETTY IMAGES. BROWN: DAN ISTITENE/FORMULA 1/GETTY IMAGES. *FOLLOWERS ACROSS FACEBOOK, TWITTER, INSTAGRAM, YOUTUBE, TIKTOK, SNAPCHAT, TWITCH, AND CHINESE SOCIAL PLATFORMS. †VIEWS ACROSS F1.COM, THE F1 APP, AND SOCIAL MEDIA. ‡AVERAGE VIEWERS PER RACE ON ESPN, ESPN2, AND ABC. DATA: F1, ESPN (U.S. TV AUDIENCE)

Chevrolet stock car. Later in the weekend, COTA hosted the world Spam-eating championship and a DJ performance by Shaquille O'Neal. And Carey was eyeing Vegas and Miami for future races.

Liberty's goal was to modernize not only F1's entertainment but also its economics. When McLaren ran into severe financial difficulties in 2020, New York-based private equity firm MSP Sports Capital announced it would plow about $240 million into the team. The pitch was that F1 properties were comically undervalued compared with their American counterparts. It didn't hurt that Ricciardo was becoming a bankable celebrity and his teammate Lando Norris is an e-sports darling, with 1.2 million Twitch followers. "There was no reason F1 teams shouldn't have the same value appreciation as an NBA, NFL, or MLB team," says Zak Brown, McLaren Racing's CEO, who's American. "Why do the LA Clippers trade for $2 billion? The NBA is a great sport, but it doesn't have a global reach, and the Clippers don't have 20 world championships to its name. So why are they worth four times McLaren?"

Maffei says if MSP hadn't come through, Liberty would have funded McLaren, a remarkable shift from the Ecclestone era. It wanted to prove to F1 stakeholders that it was invested, even if that meant upending the business. The reality was that hot U.S. destinations weren't going to fork over $50 million like Azerbaijan merely for the privilege of hosting a race. So to lock in the new grand prix on the Vegas Strip, Liberty assumed the role of promoter. "We are more involved on a risk basis," Maffei says.

In late 2020, F1 announced that Stefano Domenicali, who once led Ferrari's F1 team and later served as CEO of Lamborghini, would replace Carey, who became nonexecutive chairman. Domenicali has since said demand is so strong that Liberty could expand from 23 to 30 races a season. He's expressed particular interest in Africa and Asia, markets Ecclestone had underserved. Domenicali dismisses concerns that the Vegas framework will eat into F1's promoter fees elsewhere—which historically represented a third of sales—or inspire the Azerbaijans of the world to negotiate for better terms.

Following a rocky 2020, in which Covid-19 shut down race attendance and F1 posted an operating loss of $386 million, the league bounced back to record $2.1 billion in revenue and a profit of $92 million in 2021, in part because of a thrilling battle between Mercedes and Red Bull that was decided in the final moments of the season finale. (Spoiler: Hamilton lost to Red Bull's Max Verstappen in a controversial last lap.) Unique viewership has ticked up since the Bernie era, to about 445 million, attracting blue-chip advertisers such as Salesforce, while McLaren recently signed a huge deal with Google to deck out its liveries in Chrome and Android colors.

Formula 1 Switches Gears

2021 figures and year-over-year change

● Cumulative global TV audience
1.55b
+4%

● Season finale global TV audience
108.7m
+29%

● Social media followers*
49.1m
+40%

● Total video views†
7.04b
+44%

● Average U.S. TV audience‡
949k
+56%

It was initially unclear whether Domenicali, an Italian, might slow F1's Americanization. Ecclestone, who's been close with Domenicali for decades, says he chats with him at least three times a week. "We talk a lot about the way things are, and could be, and should be," Ecclestone says, vaguely. "Stefano hasn't done anything to rock the boat." Domenicali says he stays in touch with Ecclestone out of respect. "I knew Bernie since I was 14, because I was parking the motor home in the paddock at Imola," referring to the storied Italian F1 circuit.

Domenicali insists the U.S. market has "really been at the center of our attention." Despite the momentum in the U.S., its audience remains fairly small, with an average of 1.4 million TV viewers watching races this season. Barclays analyst David Joyce expects Liberty to renegotiate with ESPN and triple its annual U.S. broadcast fee, to $30 million, which is both a pittance compared with NFL deals and a signal of possible growth on the horizon.

The thing that could hold F1 back in the U.S. is the lack of an American driver. Alfa Romeo's Zhou Guanyu, the first starting F1 driver from China, is expected to help the country's TV and WeChat engagement explode. Mario Andretti, the last American F1 champion—in 1978!—says the sport has to be more open to new talent if it really wants traction in the U.S. He's long pushed for stateside picks, like IndyCar phenom Colton Herta, who recently signed on as a test driver for McLaren. If Liberty can build up a star American driver, says Andretti, "the country will just go crazy."

For now, locking in Miami and the Vegas grand prix is a sign Domenicali is serious about catering to F1's American converts. Sure, that may mean more Spam-eating competitions and faux yacht clubs, but the growing audience has meant there's talk of Audi and Porsche entering the league. "The old traditionalists see every single little detail and change as an attack to the system, but it's not," Domenicali says. "There is place for Michelin, and there is place for burger." Ⓑ

"Why do the LA Clippers trade for $2 billion? The NBA is a great sport, but it doesn't have global reach and the Clippers don't have 20 world championships." *—Brown*

Left Behind By Long Covid

▲ Hunter Reinard and Lincoln Brockmeyer

As the world pretends the pandemic is over, at least half a million children in the U.S. are struggling

By Anna Edney

Photographs by Daniel Lozada

Lincoln Brockmeyer folds his lanky 6-foot-4-inch frame onto the examination table as he explains to the pair of doctors that he feels tapped out, his energy totally sapped. Some days, he says, he needs a nap to make it through the afternoon. Worse than the bone-tired feeling he can't seem to shake is the constant pain in his legs and the sensation that each one weighs a thousand pounds. He tells the doctors that he's lost weight—at one point he was down 30 pounds, to 148. He can't run without getting lightheaded, he says, and every time he stands up he gets deep purple spidery veins on his arms and legs. He loves playing basketball, but not when his body hurts like this.

"I'm trying to stay optimistic," he says when the doctors inform him he's got all the signs of long Covid. They're telling him this in March, and if he wants to get better he needs to take it easy. That means no basketball for a while. Lincoln hates hearing this. Still, they start hatching a plan—something none of the other doctors he's seen have been able to offer. It's too late for what would have been his freshman season of high school, but they're hopeful he'll be back on the court in time for his sophomore year. "We've got you," says Amy Edwards, a pediatric infectious diseases expert who runs the long-haul Covid clinic at University Hospitals Rainbow Babies & Children's hospital in Cleveland.

The U.S. and the world are trying to move on from Covid-19. Everyone is tired of even thinking about it. The Centers for Disease Control and Prevention has effectively given up on trying to impose collective measures to control the virus. Even people who've been vigilant are ditching their masks. And, yet again, cases are rising in the U.S.

More cases will mean more long Covid, including pediatric long Covid. Estimates of the number of children who face long-term symptoms are far from precise, but they probably range from 5% to 10% of those infected with the virus, says Daniel Griffin, an infectious diseases expert at Columbia University who treats Covid patients and hosts a weekly podcast update on the disease. Even at the lower end of the estimates, that translates to more than a half-million children of the 13 million so far infected. (Studies of infected adults indicate that an estimated 10% to 30% may have long Covid.)

Up until last year, Lincoln, now 15, was a star forward on his middle school basketball team in Cuyahoga Falls, Ohio. So good, in fact, that high school coaches in the area were noticing his talent. In May, Lincoln's parents moved the family to Copley, a small town west of Akron, so Lincoln could play on a team his parents believed would give him his best shot at success. "I'm going to brag on my kid a little bit," says his father, Nate, who's also sitting in the examination room. "He's a stud basketball player."

But when Lincoln was handing out Halloween candy last year, he felt cold symptoms coming on. He lay down and drifted into an uneasy sleep. His dad says Lincoln's fever spiked to 104F and his breathing became labored. Lincoln tried pushing through his basketball tryouts the following week but couldn't keep up. After missing a few days of school, he forced himself back. But when he noticed blood in his urine, his parents took him to the emergency room. Doctors ran tests over the course of a two-day hospital stay, including a Covid antibody test. The results showed only that Lincoln had had the illness at some point.

He filed through a round of appointments with specialists in oncology, pulmonology, and rheumatology, but none of the doctors could pinpoint a specific reason for his extreme fatigue. He stopped going to school again in November and was barely able to get out of bed until mid-January. One doctor put him on a powerful and potentially dangerous immunosuppressive drug called methotrexate that helped him regain enough energy to resume classes. Another urged his parents to take him to see pediatric long-Covid experts at Rainbow Babies & Children's hospital. It took more than a month to get an appointment.

There isn't much known about who gets long Covid or why, which puts it in a frustrating category of mysterious illnesses that occur after infections such as Lyme disease or mononucleosis. The National Institutes of Health is working on answering these questions about long Covid, but the findings won't be available for at least another two years. And even that research will probably just scratch the surface of understanding. Meanwhile, many pediatricians still don't take seriously the sometimes amorphous complaints of their young patients, perhaps suspecting they're merely trying to avoid school. "They're told, 'It's all in your head. You're just depressed,'" says David Miller, a pediatric integrative medicine specialist who sees long-Covid patients with Edwards at Rainbow Babies. "But now we have so many of them. Not all the kids are trying to get out of school."

Even when doctors are attentive, children often can't or don't know how to articulate their symptoms. Fatigue is the most prevalent complaint, followed by pain. Difficulty paying attention and altered taste or smell are also common. Doctors who treat children and adolescents say their patients frequently show up with a battery of complaints affecting many different bodily systems, sometimes weeks after a Covid infection and regardless of the severity of the initial symptoms. At Rainbow Babies many children are surprised, as Lincoln was, to discover their stomach muscles hurt when slightly pressed, even when they've never noticed abdominal pain before. "The strange thing is how consistent it is," Edwards says.

Although children generally fare better with Covid than adults, many parents, lulled by flawed CDC guidance and a fire hose of online misinformation from self-appointed experts, have mistakenly assumed the virus poses no more risk to children than a common cold. Many pediatricians, too, have spent the pandemic unconvinced about the utility of testing sick kids for the virus. And only 28% of children age 5 to 11 had been given two doses of a Covid vaccine as of late April, according to the CDC. These factors help explain why pediatric hospitalizations reached a pandemic peak during omicron. Early research in adults has shown vaccines can ▶

"Nobody knew what to do with him. It was very frustrating because I was like, 'I don't know what to do at this point. Nobody's believing me' "

◀ help reduce the risk of long Covid if someone is infected with the virus. Deaths are rare, but that's scant comfort to the parents of the 1,010 children with Covid who have died in the U.S. And even though that number is far surpassed by adult lives lost, Covid was still the fourth-leading cause of death in kids in January, according to the Kaiser Family Foundation and the Peterson Center on Healthcare.

Not every kid with long Covid has it as severely as Lincoln; some have it much worse. Griffin recalls meeting with a 16-year-old girl who couldn't sit up for more than a few minutes without throwing up, so her mother took her to a pediatric long-Covid clinic in Colorado. Griffin says the last time he talked with the girl, she could sit up for about 45 minutes without vomiting.

Children suffering from long Covid who are able to get in to see Edwards, Miller, or other doctors at the roughly 75 to 100 children's hospitals that have set up long-Covid clinics across the country are the lucky ones. These doctors tend to take on the role of support coaches, helping children organize their days and scheduling frequent breaks so they can care for themselves better. They may advise changing diets to cut out white sugar in favor of eating anti-inflammatory fruits and vegetables. Or they may schedule an appointment with a cardiologist, gastroenterologist, or physical therapist.

Some doctors contend that whatever these kids are suffering from, it isn't long Covid. One outspoken skeptic of long Covid is Kristen Walsh, a pediatrician in New Jersey who's convinced doctors are financially motivated to treat the condition. "There's been a lot of money earmarked for Covid in kids and hospitals to open these clinics," Walsh says. "Follow the money." But, like so much heated debate over the pandemic, Walsh's argument is infused with more emotion than factual accuracy: The NIH has awarded large amounts of money for research on long Covid, but that money doesn't extend to treatment clinics. Walsh is a founding member of a group that calls itself Urgency of Normal, composed of about a dozen doctors who earlier this year began a noisy campaign to drop pandemic restrictions, particularly masking in schools. They also provide a "toolkit" for parents that minimizes the risks for children. These doctors insist, for instance, that Covid is like the flu for unvaccinated kids and that long Covid is not a major risk.

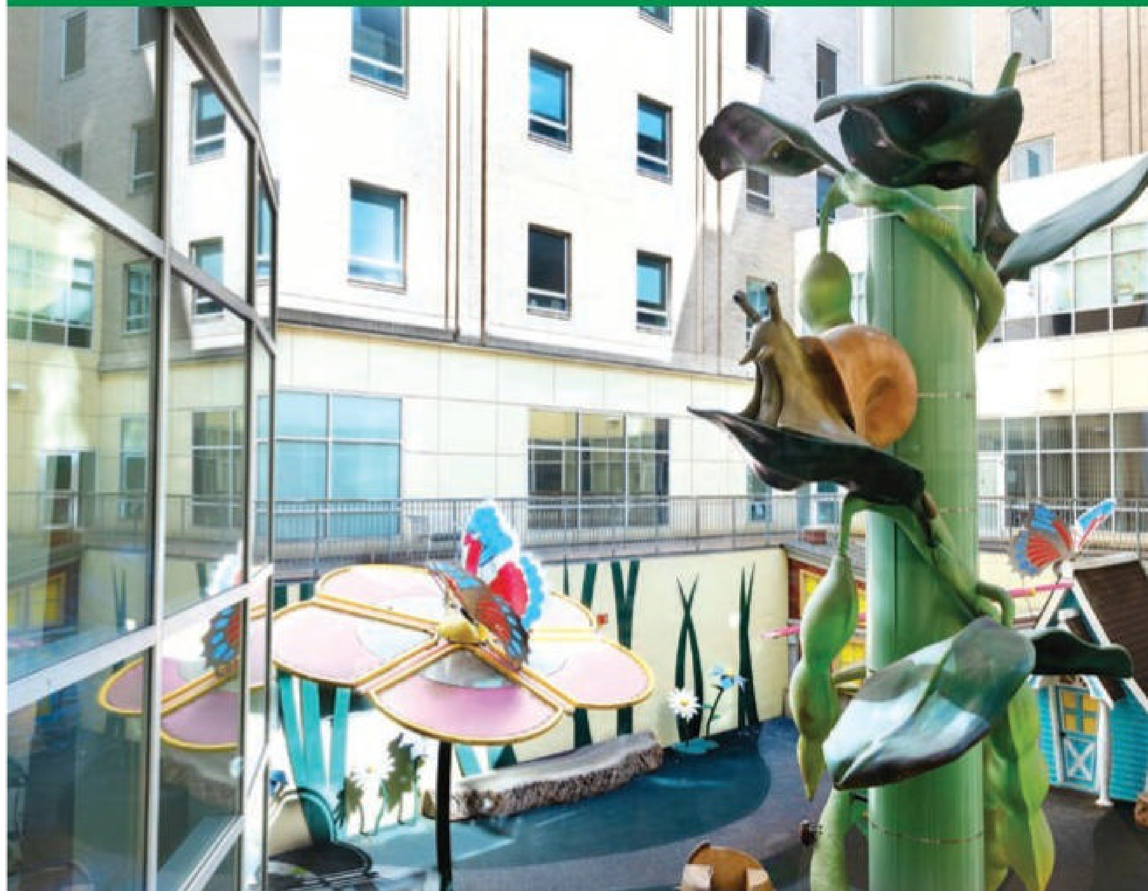
"It makes me so mad," says Alexandra Yonts, an infectious diseases physician who runs a pediatric long-Covid clinic at Children's National Hospital in Washington, D.C. "There have been so many things discounted because kids don't have a voice." Children's National received $40 million from the NIH last year to study the long-term effects of Covid, but the funding is only for research, not the pediatric long-Covid clinic, Yonts says. She spends her off-hours wrangling specialists to meet with patients. She says she was skeptical about post-infection illnesses prior to Covid, but the influx of patients with lingering symptoms coming into the hospital opened her eyes.

Determined parents eventually find their way to Children's National or one of the other pediatric long-Covid clinics in the U.S. They're staffed with doctors who, like Yonts, work extra hours to squeeze in long-Covid patients around their regular caseload. That's increasingly tough to do, because more and more children keep pouring in. Following omicron the number of families seeking help at the long-Covid clinic at Children's National has swelled. Yonts says the waitlist has stretched to four months. The story is similar across the country. "Post-infection syndromes used to be one here, one there. They weren't so common," says Sindhu Mohandas, a pediatric infectious disease specialist who leads the long-Covid clinic at Children's Hospital Los Angeles. "But now we're seeing a lot more." She says her clinic is getting calls from all over the U.S.

Many children slip through the cracks, though, especially those from Black and Hispanic families. At Children's National, the clinic primarily sees "affluent, medically literate, White families," Yonts says, even though Black and Hispanic people in Washington are more likely to have had Covid than Whites. A report out at the end of March, *The State of Black America and Covid-19*, said there is "already evidence of disparities in diagnosis and access to treatment" regarding long Covid. The group that released the report, the Black Coalition Against Covid, says more efforts are needed to include Black people in trials and treatment programs.

▲ Edwards and Miller

▼ The playground at Rainbow Babies



with long Covid for two of those years. He hides behind a blue chair in the exam room, while his mother, Kristin, explains that after the entire family came down with Covid early in the pandemic, he began suffering from high fevers every few weeks. He wasn't eating well (he told his mom food smelled "disgusting") and wasn't sleeping. Over a course of months, Kristin had taken Hunter to a series of hospitals—including the Cleveland Clinic and, before the long-Covid clinic opened, Rainbow Babies. "Nobody knew what to do with him," Kristin says to Edwards and Miller. "It was very frustrating because I was like, 'I don't know what to do at this point. Nobody's believing me.'"

She tells the doctors that Hunter is beginning to gain weight thanks to the PediaSure shakes she's been giving him. She and her husband also stopped finding Hunter downstairs at 4 in the morning playing with his toys, once they started giving him a melatonin supplement to help him sleep.

The Rainbow Babies clinic operates much the same way as Children's National. Edwards was introduced to long Covid through her work on a different Covid-related condition called multisystem inflammatory syndrome in children, or MIS-C. When a nearby medical center wanted to open an adult long-Covid clinic, it sought out Edwards and asked if she could handle any kids who also came in. It wouldn't be many, she recalls them saying. "I was like, 'Sure, one or two kids here or there? I can do it.'"

What started out as a trickle grew into a torrent. Edwards ran into Miller in the hallway one day and asked for his help. They still have more patients than they can handle, especially because they have to squeeze in the 60 cases or so that they've seen in the last year around their regular practices. The children they treat usually have ailments complex enough that appointments often take much longer than an hour—compared with standard office visits of 15 to 30 minutes—and they have to return for multiple follow-up visits. It takes about six weeks for a new patient to get an appointment.

At Rainbow Babies, Edwards and Miller see their long-Covid patients every Friday. "I'm sure we're losing money for the hospital system, because we're only seeing five patients in a day," Edwards says.

She's talking in between seeing patients in a room normally used for psychologists to observe children through a two-way mirror. It's subdued compared with the bright, happy forest landscapes that cover the walls and ceilings throughout the lobby and hallways of Rainbow Babies. Edwards and Miller see their patients wherever they can find an open spot in a wing of the hospital for specialty care. Edwards does all the administrative work herself. Her own kids know she won't be home in time for dinner most Fridays.

In early March, Edwards and Miller see their youngest patient. Hunter Reinard, who's just turned 4, has been sick

But the family all got Covid again in December. In February, Hunter's on-and-off-again fever hit 106F. He began hallucinating, seeing characters from his favorite video games floating on the ceiling. Kristin says she's been feeling overwhelmed.

"I want to say, 'You're not crazy,'" Edwards says to her.

"I feel crazy," Kristin says. "For a year and a half nobody believed me."

"I believe you," Edwards says.

Some in the medical community theorize that long Covid is an autoimmune response or that the virus causes nerve damage. But no one knows for sure. At Rainbow Babies, Edwards and Miller tend to prescribe rest and diet changes. Lincoln Brockmeyer says the support and guidance he's gotten from his doctors have begun to pay off. He's eating better and is almost back to his pre-Covid weight. He has more energy, too. Getting refined sugar out of his diet has been a "game changer," he says. He can take longer walks now, and on good days he can't resist shooting a few hoops. But he has to sit down between shots. "That was the thing that was most disappointing, because I missed my whole basketball season," he says. "I worked so hard, and it all got thrown away."

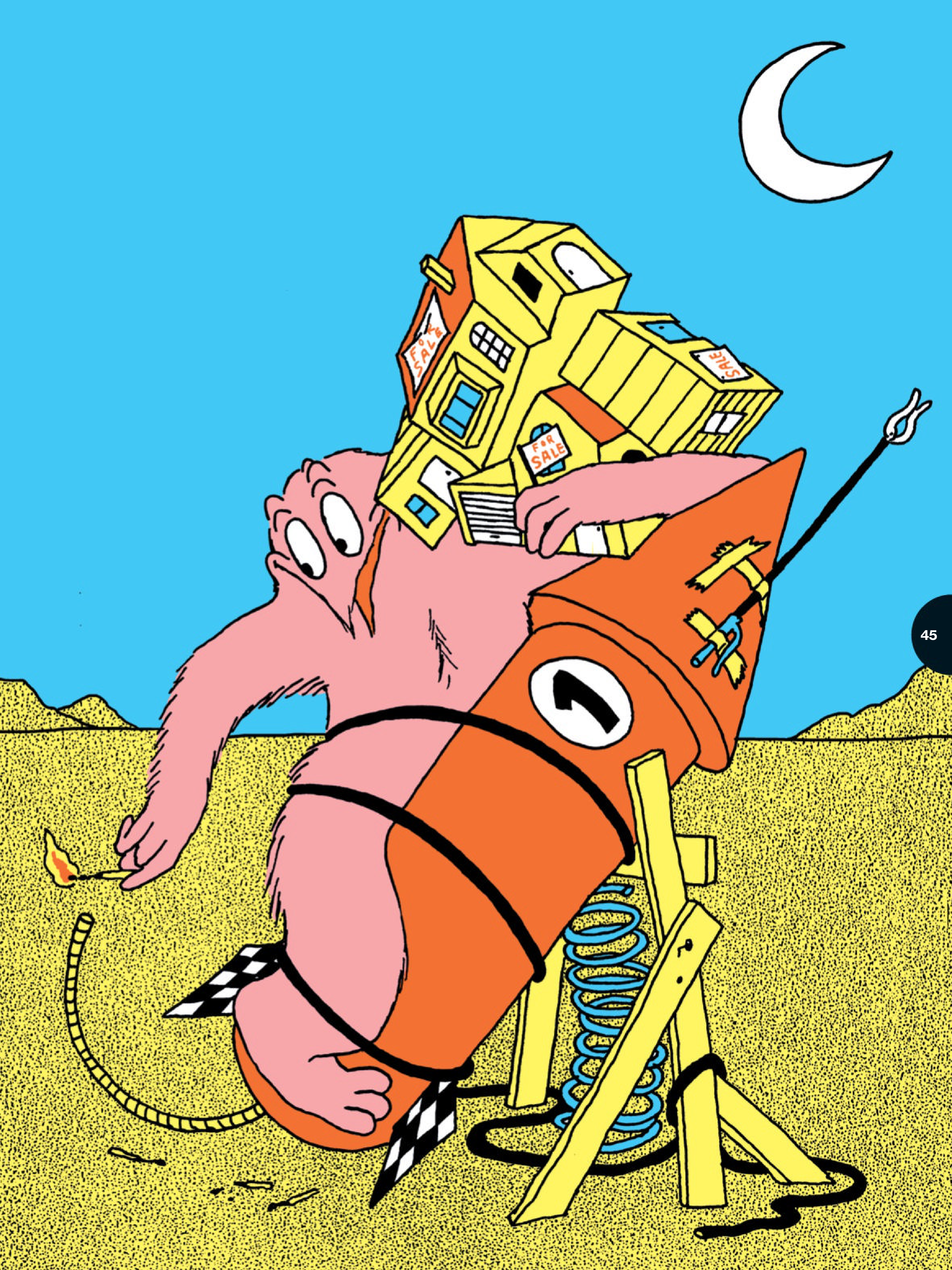
Basketball hasn't been the only loss for this high school freshman in a brand-new town. Lincoln says he'd just started warming up to people at his school when he got sick. Then he was left to watch on Snapchat all the fun his new friends were having. "I felt really alone," he says.

He still feels behind in school but says his mental health has improved since the diagnosis. "Now that I feel like we know it is long haul, it feels better to know what I actually have," he says, "and that we're able to do something about it." Ⓑ

The NORTH STAR of Flywheels to the MOUNTAINTOP of the Big Hairy *Audacious* SUPER APP

Zillow CEO Rich Barton manages his company by moonshot (among other metaphors). It hasn't always gone well

By PATRICK CLARK Illustration by ANNA HAIFISCH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In the 1994 book *Built to Last: Successful Habits of Visionary Companies*, the management guru Jim Collins introduced the concept of the Big Hairy Audacious Goal. The BHAG (pronounced "bee-hag") describes a method of stimulating progress by setting a clear, possibly unreasonable objective and chasing it relentlessly. Collins was thinking of Boeing's race to develop the 707, but he also applied the concept more broadly. Climbing Mount Everest is a classic BHAG. So is sending humans into outer space. Some executives may find the term uncomfortably anatomical, preferring to pepper their PowerPoint presentations with true norths and north stars, Manhattan Projects and Marshall Plans, and, most of all, moonshots.

Rich Barton, chief executive officer of Zillow Group Inc., likes Collins's formulation. "I find big, hairy, audacious goals are really motivating and inspirational," he says. Barton founded an online travel agency inside Microsoft Corp. in 1994. Five years later, he walked into a meeting with future CEO Steve Ballmer and asked for a $100 million marketing budget. Ballmer laughed the young executive out of the room but later blessed a plan to take Expedia Group Inc. public. Eventually, Barton left Expedia and tackled the housing market. His first effort, a plan to sell homes at auction, was a dud. But in the process of pursuing it, he and his co-founders hit upon a better idea: They would track home values as if they were stock prices.

That turned into the Zestimate, the immensely popular home valuation tool from Zillow that lets you voyeuristically gauge the net worth of neighbors, ex-girlfriends, or the kids' soccer coaches. Zillow publishes home and apartment listings and makes money by charging real estate agents for referrals to potential homebuyers. It's a good, if modest, business considering it attracts a monthly audience roughly equal to 80% of the adult population of the U.S.

A BHAG, Barton says, doesn't have to be successful to be considered a success. In 1998 he promised to shave his head if an Expedia engineer named Robert Hohman could re-create a competitor's flagship product in 90 days. Hohman completed the task on time, and Barton satisfied the wager. The knockoff product, which let consumers specify a price they wanted to pay and matched them to hotels, wasn't all that popular, but it led the company to a profitable business buying lodging inventory at wholesale prices and marking it up to consumers.

Sometimes the real BHAG is the friends you make along the way. After Barton started Zillow, he teamed up with Hohman to start Glassdoor Inc., which encouraged workers to anonymously publish their salaries and other information about their companies that could be useful to potential employees. It was acquired in 2018 for $1.2 billion. Barton also applied his knack for helping consumers make sense of opaque markets to join the boards of a series of startups in this vein. There was Avvo, for hiring a lawyer; RealSelf, for finding a plastic surgeon; and Nextdoor, for spying on neighbors. "What makes Rich special," Hohman says, "is his ability to conceive of these big risks and then having the courage to take big swings at them."

In 2019, Barton embarked on his biggest BHAG yet—and his most disastrous. The previous year, Zillow had introduced a new business, Zillow Offers, that was meant to compete with a buzzy new crop of companies, called iBuyers. More than $2 trillion worth of homes change hands in the U.S. every year through a process that often combines the excruciating task of selling a house with the exasperating job of buying one. The iBuyers used software to figure out what homes were worth, then bought them for cash, made light repairs, and listed them for sale. (The idea was to charge customers a convenience fee for relieving the headache of selling a home.) Zillow's entrance into the business made some sense: It had a huge audience and lots of experience estimating the prices of homes. But it was attempting to pivot from selling online advertising to operating what amounted to a hedge fund and a sprawling construction business, two fields in which it had no experience at all.

Zillow hired some former commercial real estate executives to manage the new initiative and added "operation excellence" to its list of core values. In February 2019, Barton climbed down from his role as executive chairman and took over as CEO, rallying employees to the task of remaking the company while he persuaded shareholders to accept the massive expenditures needed to finance the venture. His goal, he said on his first quarterly conference call, was to sell 5,000 homes a month within five years, which would put Zillow on par with the biggest U.S. homebuilders. That target was so exciting, he waxed lunar. Investors are "used to me pointing at the moon and saying, 'I want to go step on that thing,'" he said at the time.

By the accounts of Barton and those around him, the early days of Zillow Offers were a swinging time. Harvard Business School published a case study framing Zillow's pivot as an aggressive move to disrupt the disrupters, effectively inducting Barton into the big, hairy hall of fame. A rising housing market, meanwhile, was making him look like a genius. In Austin, for instance, you could buy a house for $375,000 at the end of 2020 and sell it for $550,000 a year later without so much as swiping a paintbrush. Zillow's market cap approached $50 billion, making Barton's stake worth more than $1 billion. In late August 2021 he boasted to investors that customers' biggest complaint with Zillow Offers was it was too good to be true. In September the company issued $700 million worth of home-flipping bonds, signaling a long-term commitment to the business.

A few weeks later, I started hearing that Zillow had stopped pursuing acquisitions. When I wrote a story noting the pause, a Zillow spokesman blamed the labor shortage, explaining that the company was struggling to find enough workers to inspect and renovate homes. In the two weeks that followed, my colleagues and I reported that the company had been overpaying for properties, often by tens of thousands

of dollars, and that it had begun offering thousands of them to investors in what looked like a going-out-of-business sale.

Then, on Nov. 2, Barton announced he was closing down the operation, taking what turned out to be a $405 million writedown and laying off 2,000 workers. By the time the news sank in, shares had fallen 75% from their peak in February 2021—a $35 billion wipeout that reminded observers in the tech and real estate sectors that what made a big goal hairy was its likelihood of failure.

Barton and his water feature

Zillow's headquarters in downtown Seattle had an after-the-BHAG energy when I visited in February. Early in the pandemic the company had told employees to work wherever they wanted, and on most days attendance was running in the neighborhood of 5%. In employees' absence, decorators had remade the office in the style of a boutique hotel, a first draft at designing the company's remote-working future. There seemed to be more plants than workstations, and the remaining desks were surrounded by plush furniture. Workers who did badge in could choose their own adventure. On the day I was there, an economist had commandeered a small conference room for a video chat with Biden administration officials, warning them that the combination of rabid homebuying demand and rapidly rising mortgage rates made housing trends difficult to predict.

Barton greeted me on the 40th floor and led me across a small pool he'd had installed at the threshold of his office after he was told that crossing water helped people leave their worries behind. For a guy who'd just vaporized billions of his own company's market cap, he seemed untroubled. At 54, he still looked the part of the executive-geek, with hair that was gray at the temples but flopped jauntily across his brow. He spoke quickly, peppering his speech with pop-culture references, and seemed earnest even when making comically grand pronouncements, such as when he gestured out over Puget Sound at the Olympic Mountains and told me, "That's where Zeus resides."

Zillow had gotten into iBuying, he said, during a period when investors were eager to fund audacious efforts. The business depended on economies of scale, so Barton pushed employees to chase rapid growth. But the pandemic set off a nationwide homebuying spree that led to the fastest price acceleration on record, and Barton's quest for growth exposed Zillow to bigger price swings than he'd thought possible. Although he'd once viewed iBuyers as market makers, earning fees for the relatively safe activity of connecting sellers and buyers, he'd come to feel as though he was borrowing huge sums to make risky bets. "We were doing something that was clearly a potential Long-Term Capital Management kind of thing," he said, invoking the hedge fund that crashed spectacularly in 1998. "After the new shit came to light," said Barton, paraphrasing The Dude, shutting down Zillow Offers was a straightforward, if emotionally difficult, decision. It meant firing thousands of people, enraging investors, and ▶

"These kinds of things, your body knows—your stomach knows—before your head"

PHOTOGRAPH BY GRANT HINDSLEY FOR BLOOMBERG BUSINESSWEEK

◀ subjecting Barton to criticism from those not initiated into the way of the BHAG. But he felt he was saving the company from potential ruin.

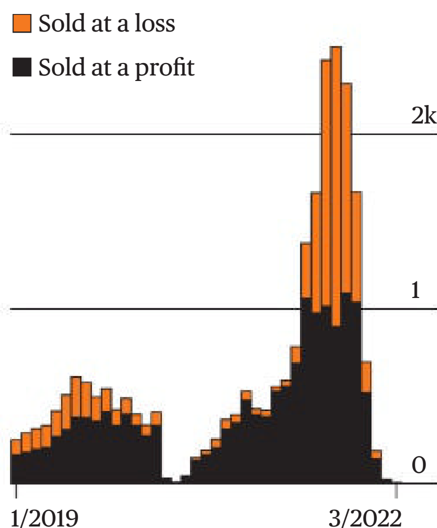
On the day he announced the decision, Barton said, he felt relief. "These kinds of things," he said, "your body knows—your stomach knows—before your head knows. And my stomach knew."

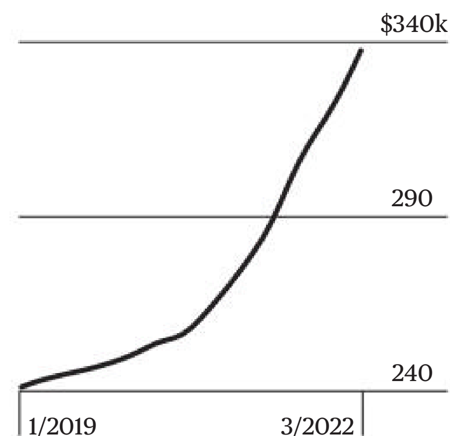
Zillow has always concerned itself with easing anxiety. The company's name combines the letter "Z" with "pillow," aiming to convey safety and comfort and perhaps borrowing from Dr. Seuss. ("But the Zillow on my pillow always helps me fall asleep," from *There's a Wocket in My Pocket!*) At first, this was as easy as shedding light on an opaque market. Real estate agents earned their commissions by collecting and collating information, says Clelia Warburg Peters, the managing partner of Era Ventures, a venture capital firm, who grew up in her family's New York real estate brokerage. "When my dad got into the business, he'd walk up and down Park Avenue with a stack of 10- and 20-dollar bills and give money to the doormen to find out who had died, who'd gotten divorced, who was moving." Zillow made the industry more transparent, taking information from the shared multiple-listing services and serving it to consumers online. This innovation transformed the way people started their home search, and the Zestimate helped Zillow outshine similar listing sites. But it did nothing to change the stressful process of actually buying or selling a home.

This dynamic was parodied, effectively, by *Saturday Night Live* last year in a bit that suggested surfing Zillow listings was akin to a sexual fantasy. In the skit, cast member Mikey Day lusts over home offices and outdoor kitchens, finally letting his passion guide his cursor to the "contact an agent" button on Zillow's website. At that point, Cecily Strong enters the frame as nasally ReMax agent Donna Lazaritti, who interrupts Day's reveries by calling him, repeatedly, to set up a home tour.

IBuying provided a way around that mess, cutting out intermediaries, providing an experience customers actually liked, and bringing Zillow to the lucrative heart of housing transactions. In theory, Zillow could make money flipping homes and then add on mortgages and other services. That had huge appeal to Barton, who, along with his co-founder (and Zillow's executive chairman) Lloyd Frink, controls the company through a special class of shares. Stock market investors valued Zillow at roughly $10 billion when it started flipping homes. But Barton told colleagues that Zillow Offers gave the company a path to being worth hundreds of billions, according to people familiar with the conversations who, like

MAYBE TOO AUDACIOUS?





DATA: BLOOMBERG NEWS ANALYSIS OF DEED RECORDS COMPILED BY ATTOM DATA SOLUTIONS, ZILLOW. DEED RECORDS WITHOUT TRANSFER PRICES, SALES LESS THAN $100,000, AND SALES MORE THAN $1 MILLION WERE EXCLUDED FROM THE ANALYSIS TO AVOID NOISE FROM RECORDING ERRORS OR PORTFOLIO SALES. LOSSES INCLUDE HOMES SOLD FOR THE SAME PRICE ZILLOW PAID.

others in this story, requested anonymity because they were discussing internal company matters.

Barton liked the business for another reason. Opendoor Technologies Inc., which pioneered the iBuying model, had raised more than $1 billion in venture capital and increasingly seemed like a threat to Zillow's dominance in online real estate. If Opendoor's service got popular enough with home sellers, the company might be able to bypass the multiple-listing service, diverting inventory, and ultimately house hunters, from Zillow.

Zillow's initial approach to iBuying was relatively conservative: The company used software to generate an offer, then asked pricing experts to vet the bid. If the seller accepted, Zillow sent workers to estimate the cost of needed repairs, subtracting that amount from its final bid. But after Opendoor went public, via a special purpose acquisition company, or SPAC, Barton decided to take his BHAG to the next level. Zillow introduced an initiative dubbed "Project Ketchup" to close the gap with Opendoor. Employees got merch to mark the occasion, including water bottles made up to resemble condiment containers, as well as an actual bottle of Heinz.

Zillow told its pricing experts to stop questioning the algorithms, according to people familiar with the process. It also raised its bids, sometimes bumping the numbers its pricing software spit out by tens of thousands of dollars as part of a process known internally as "offer calibration." The company embraced "auto evaluations," effectively allowing customers to inspect their own homes, and lowered convenience fees. In the summer of 2021, when Opendoor was charging a flat fee of 5%, Zillow was charging some

"Don't cry because it's over. Smile because it happened"

customers less than 1%. “People would be so happy when we showed up at their door,” says a former employee in the real estate operation. “I could tell them, ‘Hey, I’m going to start a small fire in your yard just to see if it burns well.’ They’d be like, ‘Cool, you’re paying me $50,000 over the value of my home.’ ” When staffers raised concerns with their superiors, management reassured them it was all part of the plan, former employees say.

Zillow bought almost 10,000 homes in the third quarter, fulfilling Barton’s desire for hypergrowth. But price appreciation was slowing, and Zillow was having trouble selling many of its homes for what it had paid. Workers and materials were also in short supply, adding to the time it took to resell houses. When Zillow did bring properties to market, they were overpriced to reflect the company’s inflated acquisition costs. The listings lingered, increasing Zillow’s carrying expenses.

Barton maintains that the unpredictable housing market was the root problem. But Opendoor and other iBuyers, including Offerpad Solutions Inc. and Redfin Corp., managed to avoid those pitfalls, setting themselves up to benefit when home prices started accelerating again in early 2022. When I asked Barton why his company failed where competitors succeeded, he traced a seemingly circular logic. Zillow needed to grow fast, which meant running the business less efficiently. That in turn led to losses that convinced Barton the business was too risky and not profitable enough to be worth the trouble. What if Zillow had simply run the business better? Barton insists that price volatility doomed the experiment. The company’s operational struggles were “absolutely moot,” he says. Sometimes, BHAG is a flat circle.

Zillow home-flipping employees were summoned to a meeting after the stock market closed on Nov. 2, right when the press release announcing the end of Zillow Offers was about to go out. Barton didn’t speak, say people who attended the video call. The task of breaking the news to employees was left to Arik Prawer, the executive Zillow hired to oversee the home-flipping operation. “Don’t cry because it’s over,” Prawer said, quoting a line commonly attributed to Dr. Seuss. “Smile because it happened.” In a call with investors that afternoon, Barton sketched out his logic. It wasn’t just that iBuying was riskier than anticipated, he told them; the market for it was too narrow. The company was transacting with only 10% of the serious sellers who asked Zillow to make them an offer. The BHAG, he seemed to be saying, wasn’t BHAG enough.

This was, for many, tough to swallow. Barton had spent the last three years hyping iBuying, saying his company was revolutionizing a broken housing market with a service that was as appealing as “free beer at a college party.” Now it was, what? Kombucha? Zillow had been hiring employees for the iBuying business up to the day it pulled the plug, according to two former managers. It needed to lay off 2,000 people in the middle of a pandemic, with firings happening on video calls. Zillow still had 18,000 or so homes to get off its books, and it needed the workers it planned to let go to stay long enough to sell them. Internal surveys, unsurprisingly, showed employees were less engaged and less confident in their bosses. Zillow’s chief marketing officer, Aimee Johnson, left, as did its chief economist, Svenja Gudell. Stan Humphries, the executive who invented the Zestimate, told colleagues he planned to retire.

Barton and his deputies sought to break through the malaise by paying bonuses and severance to departing employees and explaining their about-face in a series of companywide meetings called Zall Halls. They also argued that the work on Zillow Offers would serve the company as it shifted focus to something Barton had begun to call a “housing super app,” from which buyers could manage every part of a real estate transaction on their own terms. That would likely include ShowingTime, a feature that helps house hunters schedule home tours without having to take a call from Donna Lazaritti. Financing was another important piece of the puzzle. Zillow had acquired a mortgage lender, seeking to tap a new revenue stream for the iBuying business. After shutting down iBuying, Zillow began working on a new style of bridge loan that allows buyers to make cash offers before they’ve secured a mortgage, helping them win bidding wars. The company expects the super app will eventually help homeowners sell and let renters find apartments, submit applications, and pay their landlords. “It was just a new path,” Barton says. “The mountaintop that we’re trying to summit was the same.”

In February, Barton laid out some new targets in a call with investors. Roughly two-thirds of U.S. homebuyers search listings on Zillow, but only 5% are represented by an agent they meet on the site. Barton wanted to use his super app to increase that number, which would let him double the company’s non-home-flipping revenue by 2025. Unlike iBuying, which depends on generating slim profits on lots of transactions, Barton promised that the super app would deliver 45% margins. Is this BHAG bigger and hairier than the one that came before it? Barton thinks so.

Then again, real estate brokerages have been trying to consolidate services for decades with little success. A field of deep-pocketed companies—including mortgage lenders, brokerages, and Zillow’s old iBuying rival, Opendoor—are still chasing similar goals. “It’s going to be a long time before Zillow faces an existential crisis,” says Warburg Peters, the venture capitalist. “It’s also true that in some ways the industry is moving past them.”

Based on Zillow’s current stock price, investors are skeptical of Barton’s pitch. He says he doesn’t care. “Setting out longer-term goals is always scary,” he says. “The most important thing to me is that people at Zillow look at that and go, ‘That’s crazy. How are we going to do that?’ ”

—*With Noah Buhayar*

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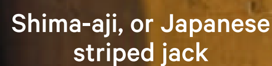
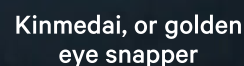

Shima-aji, or Japanese striped jack

Striped bass


Kinmedai, or golden eye snapper

PURSUITS

RESTAURANT SPECIAL

FISH, AGED LIKE STEAK

In seafood, "fresh" used to be the most important word on the menu. Not anymore. *By Matthew Kronsberg*
Photograph by Joyce Lee

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The best peppercorns for pasta

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Beneath a sprawling banyan tree at Sunny's Steakhouse in Miami's Little River neighborhood, diners sip martinis and enjoy standards such as Caesar salads and New York strips. The secret star of the menu, though, isn't a chophouse classic: It's dry-aged fish. A fillet of striped bass, its skin crisped to a potato chip shatter, benefits from the same treatment the rib-eyes get. "We hang our fish like you would hang meat," says chef and co-owner Carey Hynes.

Dry-aging fish—in this case, for about a week—is a counterintuitive treatment for a protein whose freshness is generally viewed as fundamental. But the process is rapidly being adopted around the world, including at internationally acclaimed restaurants such as Saint Peter in Sydney and Atelier Crenn in San Francisco, as well as at suburban favorites like FoodWorks at Jailbreak Brewing Co. in Laurel, Md.

Whether it's with flesh, fowl, or fish, dry-aging usually offers similar rewards: When moisture is reduced over time, it's easier to achieve a crackling skin, and texture often firms up. Enzymatic changes deepen the flavor.

As for the dreaded "fishiness," it can be sidestepped, says Josh Niland, chef and owner of Saint Peter. In his 2019 *The Whole Fish Cookbook*, Niland explains that the funky smell arises when trimethylamine N-oxide, a chemical present in fish, breaks down into derivatives of ammonia.

"JUST FROM THE PICTURES ALONE, I'M LIKE, 'OH, UGH, I HOPE YOU DIDN'T EAT THAT'"

Avoiding that breakdown requires careful handling from the moment the fish leaves the water, ensuring that it's free of bruises and blood and has been carefully scaled. It also means (as with dry-aging meat) precisely controlling temperature, humidity, and airflow throughout the aging process.

The Whole Fish Cookbook is something of a bible for the movement, and its sequel, *Take One Fish*, offers some guidance on the dry-aging process as well. In theory, dry-aging can be done at home in a conventional refrigerator. But it's generally a task best handled by professionals with dedicated equipment to avoid a result that can range from merely disgusting-tasting to something that could make you seriously sick.

And even for them, there's a learning curve. Liwei Liao specializes in dry-aged seafood at the Joint Seafood, a retail

More Flavor, Less Fresh

▼ ITAMAE, MIAMI
Located in a shopping plaza in Miami's Design District, the family-owned, Nikkei-inspired Itamae serves fish that glisten like the jewels in the nearby windows of Bulgari. A menu highlight: aged wahoo dressed in white soy and lime and garnished with two types of Peruvian corn—kernels of fat, chewy choclo and crunchy, toasted cancha.

SAINT PETER, SYDNEY
At chef Josh Niland's flagship restaurant—the world epicenter of progressive fish cookery—the menu changes daily. But it invariably features seafood such as Murray cod and swordfish from his custom-built dry-aging room. Niland says to treat it just like meat, contrary to belief: The last time water should touch a fish, he says, is when it's caught.

▲ JAILBREAK BREWING CO., LAUREL, MD.
A brewpub midway between Washington and Baltimore isn't the first place you'd expect to find an ambitious dry-aging program. But chef Janny Kim's butcher boards can feature dishes such as kanpachi (greater amberjack) sashimi, and seared crispy-skin madai (red sea bream), each aged for 15 days.

▲ SUNNY'S STEAKHOUSE, MIAMI
It's not all red meat at this hot spot, tucked into an industrial corner of Miami's Little River neighborhood. The restaurant's fillet of dry-aged sea bass is grilled over the same wood fire as the steaks before it's topped with a mushroom-heavy XO sauce.

BAR LE CÔTE, LOS OLIVOS, CALIF.
Ubiquitous branzino gets an uncommon depth of flavor and a crackling crisp skin after it's dry-aged and given a turn on the plancha at this Central Coast seafood tavern. It's served over a Basque mix of stewed fennel, eggplant, tomatoes, and Calabrian chiles.

ITAMAE: COURTESY ITAMAE. JAILBREAK BREWING CO.: JANNY KIM. SUNNY'S STEAKHOUSE: FRANK LI. BERNARD-COMPARAT, EDANGE: COURTESY GUEULETON

and wholesale fish market in Sherman Oaks, Calif. Known on Instagram as @dry_aged_fish_guy, Liao has become central to the movement, with chefs tentative and brash seeking his advice and approval. "Man, you should see some of the pictures I get," Liao says. "Just from the pictures alone, I'm like, 'Oh, ugh, I hope you didn't eat that.' It's definitely something that I worry about." That's why he's open to sharing his knowledge: "So that chefs from around the world can actually benefit from this new way of thinking."

The advantages of dry-aging extend beyond the plate–they also appear on a restaurant's bottom line. The ability to extend the prime usable life of a fragile, expensive ingredient has been a boon for businesses still recovering from pandemic-induced fluctuations in customer traffic and lingering financial hardships.

At Itamae, a restaurant near Sunny's Steakhouse in Miami that celebrates the cuisine of the Japanese diaspora in Peru, chef and co-owner Nando Chang opens the glass door to his 17-cubic-foot Dry Ager refrigerator and shows off a yard-long, locally caught wahoo hanging from a steel hook next to a hamachi imported from Japan. Both were being prepared to be used, raw, in bracingly tart ceviches and tiraditos.

Before Chang started dry-aging, a wahoo like that would be broken down into loins and stored in a conventional refrigerator. Over the four or so days it would take to use it, "it would lose significant, significant quality." Now, he says, "we'll break down a third of this fish, use it today, and leave the rest hanging." Rather than having to toss unsold product, he knows that the next day it will taste even better. Space and time are the biggest hindrances: With limited room in his 600-square-foot space, he sometimes serves fish that's not as thoroughly aged as he'd like.

The optimal amount of dry-aging varies from fish to fish, based on size and fattiness. Lean, white-fleshed fish might benefit from three or four days; a 200-pound tuna, 30 to 60 days. In Los Alamos in California's Santa Ynez Valley, Daisy Ryan, executive chef and co-owner of Bell's Restaurant, is a fan of Liao's Ora King salmon. Lately she's serving it, aged for 8 to 14 days, as crudo. His jumbo Ora King Tyee salmon, meanwhile, hit their sweet spot–literally–after about 25 days, when, he says, "they taste like mangoes. They taste like lychee and longan, with fruit notes coming out. It doesn't taste like salmon anymore."

At Bar Le Côte in nearby Los Olivos, where Ryan is also a co-owner, the menu features a dry-aged branzino, also from the Joint. Liao says he ages about 800 branzino a week for his roster of about 100 clients. Three years ago he had annual gross sales of about $700,000. This year he's forecasting more than $3.5 million.

Even though Ryan went from being unaware of dry-aged fish to being one of its biggest advocates within a year, she knows it's a hard concept for some to swallow. Having heard other chefs say things like "I don't believe in that," she's found herself amused and a little incredulous. "It's like, 'What do you mean, you don't believe in that? Don't make up your mind before you try it.' " Ⓑ

A FEAST GOES VIRAL

Restaurant brand Gueuleton is an unabashed throwback to hedonistic French food—and diners are eating it up. *By Alice Kantor*

Bernard-Comparat (left) and Edange

In their popular video series on YouTube and TikTok, Vincent Bernard-Comparat, 36, and Arthur Edange, 34, the founders of Gueuleton, can seem like a spoof of a French tourism ad: Over a soundtrack of upbeat tuba, the self-described bons vivants don black berets and dig into duck confit and pâté en croûte, laughing into the camera with a glass of wine in one hand and a cigar in the other. A tricolor flag is sewn into their aprons.

But during strict Covid-19 lockdowns, when people were unable to meet their friends or go out for a drink, the French gorged on Gueuleton's then-40-strong video library that featured the two men sampling traditional food. In one, they visit the Charente-Maritime region and banter with friends while they grill salted beef ribs, spider crabs, prawns, oysters, and mackerel (as well as zucchini, mushrooms, and peppers) and enjoy a white wine from a local vineyard. The video has more than 1.1 million views.

The pair's first restaurant opened in 2013 in Agen, a small town in southwest France, using a €15,000 ($15,900) loan they secured in 2012. Edange grew up in the southwest Gers region, near there; Bernard-Comparat also grew up nearby, in the Lot-et-Garonne region. Initially their goal was to start a ▶

◀ catering business that would showcase food and drinks from local farmers and vineyards. Now it's grown to 16 Gueuleton restaurants in Bordeaux, Lyon, Toulouse, and other cities; 14 Gueuleton catering groups that provide large pig roasts for company retreats and weddings; a Gueuleton magazine; and a Gueuleton gin and Armagnac distillery. Bernard-Comparat and Edange have begun experimenting with a local outfitter on Gueuleton Séjours to offer guided gastronomy and agriculture tours. They also sell brasero grills, wine, and pantry food online.

The brand almost didn't survive the pandemic. Like most restaurateurs caught in the middle of a public-health crisis, they struggled to keep their catering units and eateries afloat during lockdowns. But none of them closed permanently. Bernard-Comparat and Edange gathered some extra funding, including government support. They also started a TikTok account, doubling down on their decadent videos to raise brand awareness and increase their audience. Since 2020 they've produced almost 150 charming vignettes and now have more than 1 million followers across social media.

It takes a lot of work to have such joie de vivre. When I catch up with them by phone, they're stuck in traffic on the way to one of their restaurants in Bordeaux. Later they'll head to Tours to interview actor and wine merchant François-Xavier Demaison before fishing for barbels, carp, and mullets in the Loire River as part of another video.

Gueuleton restaurants offer classic French fare such as this steak with an herb-based sauce

"Gueuleton" is an old French term that means a joyful feast, and it encapsulates their enterprise. "It's really a concept," Bernard-Comparat says. The two friends were roommates studying in Bordeaux and sharing hearty meals in their apartment when they came up with the idea. "It's the good life, the long and plentiful rustic meals our parents used to have with their friends."

Neither of the men is a trained chef: Edange studied accounting; Bernard-Comparat, business management. Instead they create franchises with local restaurants (which must initially bring €150,000 to €200,000 in funding), then they collect 5% of the restaurant's revenue. Popular menu items include reasonably priced truffle-based croque-monsieur, charcuterie platters, and duck breasts with a foie gras sauce. The owners say they get about 700 requests from restaurants to be affiliated with the brand every year.

"Gueuleton has hit a kind of niche market," says Julien Guitard, a marketing and communication consultant at Cuisimaniac, a company dedicated to food branding and strategy. "It's not really the trendy hipster Parisian who's moving toward a meat-free diet and buying their vegetables at the local green shop, and it's not rural folks who wouldn't spend $20 on a bottle of wine or $3,000 on a brasero. It's young, middle-class professionals, in small or medium-size cities, who might be eco-conscious and want to support local food but who also want to be reminded of a comforting and hearty food culture that their parents or grandparents gave them."

The French are eating less red meat and drinking less wine than in the past. Driven by the health impact of too much steak as well as the surging price of a good cutlet, consumption of beef has dropped 30% in the past four decades, according to the French ministry of agriculture. Rabbit and other game went down 75% within the same time frame. Wine consumption decreased from 109 liters per person per year in 1970 to 36 liters now, according to Insee, the National Institute of Statistics and Economic Studies.

Gueuleton is a backlash to all that. In the pandemic, people wanted comfort food, including in France, where cheese consumption hit record levels. Combine that with current trends at fancy French restaurants, and the popularity of Gueuleton makes sense, says Patrick Rambourg, author of *History of French Cuisine and Gastronomy*. High-end dining in France "focuses on subtle tastes of refined dishes that tend to be light and restrained. Gueuleton seems to promote the opposite, the large feast where people maybe drink a bit too much, eat a lot, maybe share a few racy jokes among male friends."

In one video, Edange and Bernard-Comparat ride a World War II-era Jeep in the Lorraine region to a farm where they try, among many other things, a 9 a.m. coffee with a 100-proof liqueur poured in, along with cheeses from the region, including Muenster, Crème d'Albert, and Brillat-Savarin. "It's a good sign when you can smell the cheese through the wrapper," Bernard-Comparat says.

They also sample a fried andouillette sausage made from pig's feet, sweetbreads, potatoes, and even more cheese. It's finished with a tray of hay-based alcohol, which causes Edange to jokingly reflect on the similarities between their behavior and the creatures nearby: "We're going to try it because we're animals and we love hay."

The founders themselves are amazed at how they're tapping into a French desire to enjoy their old and rural gastronomical culture anew. "When we saw how popular our brand was on TikTok, we were surprised," Edange says. "We were drawing on traditions that our parents taught us, and somehow young people showed they cared, too."

In the car on their way to Bordeaux, Bernard-Comparat and Edange discuss what the future might hold for them. They'd like to build on the success of their videos and are working on a book. The pair would like to open restaurants abroad and offer ready-made meals in supermarkets across France. But what excites them most is the role they seem destined for: their own TV show. Ⓑ

GUEULETON: FABIEN LAINE AT CREATIVEFABIEN. MALLMANN: PHOTOGRAPH BY WILLIAM HEREFORD

Mallmann

A HUNK OF BURNIN' LOVE

A new book by grilling maestro Francis Mallmann makes the case for char. *By Kate Krader*

Francis Mallmann is renowned for his open-flame heroics, torching everything from a rabbit's kidneys to a whole cow in Patagonia. But recently the Argentine chef has begun loading up his fantastical domed fire pits with a farmers market's worth of fruits and vegetables.

And he's advocating that you should, too—and that you burn them.

Well, not exactly. Mallmann, the world's foremost grilling expert, knows better than to tell people to thoughtlessly carbonize a good piece of produce. But in his new cookbook, *Green Fire: Extraordinary Ways to Grill Fruit and Vegetables, From the Master of Live-Fire Cooking* (Artisan Books, $40), he repeatedly recommends giving produce a good amount of char before serving it. "Charring is a delicate, fragile way of getting a little bit of black, and a lot of toasted color, and that delicious crunchiness that takes you to heaven when you eat," he says.

The book, written with Peter Kaminsky and Donna Gelb, is stocked with recipes such as burnt tomato and plum caprese, Mallmann's variation on the classic Italian salad. He makes it by charring tomato wedges; the result, he writes, "is to produce a gradation of texture—from burnt to ripe and sweet."

Among the more than 80 vegetarian dishes (there's no meat in the book), there's also a recipe for scorched Brussels sprouts, cooked over medium heat on a plancha to give the leaves a crispy bite in a simple side dish with walnuts. He likes to burn citrus: It softens the harshness of the juice and the zest and adds an entirely new level of flavor—smoke—to everything: sauces, cocktail components, garnishes. The drinks chapter includes a section on the benefits of adding well-toasted elements to beverages for the extra flavor they deliver.

But Mallmann especially likes to burn sweet fruits, namely pineapples, peaches, plums, and strawberries. "I love to char them without cooking them very long, so the idea is that they remain raw. I do it very fast, with a bit of butter or sugar, so they get that delicious char," he says.

All this raises an important question: Where do you draw the line on burning on the grill? The book uses the words "burning" and "burnt" very loosely in recipe titles, such as burnt cherries with vanilla ice cream (see below), which might more accurately be described as "well caramelized."

"The boundaries between burning and charring is that you sit in a chair or you stand in front of what you're cooking," he says. "You set your eyes on the object, and you don't distract yourself. You're constantly wondering if it's the moment to flip it—does it have enough char?—so you pick it up slowly to see how it is. It's a matter of love."

Blackened Is The New Black

Burnt Fennel and Cherry Tomatoes a la Plancha
Mallmann didn't pay much attention to fennel until he started cooking it over wood fire. He discovered that when the anise-flavored vegetable is lightly burnt, it opens up its "simple intense beauty" as well as "an almost mystical ability to reveal the subtle sweetness in other ingredients," as he writes in his book. In this case the fennel bulbs are lightly toasted on a hot plancha, along with juicy griddled cherry tomatoes, served with fresh avocado in a bright lemon dressing.

Pisco Sour With Burnt Lime
To make his version of the classic Peruvian drink, Mallmann holds a whole lime over the flames with a long-handled fork until it's scorched, which cuts back on the bitterness of the rind. It also imparts an alluring smoky flavor to the chef's take on the drink, which calls for blending the whole singed lime with pisco, simple syrup, an egg white, and ice.

Burnt Cherries and Ice Cream
In his book, Mallmann describes this dramatic dish as "part performance art and part dessert." Indeed it is: Sugar-coated cherries are spread on top of a simple bowl of ice cream, then a heated cast-iron skillet is set directly on top of them for 10 seconds—a clever way to cook the small fruit that doesn't involve keeping it from falling through grates. The ripe cherries caramelize into the softened ice cream, and a cloud of steam wafts up. "Use pot holders!" Mallmann says.

An order of dumplings at Locust

THE POWER OF THE DUMPLING

Nashville is buzzing over a restaurant that serves only five dishes, three days a week, based on one concept: Simplicity. *By Kat Odell*

For almost a decade, Nashville has acted like the Las Vegas of the South for out-of-state restaurateurs who set up shop to appeal to the tiara-clad bachelorette crowd. The venues are big, which also works for the metro area's skyrocketing population—up 21% in the past 10 years.

More recently, though, artistically minded, highly credentialed chefs have chosen to plant their flag in Music City, rather than a major dining hub like New York. The proximity to good farms and a vibrant creative industry has encouraged endeavors such as chef Sean Brock's first solo restaurant, the Appalachian tasting-menu spot Audrey, as well as the acclaimed, vegetable-forward Lou, from Los Angeles expat Mailea Weger.

But the most thrilling restaurant in the city right now is Locust, a spare space nestled among clothing boutiques in the 12 South neighborhood. From Friday through Sunday

PHOTOGRAPH BY ANDREW THOMAS LEE

only, a maximum of 130 diners a day get to experience chef-owner Trevor Moran's rotating menu of a mere five items.

One option, which is always available, stands above the rest: steamed dumplings, bound by wrappers so translucent that even a farsighted diner could admire the mix of vibrant green onion and pork within. Each order, priced at $20, comes with 12 dumplings. Sometimes, says the chef, "people may order 10 or more baskets, no joke."

"It is hard to just let a dish be simple, elegant, and delicious," says Kevin Fink, chef-owner of Austin's lauded Emmer & Rye. But, he adds, "those are the most craveable dishes. Locust is jam-packed full of those."

Moran's casual approach is a surprise, considering his highly decorated background in fine dining: He spent years cooking detailed tasting menus at the pioneering Danish restaurant Noma, ranked No. 1 by the World's 50 Best Restaurants, as well as at Nashville's renowned Catbird Seat. (See sidebar.)

Ingredient sourcing is key to the Locust formula, starting with sustainably raised pigs from nearby Bear Creek Farm. The free-range Berkshire- and Duroc-breed hogs eat apples and sake lees—the fermented, pastelike byproduct of sake production—which ultimately yields meat with "lots of good marbling," Moran says. The extra fat makes his dumplings incredibly unctuous. He uses one 300-pound hog every month, which affords him enough meat for about 800 dumplings a day. And he uses cuts from every part of the pig: One day the blend might include the neck and ham, on another the jowl (cheek) and belly.

Moran puts equal effort into the delicate dumpling skins, which are based on transformative gyoza he tasted in Japan. They're made with a proprietary mix of flours, hot water, oil, and salt, then folded over into half-moons right before the dumplings are steamed. Without those steps, the chef says, the superfatty filling "just busts its way through."

The dumplings are served with a neon orange-red sauce made with vinegar-steeped seaweed and a chile oil blend of slowly fried spices and peppers—a tangy mix of Sichuan flavors and acid that balances the dumplings' richness.

Word about Locust has spread since its October 2020 opening. "I text Trevor for a table," says former Catbird Seat chef Ryan Poli, "and he's like, 'Dude, there's nothing I can do, we have nothing available.'" Locust opens reservations two weeks in advance, and "we fill up straightaway, within an hour," Moran says.

Beyond the dumplings, patrons can sample weekly specials such as fried shrimp mousse brushed with shrimp head oil and glazed in a sour-spicy chile sauce. There's also Moran's build-your-own beef tartare hand roll. It comes touched with horseradish oil, as well as steamed California-grown white rice, seasoned crispy rice, green onion, nori sheets, freeze-dried capers, and mayo made from smoked pickled eggs. Patrons can kick it up with ossetra caviar.

The second-most popular dish at Locust is a Japanese shaved ice dessert known as kakigori. Using a Swan ice shaver and blocks of crystal-clear cubes, Moran shapes square mounds of ice, layer upon layer, with house-made syrups and sauces. Options include a take on tea and biscuits and more unexpected flavor combinations such as marzipan mousse blanketing layers of passion fruit curd, crispy pastry pieces, whipped almond cream, and bergamot zest, all drizzled in salted caramel.

> **"I TEXT TREVOR FOR A TABLE, AND HE'S LIKE, 'DUDE, THERE'S NOTHING I CAN DO, WE HAVE NOTHING AVAILABLE'"**

The restaurant's simplicity extends to the drinks menu, which features only one beer—Orion Okinawan lager—plus a can of sake, an in-house bottled Toki whisky highball, and five crisp wine options. Staffing, likewise, is minimal: Six employees maintain the three-days-per-week schedule, which is "unusual for sure," Moran says.

As a result, there's no spending on extraneous ingredients, allowing him to invest in the quality of the ones he needs. The dividend is a dish that's being talked about within his busy city of Nashville—and far outside it, too.

The Other Reservations To Book in Music City

AUDREY
Sean Brock's ambitious Appalachian-roots tasting-menu restaurant is named for his maternal grandmother. It offers specialties such as thinly sliced country ham glazed with sorghum amazake (a fermented drink usually made with rice) and dotted with the popped grains.

THE CATBIRD SEAT
Eighteen diners can fit around the cozy, U-shaped counter here. For the past two years, chef Brian Baxter has plated inspired seasonal dishes with Japanese and European accents, such as plump uni capped with fermented rhubarb and rose cream.

LOU
Mailea Weger flipped a 1930s craftsman bungalow into a warm and inviting all-day cafe where small vegetable plates shine alongside natural wines. Dishes here—like fermented carrots with cumin vinaigrette and crème fraîche—are bright and seasonal.

FOLK
Chef Philip Krajeck, a local legend for his Italian spot Rolf and Daughters, serves more casual food at this three-year-old hot spot in East Nashville. The specialty is naturally leavened pizza with toppings such as spring leeks and ramps in mustard vinaigrette, topped with raclette cheese and mortadella.

PENINSULA
In an unfussy, tavernlike space, chef Jake Howell is gaining attention for his unconventional flavor combinations. Don't miss out on the grilled maitake mushrooms with white chocolate sauce.

THIS ROUND'S ON BITCOIN

A Singaporean watering hole develops a devoted following among crypto enthusiasts

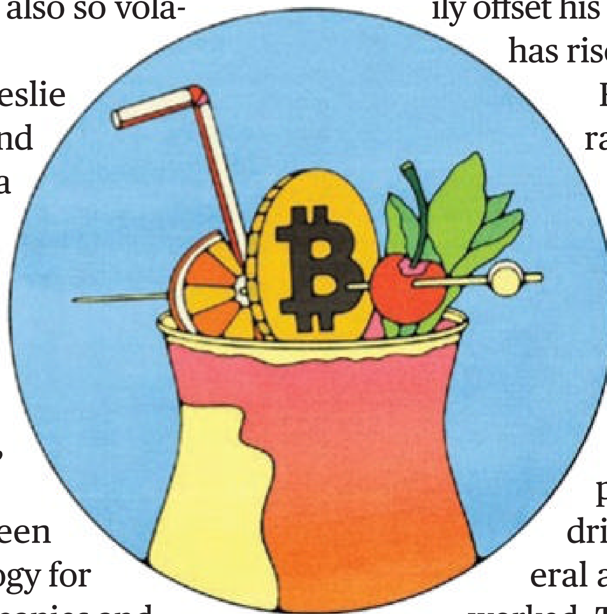
By Joanna Ossinger

Maison Ikkoku is known for a lot of things. The 80-seat restaurant and bar in the historic Kampong Glam neighborhood has a picturesque patio with views of the nearby Sultan Mosque, Singapore's largest. The menu lists a Japan Kumamoto Emperor A5 wagyu steak with potatoes, edamame, and miso, starting at S$208 ($150). It also includes a roster of cocktails, such as the S$28 La Vie en Rose with aged sake, French rosé, and edible gold glitter.

And then there's the crypto.

A sign on the door advertises that payment is accepted in Bitcoin, Ether, Tether, and Binance Coin. You won't find a menu with prices listed in cryptocurrencies—Leong says that's because of regulations. Crypto prices are also so volatile, the conversion could change daily.

But Chief Executive Officer Ethan Leslie Leong, a 30-plus-year veteran of the food and beverage business, says crypto has been a serious boost. He became interested in it a few years ago and saw an opportunity to engage the burgeoning community. Now that Covid-19 restrictions are lifting, get-togethers have attracted employees of centralized exchanges, individual traders, and hedge fund managers, Leong says.



The Singaporean government has been facilitating the use of blockchain technology for years. And numerous crypto-related companies and leaders in the industry—Binance CEO Changpeng "CZ" Zhao, Ethereum co-founder Vitalik Buterin, and nonfungible token (NFT) investor Vignesh Sundaresan (aka MetaKovan, owner of the $69.3 million NFT by the artist known as Beeple)—are among those who've made the city-state their home base in the past couple of years. Crypto.com is also based in the principality; it bought the naming rights to the Staples Center in Los Angeles in the largest such deal ever, at $700 million over 20 years.

Not many restaurants take crypto payments at the moment. Adoption has been so slow in the U.S., places such as the pan-Asian Cambo Flare in Big Lake, Minn., offer diners as much as 50% off if they use cryptocurrency. But Maison Ikkoku isn't alone in Singapore.

At Joo Bar, a 10-minute walk away, owner Jamie Lim has been taking payments in tokens for four years. He claims to have the only such establishment in Singapore processing its own Bitcoin transactions; he even runs his own node. Although he'll accept many cryptocurrencies as payment, including Ether and Dogecoin, he converts them into Bitcoin immediately. "I'm a pure Bitcoin guy," he says, but he adds that he isn't a Bitcoin "maxi"—a maximalist who denigrates other forms of crypto. He just wants to encourage adoption overall.

Lim also offers a 15% discount at both Joo Bar and his restaurant 8 Korean BBQ, where those who pay in Bitcoin can avail themselves of offerings such as Joo Summer Punch, which runs S$50 a jug, or the S$18 Nymph of the Nile soju cocktail with organic white peony tea, Hendrick's gin, basil, and citrus. Food options include kimchi stew with pork belly and Korean glass noodles for S$24. Joo Bar's website lists other Bitcoin merchants in Singapore that, it says, "we know personally." Included are a sweets shop called Glaze, a luxury car dealer, and a mobile phone store.

Isaac Tang, a Joo Bar regular, is already predisposed to pay in Bitcoin because the decentralized nature of crypto allows merchants to bypass the banks. "Transacting in Bitcoin has improved significantly since its inception," he says. "These days it's a simple matter of scanning a QR code." The markdowns are just icing on the cake: "I have been paying in Bitcoin since 2018, and so the Bitcoins Jamie has earned from me easily offset his discount." (The value of the cryptocurrency has risen almost 900% since 2018.)

For now, Tang remains the exception rather than the rule. Lim says he's attracted many crypto fans to his bar, but very few are willing to part with their digital assets. "The takeup rate is extremely low," he says. This sentiment was confirmed on my own recent trip to Maison Ikkoku, where I was reminded that crypto is still an emerging payment system. A friend paid our tab in Ether—about 0.1 ETH for drinks and snacks—but had to go through several attempts on her Crypto.com app before it worked. That glitch is pretty typical, she says, for the rare occasions when she uses crypto. She prefers to HODL, often pronounced "hoe-dull"—slang for holding on to one's tokens amid swings in value.

Leong agrees that not a lot of people pay in crypto yet anyway—on average, a couple of customers a week. For now, accepting cryptocurrency is primarily a signal to attract like-minded (and presumably deep-pocketed) regulars. "We create a place for people to meet," he says. "It's not just in the metaverse. It's real life." Leong adds that he's even connected people looking for jobs or business partnerships. But, he quips, "I didn't take any agent fees." Ⓑ

ILLUSTRATION BY KATE DEHLER

SWEET HEAT

Kampot peppercorns give pastas another layer of flavor

By Kate Krader Photograph by Fujio Emura

Peppercorns are the unheralded heroes of the pantry. Home cooks happy to obsess over the provenance of their salt or the scorching heat of their chile flakes usually pay scant attention to the pepper they grind from dawn to dusk. But there's a wide world of peppercorns, and their range of flavors can have a powerful impact on scrambled eggs, spaghetti, and T-bone steaks. These unassuming dried Kampot peppercorns, available from the marvelous spice hideout SOS Chefs ($15 for 2 oz), don't look like anything special, but they pack a bright spiciness that delivers an intensely fragrant punch to everything they touch.

THE COMPETITION

• Grown on a coffee farm in central Vietnam, Burlap & Barrel's Robusta black pepper ($9 for 1.8 oz) evokes java with a wallop of ginger.

• White Penja peppercorns ($16 for 2.5 oz) are a specialty at the New York spice company La Boîte. Sourced from Cameroon, on Africa's west coast, they have a light fermented taste and are especially good on seafood and vegetables.

• Diaspora Co. founder Sana Javeri Kadri extols the virtues of her sun-dried Aranya black pepper ($12 for 2.3 oz) as "holding two generations of expertise, and a few thousand years of growing," in the Kerala hills on India's southwestern coast.

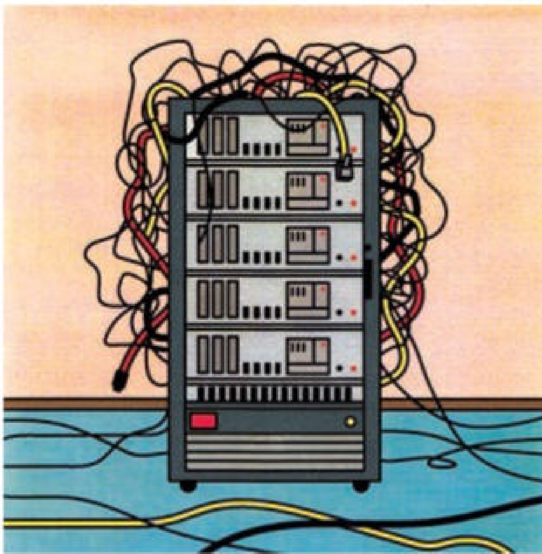
THE CASE

The charcoal coloring of a Kampot peppercorn resembles any other black pepper out there, but taste the Cambodian spice and you'll know the difference. The fruitiness is profound: It makes you rethink pepper as a one-dimensional seasoning. They've become a favorite of New York chefs who want to amp up their pastas. At Altro Paradiso, Ignacio Mattos uses them on his rich cacio e pepe. Hillary Sterling, executive chef at the Italian restaurant Ci Siamo, relies on them for her bestselling rigatoni alla gricia with guanciale. Kampot peppercorns, she says, "add citrus and a little bit of pine and an entire other level of fruity flavors, the opposite of muted and mass-produced peppercorns." *$15 for 2 oz; sos-chefs.com*

Beijing's Tangled Relations With Big Tech

By Shuli Ren

The regulatory crackdown on Big Tech that started in China in late 2020 sent stocks reeling. Over the past year, tech companies have lost as much as $2 trillion in market value, the equivalent of 11% of China's gross domestic product, estimates Goldman Sachs Group Inc. Lately, Beijing seems to be relenting a bit. At an April Politburo meeting, the government vowed to support the healthy growth of platform companies. Is it time for investors to give Chinese tech another look?



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As the country races to contain the fast-spreading omicron variant with citywide lockdowns, the government is starting to find Big Tech useful. Companies such as Alibaba, JD.com, and Meituan have built efficient distribution systems, sourcing fresh produce from farmers and recruiting armies of migrant workers to make speedy deliveries. When millions of Chinese can no longer go out shopping, Big Tech comes in handy. According to the Shanghai government, internet companies have dispatched about 20,000 riders to fill 2.5 million grocery orders a day, on average, for its 25 million residents, who've been in a full lockdown since April 1.

Nonetheless, the dynamic between Big Tech and the government remains uneasy. As far as the state is concerned, with generous tax treatments, tech companies had it easy for years. While China's standard corporate income tax rate is 25%, internet companies have been paying a lot less. Those that qualified as high-tech enterprises enjoyed a 15% rate, and an even more generous 10% was awarded to companies deemed to produce essential software. Others had to pay a lot more. According to Bernstein Research, in 2019, state-owned high-end alcohol makers such as Kweichow Moutai Co. and Wuliangye Yibin Co. contributed 61% and 45% of their gross revenue, respectively, to the state. Alibaba Group Holding Ltd. and Tencent Holdings Ltd. each paid only 4%. Smaller e-commerce companies such as Pinduoduo Inc. and JD.com Inc., which were at the bottom of Bernstein's list, made almost no contribution.

So the government has no problem asking tech companies to make sacrifices now. Case in point, Big Tech's grocery delivery services during city lockdowns are likely provided at a steep loss. Hiring riders is expensive. Often, delivery workers can't go home at the end of their day, because the government wants to minimize traffic in and out of residential areas. As a result, e-commerce businesses have to provide housing, or they risk unflattering media reports of homeless riders sleeping under bridges at night.

Along with demanding that tech companies pay more taxes, the government also from time to time asks them to provide essential services that profit-oriented businesses would normally shy away from. What kind of valuation multiple do Chinese tech companies deserve? Are they still growth stocks, or are they becoming boring utilities that provide basic necessities for households? Bottom-fish China tech at your own risk. Ⓑ —*Ren is a columnist for Bloomberg Opinion*

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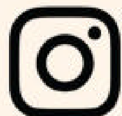
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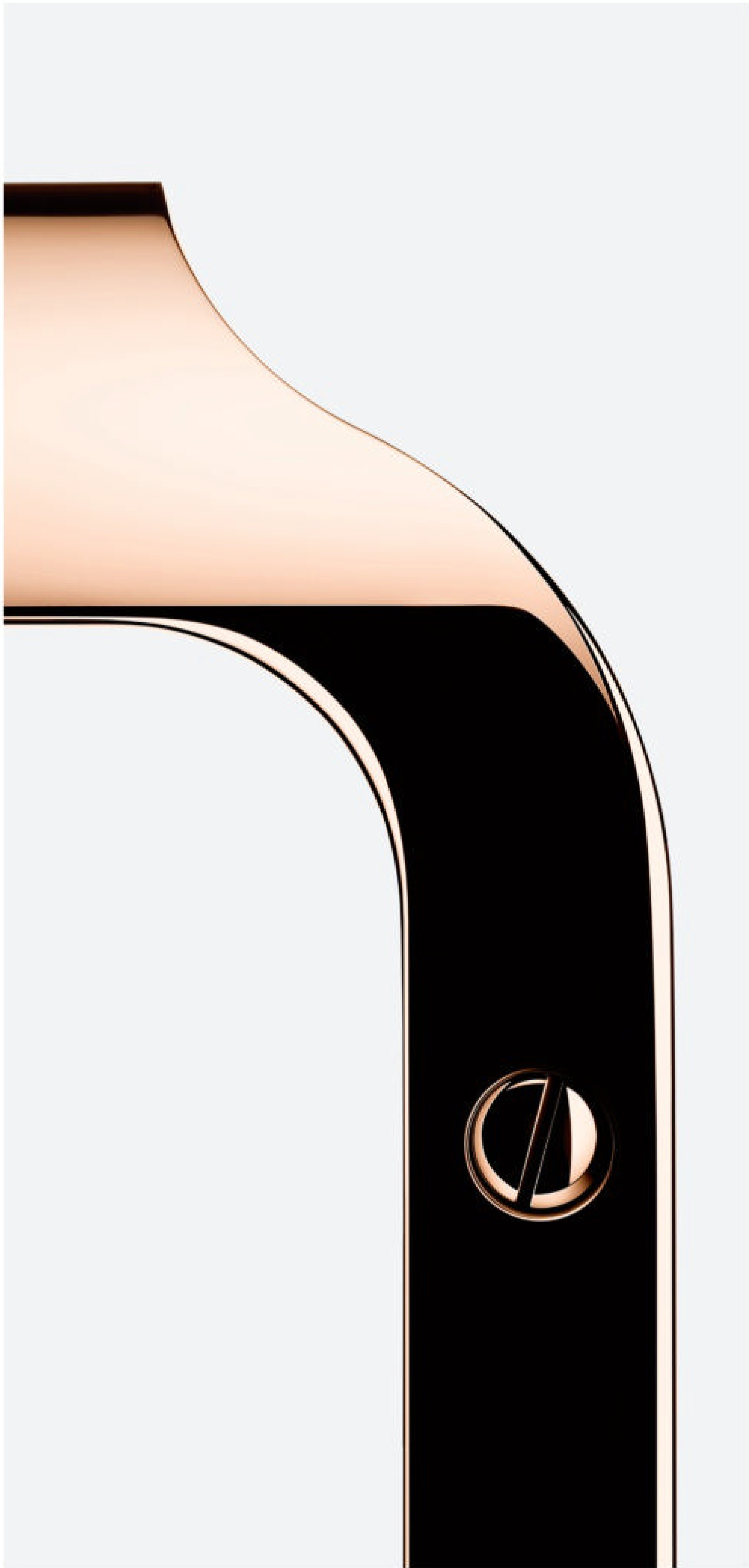

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