Bloomberg Businessweek

July 19, 2021

What else can mRNA fight?

Moderna's Next Move 42

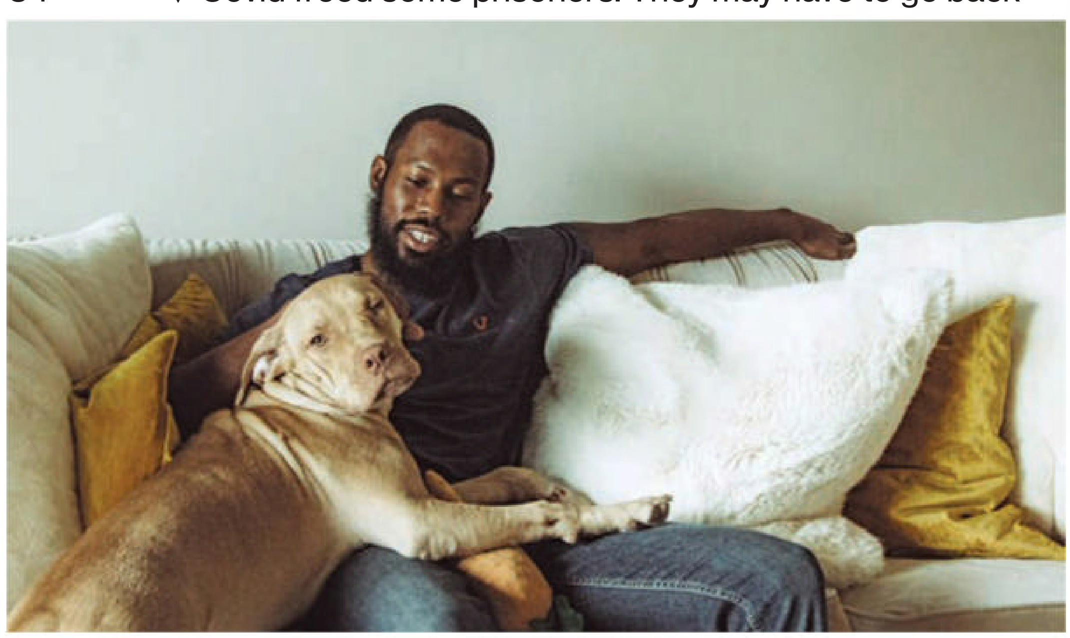
Bloomberg Businessweek

July 19, 2021

◀ Savorease crackers melt in the mouth, a godsend for people who have trouble chewing

PHOTOGRAPH BY HOLLY LYNTON FOR BLOOMBERG BUSINESSWEEK

FEATURES



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■ COVER TRAIL

How the cover gets made

❶

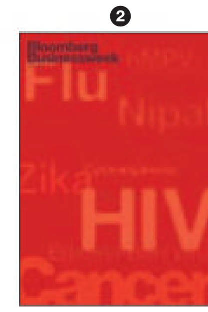
"This week we're talking about what's next for Moderna."

"Oh, fascinating! Are they getting into knitting or kayaking, something relaxing after working so hard to get that vaccine done?"

"Not exactly. More like trying to treat cancer next."

"Oh, I see how it is. Well, I'll start there."

❷



"Nice! Looks like *somebody* just finished the MasterClass with David Carson on graphic design."

"I may not be Moderna, but I care about personal growth, too."

"Great! Because I've been looking for a burpee accountability partner! You in?"

"😔"

"Never mind."

POLITICS: PHOTOGRAPH BY SCHAUN CHAMPION FOR BLOOMBERG BUSINESSWEEK

Google

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● Global coronavirus cases surupassed 188 million, and more than

4m

have died. British Prime Minister Boris Johnson announced plans to lift most remaining Covid-19 restrictions starting on July 19, a move some critics characterized as reckless.

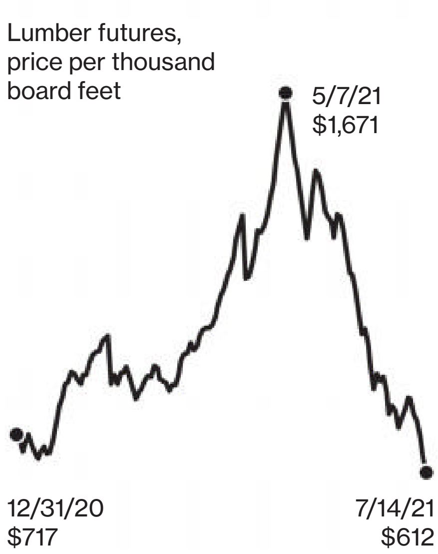
● European Union officials agreed to postpone a levy on goods and services sold online by EU companies.

The tax would apply to companies with annual sales of €50 million ($59 million) or more. G-20 countries also formally endorsed a proposal for a global minimum corporate tax rate of 15%, a plan U.S. Treasury Secretary Janet Yellen also backs.

● Cubans took to the streets by the thousands on July 11 in a spontaneous protest against economic policies and food and medicine shortages. Activists called it the biggest demonstration since the Maleconazo uprising of 1994.

● The U.S. consumer price index jumped 0.9% in June and 5.4% from the same month last year, the biggest year-over-year gain since 2008. A Federal Reserve Bank of New York survey showed consumer inflation expectations for the coming year at an all-time high of 4.8%.

● After more than doubling, lumber prices have erased all of 2021's dramatic gains. As of July 14, prices were down 14.6% for the year.



● Smart Fit, a Brazilian gym chain with outlets in 13 Latin American countries, is planning an IPO set to raise at least 2.3 billion reais ($452 million), people familiar with the matter said. Among its backers is Singapore's sovereign wealth fund and Canada's largest pension fund.

● Philip Morris International said it would acquire Vectura Group, a U.K.-based company specializing in inhaled drug delivery, for

$1.2b

The purchase is part of PMI's "Beyond Nicotine" strategy to move into respiratory drugs, self-care, and wellness.

●"Have you no shame?"

President Joe Biden savaged Republican state initiatives on voting restrictions on July 13, calling voter suppression efforts "the most significant test of our democracy since the Civil War."

● Hong Kong police arrested five people on July 12 on charges of "conspiracy to plot terrorist activities."

Police said that the suspects, who support independence, were planning bomb attacks and that more arrests may be made as the investigation continues. They also arrested nine people on similar charges the previous week.

● Sacha Baron Cohen is suing Solar Therapeutics, a cannabis dispensary in Massachusetts, for using his Borat image on a billboard. Noting that he "has never used cannabis in my life," Cohen is seeking at least $9 million in damages.

CUBA: YAMIL LAGE/GETTY IMAGES. DUMBBELL: GETTY IMAGES. BORAT: SCOTT GRIES/GETTY IMAGES. DATA: COMPILED BY BLOOMBERG

Google

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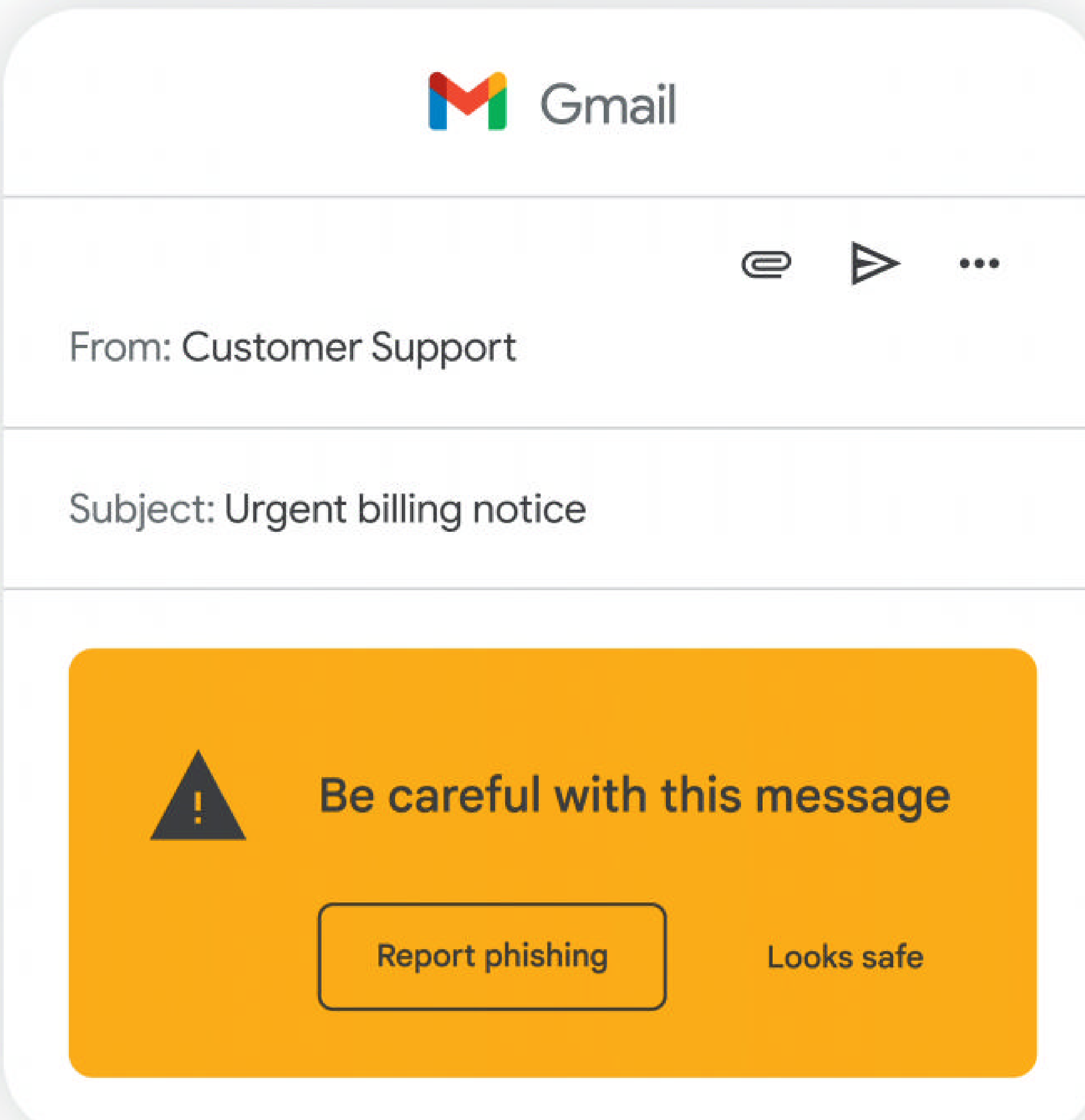

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Fresh Air in the Office Isn't an Amenity. It's a Necessity

Covid-19 has taught the world quite a few things. Not least the value of fresh air. Indoors—in restaurants, church halls, nursing homes, meatpacking plants—the contagion spread easily, as virus particles exhaled by the infected hung in the air to be inhaled by new victims. Outside, flows of air dispersed those same aerosols enough to bring the spread of the disease almost to a stop. Schools, offices, and other indoor spaces need better ventilation to minimize the harm from new coronaviruses, cold and flu viruses, and every other sort of airborne pathogen.

This calls for rethinking how indoor air is controlled. The need for guidance on safer ventilation in schools is urgent and under discussion. State and local building codes should also be revised. Economizing on buildings' use of energy is vital in the fight against climate change—but the need for effective ventilation, which often requires more energy, can no longer be ignored.

Most big systems for heating, ventilation, and air conditioning circulate air quite slowly, even when operating at their best. Fresh or filtered air is fanned in from the ceiling, mixes with air in the room, and eventually moves out through vents also in the ceiling. Typically, most of the air in a room changes about twice an hour, unevenly. That's fine for maintaining comfortable temperature and humidity without wasting energy, but not for clearing exhaled virus particles from a room full of people. Such particles are heavier than gases and can remain suspended for hours.

What's needed is "displacement ventilation," which sends cool air through vents low in the room and draws warmer air out through the ceiling. Some hospitals and other buildings (especially in Scandinavia) have these systems. They should be preferred in new construction—but what about existing offices, schools, and other buildings?

During the pandemic, the American Society of Heating, Refrigerating and Air-Conditioning Engineers recommended that buildings filter air more thoroughly (with portable high-efficiency systems, if necessary) and keep ventilation systems running for hours before and after people are present. This seems sensible, though more research is needed on using filtration and ultraviolet irradiation to minimize the risk of infection.

How well plug-in ionizers and other air "purifiers" clear virus particles is disputed. They certainly can't be relied on to do the job themselves. Ionizers also release ozone, which can cause trouble for people with asthma. Too many schools have spent Covid relief funds on such devices while neglecting other measures (such as installing better filtration or opening windows). Most classrooms are still poorly ventilated. Stagnant air, thick with exhaled carbon dioxide, helps spread disease and hinders student performance.

It takes power to move and filter air adequately, but Covid has shown that regulators need to face this trade-off. Along with changing building codes, states should require building operators to tell occupants how well their air is being ventilated, so they can judge what's safe and adjust their behavior when infectious diseases are spreading. The threat of contagion rises when people talk, laugh, sing, sneeze, or cough—rendering it virtually impossible to make any room perfectly safe. Masks and social distancing help. Again, though, there's a lot to learn about using placement and room-capacity limits to mitigate the risk.

Two years ago, not many policymakers had "quality of building ventilation" on their list of priorities. Score it as one more thing that, thanks to the pandemic, needs to change. B

For more commentary, go to bloomberg.com/opinion

AGENDA

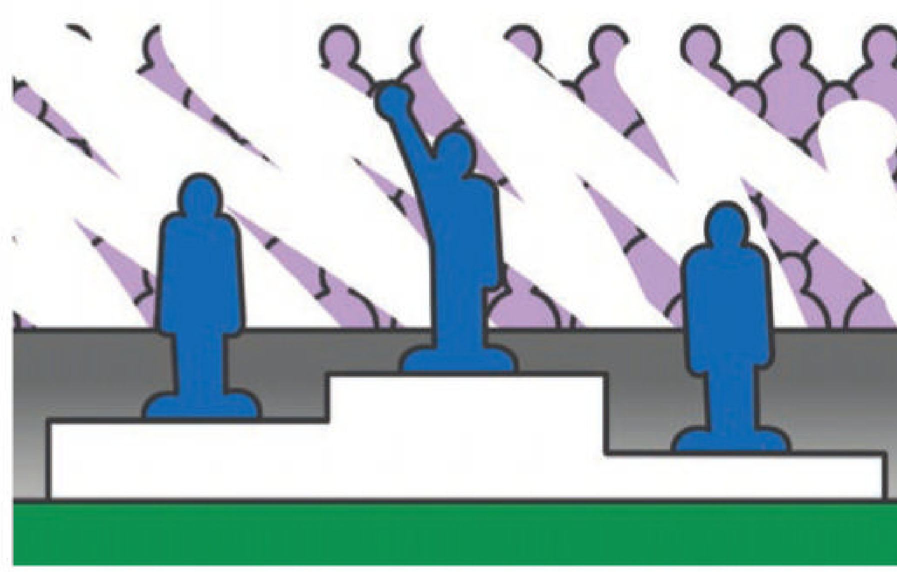


ILLUSTRATION BY FRAN CABALLERO

▶ Empty Stands

The Tokyo Olympics will go ahead without fans because of a rebound in Covid-19 cases. Prime Minister Yoshihide Suga accepted the decision after polls showed a nervous public backing the move. Opening ceremonies are on July 23.

▶ The G-20 Environment Ministers' Meeting takes place in Naples, Italy, on July 22. The next day is the Ministerial Meeting on Climate and Energy. Themes include water use and biodiversity.

▶ The Salzburg Summit, July 22-24, will gather CEOs and government officials to discuss trends in European business, politics, and sciences, notably the digitalization of the future.

▶ IBM reports second-quarter earnings on July 19. The company may see higher sales growth in most segments, especially global business services, analysts say.

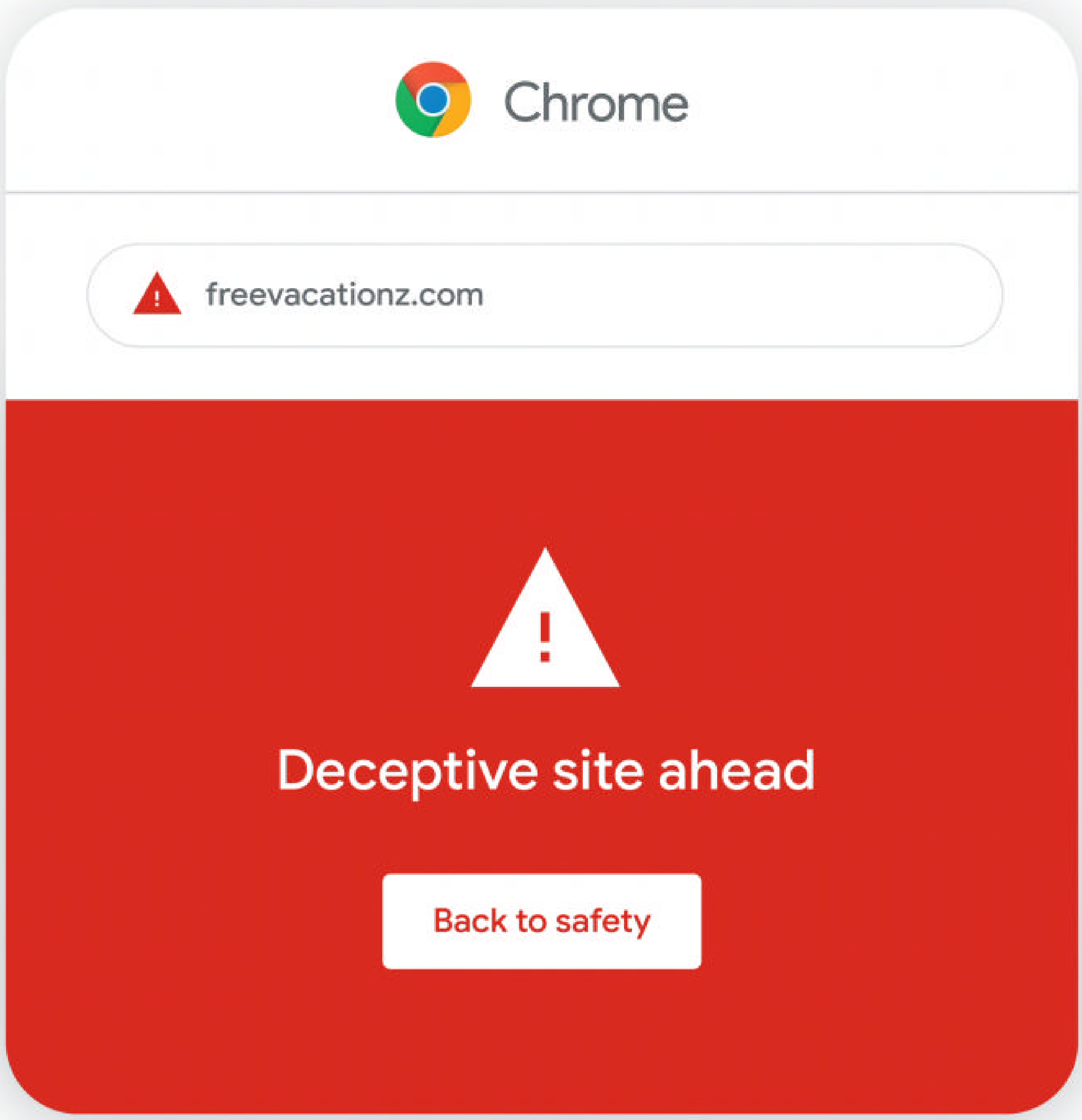
▶ American Express delivers second-quarter earnings on July 23. Analysts expect them to be strong, with year-on-year revenue growth for the first time in five quarters.

▶ The National Association of Realtors releases its June existing-home sales report on July 22. An uptick is predicted, indicating that more buyers were able to enter the market.

▶ Lawyers for Civil Rights will host the BizGrow Conference, an online forum offering legal support for minority-, immigrant-, and women-owned businesses, on July 22.

Google

Every day Google protects 4 billion devices from risky sites,



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Fear of a Digital Dollar

● The idea of a government-backed virtual currency has support in policy circles, but banks see a threat to their dominion over consumer finance

● By Christopher Condon

Imagine logging on to your own account with the U.S. Federal Reserve. With your laptop or phone, you could zap cash anywhere instantly. There'd be no middlemen, no fees, no waiting for deposits or payments to clear.

That vision sums up the appeal of the digital dollar, the dream of futurists and the bane of bankers. It's not the Bitcoin bros and other cryptocurrency fans pushing the disruptive idea but America's financial and political elite.

ILLUSTRATION BY NICHOLE SHINN

Fed Chair Jerome Powell promises fresh research and a set of policy questions for Congress to ponder this summer. J. Christopher Giancarlo, a former chairman of the Commodity Futures Trading Commission, is rallying support through the nonprofit Digital Dollar Project, a partnership with consulting giant Accenture Plc. To perpetuate American values such as free enterprise and the rule of law, "we should modernize the dollar," he recently told a U.S. Senate banking subcommittee.

For now the dollar remains the premier global reserve currency and preferred legal tender for international trade and financial transactions. But a new flavor of cryptocurrency could pose a threat to that dominance, which is part of the reason the Federal Reserve Bank of Boston has been working with the Massachusetts Institute of Technology on developing prototypes for a digital-dollar platform. Other governments, notably China's, are ahead in digitizing their currencies. In these nations, regulators worry that the possibilities for fraud are multiplying as more individuals embrace cryptocurrency.

Steven Mnuchin, former President Donald Trump's treasury secretary, said he saw no immediate need for a digital dollar. His successor, Janet Yellen, has expressed interest in studying it. Support for a virtual greenback cuts across party lines in Congress, which will have a say on whether it becomes reality. At a hearing in June, Senators Elizabeth Warren, a Massachusetts Democrat, and John Kennedy, a Louisiana Republican, signaled openness to the idea. Warren and other Democrats stressed the potential of the digital dollar to offer free services to low-income families who now pay high banking fees or are shut out of the system altogether.

Kennedy and fellow Republicans see a financial equivalent of the space race that pitted the U.S. against the Soviet Union—a battle for prestige, power, and first-mover advantage. This time the adversary is China, which announced this month that more than 10 million citizens are now eligible to participate in ongoing trials.

The strongest opposition to a virtual dollar will come from U.S. banks. They rely on $17 trillion in deposits to fund much of their core business, profiting from the difference between what they pay in interest to account holders and what they charge for loans. Banks also earn billions of dollars annually from overdraft, ATM, and account maintenance fees. By creating a digital currency, the Federal Reserve would in effect be competing with banks for customers.

In a recent blog post, Greg Baer, president of the Bank Policy Institute, which represents the industry, warned that homebuyers, businesses, and other customers would find it harder and more expensive to borrow money if the Fed were to infringe on the private sector's historical central role in finance. "The Federal Reserve would gain extraordinary power," wrote Baer, a former assistant treasury secretary in the Clinton administration.

Some economists warn that a digital dollar could destabilize the banking system. The federal government offers bank depositors $250,0000 in insurance, a program that's successfully prevented bank runs since the Great Depression. But in a 2008-style financial panic, depositors might with a single click pull all their savings out of banks and convert them into direct obligations of the U.S. government. "In a crisis, this may actually make matters worse," says Eswar Prasad, a professor at Cornell University and the author of a book on digital currencies that will be published in September.

Whether a virtual dollar is even necessary remains up for debate. For large companies, cross-border interbank payments are already fast, limiting the appeal of digital currencies. Early adopters of Bitcoin may have won an investment windfall as its value soared, but its volatility makes it a poor substitute for a reliable government-backed currency such as the dollar.

Yet there's a new kind of crypto, called stablecoin, that could pose a threat to the dollar's dominance. Similar to the other digital currencies, it's essentially a string of code tracked and authenticated via an online ledger. But it has a crucial difference from Bitcoin and its ilk: Its value is pegged to a sovereign currency like the dollar, so it offers stability as well as privacy.

In June 2019, Facebook Inc. announced it was developing a stablecoin called Libra (since renamed Diem). The social media giant's 2.85 billion active users worldwide represent a huge test market. "That was a game changer," Prasad says. "That served as a catalyst for a lot of central banks."

Regulators also have concerns about consumer protection. Stablecoin is only as stable as the network of private participants who manage it on the web. Should something go wrong, holders could find themselves empty-handed. That prospect places pressure on governments to come up with their own alternatives.

Although the Fed has been studying the idea of a digital dollar since at least 2017, crucial details, including what role private institutions will play, remain unresolved. In the Bahamas, the only country with a central bank digital currency, authorized financial institutions are allowed to offer e-wallets for handling sand dollars, the virtual counterpart to the Bahamian dollar.

If depositors flocked to the virtual dollar, banks would need to find another way to fund their loans. Advocates of a digital dollar float the possibility of the Fed lending to banks so they could write loans. To help banks preserve deposits, the government could also set a ceiling on how much digital currency citizens can hold. In the Bahamas the amount is capped at $8,000.

Lev Menand, an Obama administration treasury adviser, cautions against such compromises, saying the priority should be offering unfettered access to a central bank digital currency, or CBDC. Menand, who now lectures at Columbia Law School, says that because this idea would likely require the passage of legislation, Congress faces a big decision: to create "a robust CBDC or a skim milk sort of product that has been watered down as a favor to big banks." Ⓑ

Get 'Em While They're Hot

After their smokin' pandemic-era growth, grill makers Weber and Traeger are going public

Buoyed by a rush of locked-down homeowners investing in high-end barbecue gear, grill makers are taking advantage of soaring sales to go public.

Within a week of the traditional U.S. barbecuing holiday, July Fourth, two companies filed paperwork for initial public offerings. Traeger Inc. and Weber Inc., the biggest American manufacturers of barbecue grills, will tap public investors for the first time this summer after decades of being closely held. And BBQGuys, an online retailer of grills, outdoor

ILLUSTRATION BY BRIANNA MORENO. DATA: JANUARY 2021 INTERNATIONAL CASUAL FURNISHINGS ASSOCIATION SURVEY

Edited by James E. Ellis

kitchens, and other accessories, whose investors include football greats Eli and Peyton Manning, is in talks to go public through a merger with Velocity Acquisition Corp., according to people with knowledge of the matter. The combined company is set to be valued at about $900 million, including debt, they say.

So-called stay-at-home trades have proven popular for investors over the past year, as consumers spent more money on their immediate surroundings after being kept away from restaurants, bars, and entertainment venues by state- and countrywide pandemic lockdowns.

Sales at both Traeger and Weber have surged, giving the companies some of their best quarterly results ever. Revenue was up 50% at Traeger in 2020, and sales climbed 60% at Weber in the six months through March. One reason: Throwing a few steaks on the barbie doesn't come cheap these days. Barbecue enthusiasts can spend as much as $4,000 on a Weber gas grill before adding any accessories, and Traeger's outdoor kitchen setups can run to the tens of thousands of dollars.

Add together equity markets that just won't stop setting record highs, a booming IPO market, and no sign of consumer spending slowing down, and you can see why these long-private enterprises are changing their approach. The pandemic, by keeping people at home, "not only created an economic savings," says Clayton Hale, Citigroup Inc.'s global head of consumer and retail investment banking, who says he grills on his lunch break about a quarter of the time when he works at home. "But it also created an opportunity for business models to take advantage of a natural shift in consumer sentiment, which is, things are now not just purchased to own, things are being purchased because one has a passion."

What makes the IPOs even easier to sell is a hefty dose of brand loyalty: Consumer names tend to resonate with investors who have personally used the product. And, according to the Hearth, Patio & Barbecue Association, 64% of U.S. adults own an outdoor grill or smoker. In fact, every source contacted during the reporting for this story owns equipment made by at least one of the two soon-to-IPO brands—and often had strong opinions about which is better.

One banker says pricey Traeger's "low and slow" wood pellet style of cooking is of no use when his kids are hungry, and another loves being able to control his Traeger from his phone. One adviser is optimistic there's room for both companies. "There's always an American guy who wants to grill," he says.

Across the industry, manufacturers of luxury home goods have been benefiting from the extra money that middle-class American families funneled into improving their homesteads when vacations were out of reach.

Sales of big-ticket items (think stand mixers, grills, and swimming pools) have exploded. Sales of grills and smokers in the U.S. shot up 41%, to $3.2 billion for the 12 months ending in March, according to data from NPD Group.

Over the past year three companies that manufacture or maintain home swimming pools—Leslies, Hayward Industries, and Latham Group—have gone public, together raising almost $2 billion. Each of the stocks has risen more than 40% since their IPOs.

As with most Covid-era growth stories, the question investors want answered is whether sales can continue to rise as rapidly now that consumers in many markets are returning to restaurants and taking vacations. Swimming pools need regular expert cleaning and maintenance; barbecues, not so much.

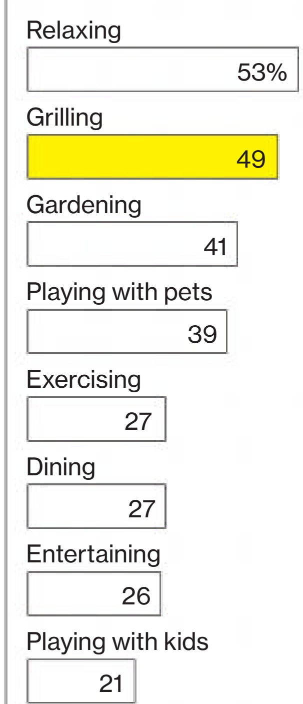
Some industries are ripe to ride the growth runway built by the pandemic, but others are beholden to consumers resetting their behaviors. In May, DoorDash Inc. executives warned shareholders of a slowdown as users ditched delivery for summertime activities outdoors now that businesses have reopened. "We expect the combination of summer seasonality, market reopenings, and the waning impact of stimulus to result in some impact to our business in the near term," the company wrote in a letter to shareholders.

Likewise, meal-kit makers Blue Apron Holdings Inc. and HelloFresh SE may be poised to outperform grocery stores, but they're still likely to see sharp deceleration from their Covid-lockdown pace. According to Coresight Research, the entire market's growth rate could plummet to 18% in 2021, from the almost 70% seen last year during peak quarantines.

Grill makers aren't necessarily using their windfalls for future expansion. Traeger is putting the IPO proceeds toward repaying a loan, plus allowing some existing shareholders to cash out. Weber says it will use all its net proceeds to buy back shares from its holding company, existing shareholders, and management.

Joe Derochowski, a home improvement industry adviser at NPD Group, says the trend is sustainable for grill makers because there's no better way to show off your new landscaping, hot tub, or house renovation, after all, than inviting friends over to grill in the yard or garden. A shift toward ▶

▼ Americans who say they'll be doing more of these activities outdoors in 2021



◀ hybrid work schedules would also provide the industry with another growth opportunity in lunchtime meals. "The table is set for grilling," Derochowski says. "Everything is growing because we're eating and entertaining more at home." —*Crystal Tse and Gerald Porter Jr.*

THE BOTTOM LINE Sales of outdoor grills and other stay-at-home goods soared during the pandemic. Investors are waiting to see if those gains continue as economies return to normal.

China's No.1 Booze Gets a Makeover

● Jiangxiaobai is targeting younger drinkers to expand the $147 billion market for fiery baijiu

For centuries, baijiu has been a staple at celebrations in China. The fiery alcohol has aided diplomacy, as when Richard Nixon and Zhou Enlai raised a glass or two to toast the Sino-U.S. detente in the 1970s. And to this day a $390 bottle of Moutai, a preferred gift across the mainland, can still open a surprising number of doors.

But China's potent national tipple, usually imbibed over long banquet meals, faces a challenge. The older generation, for health reasons, is consuming less of what's broadly viewed as the booze of choice for men in their 40s and above. And younger Chinese don't care much for it. At about 110 proof, the clear liquor distilled mostly from fermented sorghum is an acquired taste for many hipsters, who increasingly are likely to experiment with Western wines and cocktails.

Chongqing Jiangxiaobai Liquor Co. is trying to revive the traditional drink by appealing to two previously neglected groups: millennials and the generation after that, Gen Z. And it's resorting to tactics considered heresy in the $147 billion industry long dominated by staid state-controlled giants Kweichow Moutai Co. and Wuliangye Yibin Co. For starters, Jiangxiaobai's marketing blitz includes colorful baijiu bottles emblazoned with enigmatic phrases that appeal to the young, and the company is even offering peach- and grape-flavored drinks that seem closer to cocktails.

Many have tried—and largely failed—to bring the drink to a younger generation, but Jiangxiaobai has attracted well-known investors including Hillhouse Capital Management Ltd. and Sequoia Capital Operations LLC. Founded in 2012, it's been profitable since 2014, according to the company, with 2019 revenue of almost 3 billion yuan ($463 million). "We are somewhat like the Uniqlo of baijiu," says Jiangxiaobai founder and Chief Executive Officer Tao Shiquan, referring to the Japanese retailer that's won global fame for its utilitarian clothing. "We serve the consumer's basic needs. We want our products to be affordable and easily found."

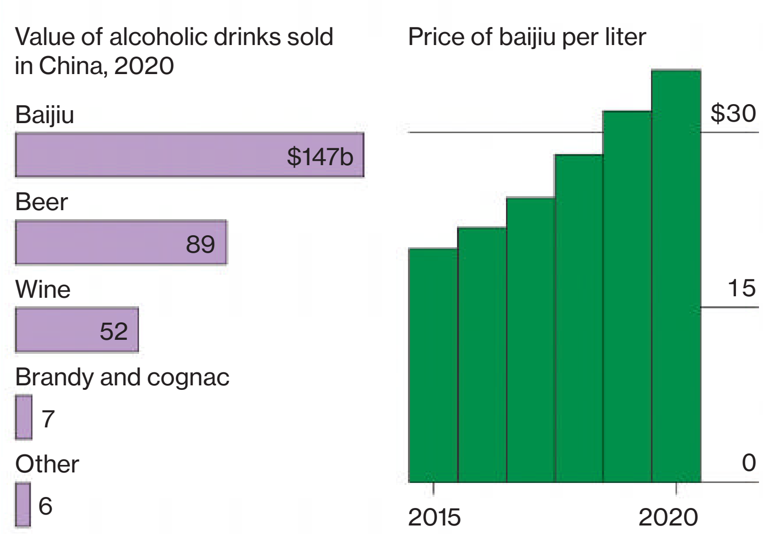
Jiangxiaobai—the name is slang based on Chinese characters associated with self-deprecation and humility—is among a flood of new food and beverage companies spreading across the country. Rising incomes are stoking a consumption boom. Retail sales of $6.1 trillion in 2020 are closing the gap with the U.S., and startups are betting that capturing even a sliver of a popular segment can result in a major business.

"Even if you just serve one niche category, the potential market size still won't be small," says Zhou Jianhong, investment director at Cyanhill Capital, an early-stage investment company.

Jiangxiaobai's leaders say they need to use unconventional tactics to help boost consumption of baijiu, because the giant producers of the liquor are keeping supply tight and prices high to maintain their premium status. A half-liter of Moutai Flying Fairy—if you're lucky enough to find one—has an official retail price of 1,499 yuan ($232). But some distributors sell it for more than 3,000 yuan.

Just as Scotch whisky is native to Scotland, some provinces of China are known as particularly adept producers of baijiu. Connoisseurs can tell the

China's Preferred Tipple



DATA: EUROMONITOR INTERNATIONAL

▶ From top, the fermentation and distillation room and the packing line at Jiangxiaobai's distillery in Chongqing; Jiangxiaobai bottles

"Even if you just serve one niche category, the potential market size still won't be small"

QILAI SHEN/BLOOMBERG (3)

difference. A half-liter Moutai made in the town of Maotai in northwestern Guizhou province, distilled to mimic the taste of 50-year-old liquor, can cost as much as $4,000.

On the other end of the spectrum, cheaper varieties of baijiu aimed at working-class consumers can cost as little as 164 yuan for a pack of a dozen half-liter bottles. But as leading baijiu makers have shifted toward even more premium-priced brands—sales revenue increased 39% while consumption volume declined 21% in the past five years, according to market researcher Euromonitor International—some smaller makers of the cheaper varieties are shutting down. Data from the China Alcoholic Drinks Association show the number of sizable baijiu companies (excluding small family-based distillers) fell to 1,040 last year, from about 1,600 in 2017.

Jiangxiaobai has departed from the norm by selling smaller 100-milliliter bottles, with a pack of six going for 178 yuan. Given that baijiu is so strong, a smaller bottle can be shared with a friend or two, and there's no pressure to finish the pack, unlike bigger bottles, which are typically used at large business meals with more than 10 people at each table.

The company has also used marketing unusual in the tradition-bound baijiu industry. In 2017 and 2018 it promoted the brand on two seasons of an anime series whose main character is a boy named Jiangxiaobai. It engages with fans, calling on them to suggest phrases that get printed on its bottles. An example: "I have a bottle of baijiu. I have something to tell you." (It sounds way more poetic in Mandarin.) The company also uses media and events popular with the young, such as online dramas, films, and music festivals, to promote its products. Like beermakers, it's struck deals with restaurants, while maintaining online stores on Alibaba Group's Tmall, China's largest business-to-consumer e-commerce platform, and the popular WeChat app. At the 2019 Vinexpo Bordeaux in France, it promoted its ties to Chinese culture, with its bottle designs incorporating traditional poetry and calligraphy.

Eschewing expensive television commercials while tapping avenues popular with younger consumers has helped keep marketing costs down. Tao says Jiangxiaobai spends 10% of sales on marketing, vs. spending by industry peers that largely fall in the range of 10% to 20%. "They picked a very specialized race course early enough and applied some marketing skills from the consumer goods industry," says Zhong Yuchen, Chengdu-based owner of baijiu technical consulting company Yuan Kun Education. "Packaging, storytelling, crossovers—these tactics were never heard of before in the baijiu industry."

Valued last year at about $1.6 billion, ▶

◀ Jiangxiaobai is looking to go public in three to five years, Tao says. When the Covid-19 crisis hit China, Jiangxiaobai suffered like other businesses, but sales will continue to grow 20% annually in the next three to five years, he says.

"Before Jiangxiaobai appeared, the industry consensus was that young people did not drink baijiu," says David He, managing partner at BA Capital in Shanghai, one of the upstart's investors. "Tao founded a brand that focuses on the young segment of the market and made it grow."

Tao is intent on keeping sales bubbling by introducing products popular in online marketplaces, where plum wine and baijiu were the fastest-expanding alcohol categories in the 12 months through November 2020, growing at more than 90% and 50%, respectively, on Tmall. Bowing to demand from female drinkers who prefer sweeter, low-proof alcohol, Jiangxiaobai introduced its plum wine in late 2019.

The brand's growing popularity is attracting competition. Targeting young female consumers since its founding in 2019, Miss Berry has become one of the top sellers of fruit wine on Tmall. Hong Kong property tycoon Adrian Cheng's C Ventures is among the investors in Miss Berry.

There's also pressure from foreign alcohol giants. Pernod Ricard SA has announced plans to introduce a made-in-China whiskey brand by 2023. Les Domaines Barons de Rothschild and LVMH Moët Hennessy Louis Vuitton SE are among the investors in Chinese vineyards.

Tao says he will continue to turn out new products and explore high-end lines while keeping prices low. He plans to double Jiangxiaobai's geographical footprint in five years, expanding beyond the 30 countries or regions where it's currently available and making growth in Asia and Europe priorities.

Back home, Tao may also benefit from the growing number of Chinese consumers who are turning increasingly to local brands that understand their tastes, says Wang Mi, who works in the creative industry in Chongqing and is a Jiangxiaobai plum wine buff. "People in my generation," she says, "don't automatically opt for Western brands like in previous generations." —*Jinshan Hong, with Stephen Engle*

THE BOTTOM LINE Chinese businessmen have long marked celebrations with baijiu. Startup Jiangxiaobai is using social media and e-commerce to extend the fiery drink's reach to younger people.

Another Covid Crisis for Global Supply Chains

● Hundreds of thousands of unvaccinated seafarers could snarl international trade

Vaccinations of seafarers are going too slowly to prevent outbreaks on ships from causing more trade disruptions, endangering maritime workers and potentially slowing economies trying to pull out of a pandemic slump.

Infections on vessels could further harm already strained global supply chains, just as the U.S. and Europe recover and companies start stocking up for Christmas. The shipping industry is sounding the alarm as infections increase and some ports continue to restrict access to seafarers from developing countries, which supply the majority of maritime workers but can't vaccinate them.

All signs point to a worsening crisis on the oceans, at the same time the industry seemed to be emerging from months of port restrictions that hurt shipping firms' ability to swap out crews and left hundreds of thousands stuck at sea for months.

"It's a perfect storm," says Esben Poulsson, chairman of the International Chamber of Shipping (ICS), which represents ship owners. "With this new delta strain, there's no doubt it's setting us back and the situation is getting worse. Demand for products isn't letting up, crew changes aren't happening fast enough, and governments continue to stick their heads in the sand."

Two recent events that interrupted essential ports and shipping routes show exactly how big

SAMSUL SAID/BLOOMBERG

◀ A program to inoculate sailors and port workers at Port Klang, Selangor, Malaysia

the risks are. In May a sailor died and dozens of hospital workers in Indonesia were sickened with the delta variant of Covid-19 after a ship with an infected Filipino crew docked. About the same time, global shipping was thrown into chaos after one of China's busiest ports in Shenzhen was shuttered for weeks because at least one dockworker was infected as part of a broader outbreak.

Gard P&I, the biggest marine insurer among the more than dozen mutual liability associations that provide coverage to members, has seen a spike in claims for Covid infections. There were more than 100 outbreaks in both April and May on ships and offshore mobile units such as oil drilling platforms involving multiple sick seafarers, says Alice Amundsen, vice president for people claims. During the peak of the pandemic in July and August 2020, Gard saw almost 80 outbreaks on vessels and offshore units that infected about 160 people, she says.

"It's a little bit like a fire that is glowing, and it could quickly turn into a firestorm again," says Rene Piil Pedersen, managing director of shipping line AP Moller-Maersk A/S in Singapore. Even as more people get vaccinated, Covid will be around for years, and there will still be outbreaks in ports and on ships, he said last month. He's calling on governments and industry to work together to protect seafarers and dockworkers as essential employees supporting critical supply chains all over the world.

Despite efforts in the U.S. and elsewhere to inoculate seafarers in ports, most still depend largely on their home country for vaccinations, and more than half of the 1.6 million seafarers globally come from developing nations such as India, Indonesia, and the Philippines, which are well behind most developed economies in vaccinations.

The lack of international coordination is evident in the absence of data on how many seafarers have been vaccinated. There's no organization or company keeping track of the situation for all workers across various companies, ships, and ports. The International Chamber of Shipping estimates that 35,000 to 40,000 seafarers—only 2.5% of the global pool—are vaccinated.

More than 23,000 seafarers had been inoculated in the U.S. with the help of various charities, and China's Cosco Shipping Holdings Co. said in June that all seafarers who are onshore and fit for vaccinations had received shots.

India has kicked off inoculation programs for its more than 200,000 seafarers, but Poulsson and ship managers, including Wilhelmsen Ship Management, say the drive needs to be accelerated. As of May about 14% of India's seafarers had received a single dose of the vaccine, and 1% had gotten two, according to the *Hindu Business Line*, citing an industry estimate.

In the Philippines several companies including Maersk have said they're working with the government to procure shots for their workers. Seafarers get priority access, but vaccines are scarce, with several cities near Manila halting vaccination programs in recent days as supplies ran out.

Even if shots were available at home, they're of no use to workers already aboard ships, some of whom may not finish contracts until next year. About 99% of Filipino seafarers are unvaccinated, says Gerardo Borromeo, the Manila-based vice chair of the ICS, who estimates it will take a year to inoculate them all. The Philippines supplies some 460,000 seafarers, or 25% of the global maritime workforce, according to the government.

The easiest solution would be for every port to have a clinic and offer vaccinations to all seafarers coming through, says Ben Cowling, head of the University of Hong Kong's department of epidemiology and biostatistics. So far only a small number of countries are following the U.S.'s lead in offering vaccinations to seafarers who come into ports, regardless of their nationality. "For parts of the world where they're aiming to eliminate Covid, loopholes including maritime workers at container ports are opportunities for the virus to break through," Cowling cays. "They have to eliminate the risk coming off container ships."

"It's a little bit like a fire that is glowing, and it could quickly turn into a firestorm again"

If the risk to seafarers isn't defeated, then further port shutdowns or outbreaks on ships taking them out of service will make it even harder and more expensive to get Christmas shopping done. "We will run out of the available crew," says Columbia Shipmanagement Ltd. Chief Executive Officer Mark O'Neil, whose company oversees a crew pool of 18,000. "They would either have Covid, or they will be part of a Covid-infected crew, or they will not be vaccinated and therefore will not be allowed into a port. The number of vessels operating will be reduced." —*K. Oanh Ha, Ann Koh, and Claire Jiao, with Arys Aditya and Dong Lyu*

THE BOTTOM LINE More than half of the 1.6 million seafarers globally come from nations that are behind in vaccinations. This could cause outbreaks in merchant fleets and stall shipping.

2

TECHNOLOGY

He's Making Apple the Bad Guy

● Horacio Gutierrez has spent five years molding the narrative of the iPhone maker as an abusive monopolist

Edited by Joshua Brustein

Horacio Gutierrez made his name in U.S. corporate law two decades ago defending Microsoft Corp. against charges of anticompetitive behavior in the first major antitrust case of the internet age. As the tech industry is once again dominated by talk of monopolies, Gutierrez, now Spotify Technology SA's chief legal officer, has switched sides. For the past five years he's led Spotify's campaign against Apple Inc., one of a series of antitrust actions with the potential to make an even greater impact than the Microsoft litigation.

While the shift in public opinion about the tech industry in recent years has been stunning by any measure, the change in the perception of Apple may be the most improbable. When Gutierrez started accusing the company of anticompetitive behavior in 2016, many public officials had already begun to look with suspicion at Facebook Inc. and Alphabet

PHOTOGRAPH BY DEVIN CHRISTOPHER FOR BLOOMBERG BUSINESSWEEK

Inc.'s Google, with their business models based on amassing personal data and their troubling impacts on U.S. politics. Apple was far less controversial. Lawmakers associated the company with Steve Jobs, one of America's greatest entrepreneurs; with the explosion of convenient smartphone apps; and with the comforting buzz of the phones in their pockets. "You had to overcome a certain amount of deference regulators had," Gutierrez says. "So many people I was talking to were using Apple products and admired the company."

Gutierrez has been instrumental in chipping away at that admiration. His criticism of Apple starts with its mobile App Store, a business it invented and still dominates. App developers such as Spotify and Epic Games Inc. claim Apple has abused its power by requiring them to pay a 30% fee for transactions within its App Store and within apps themselves—and by prohibiting them from offering customers other ways to pay.

Gutierrez says he doesn't think Apple has helped itself with a defense based on rejecting criticism outright, a stance that reminds him of Microsoft's early response to its antitrust troubles. A growing number of governments, other tech companies, and regulators have become receptive to Gutierrez's arguments. In June 2020, the European Commission responded to Spotify's complaints about Apple by opening an antitrust investigation, and there are signs it's leaning against Apple. Two months later the video game maker Epic sued Apple. U.S. lawmakers are considering sweeping antitrust legislation that could significantly affect large tech companies, and on July 9 President Joe Biden signed an executive order on competition that included a policy of focusing on tech companies in antitrust enforcement. France, Germany, Japan, the Netherlands, and the U.K. are all investigating the company as well.

On July 7 dozens of U.S. state attorneys general filed an antitrust lawsuit against Google for similar practices in the Google Play store. Gutierrez says Spotify also plans to pursue a campaign against Google that mirrors the one it's waging against Apple if it follows through with its Play Store policy changes. He's increasingly optimistic that governments will take significant action to address his app store critiques. "All of these things that may be loosely connected today, but what they point to is a new set of competition rules that will apply to these gatekeeper platforms on a global basis in the long term," he says. "What we perceive is the genuine desire to do something, and something that will be effective."

Apple says the App Store has helped Spotify become the largest music subscription service in the world, and that it now pays a commission of only 15% on those subscriptions that did come through Apple devices. "They want all the benefits of the App Store but don't think they should have to pay anything for that," an Apple spokesperson said in a statement. Google declined to comment.

Gutierrez, one of the most powerful attorneys of Hispanic descent working in U.S. corporate law, was born and raised in Venezuela. He joined Microsoft in 1998 after graduating from the University of Miami's law school—it was his fourth law degree—and started off as its lead counsel for Latin America and the Caribbean. He impressed his bosses enough to get dispatched to Europe to serve as the top lawyer defending Microsoft before the European Commission, which had accused the company of anticompetitive behavior for integrating its Internet Explorer browser with its Windows operating system, making it harder for competing browsers.

"We were there in the darkest hour for Microsoft in Brussels," says John Kelly, who at the time oversaw Microsoft's corporate affairs in Europe. "We were the symbol for many people of the big arrogant monopolists." Although Microsoft would lose the case, Gutierrez gained an understanding of antitrust law in Europe, honed his strategic thinking, and cultivated relationships with some of its top lawmakers.

Spotify hired Gutierrez away from Microsoft in 2016. The idea wasn't specifically to go after Apple, says Barry McCarthy, a board member who was then chief financial officer, but the iPhone maker had already started to make the music service's life very difficult. Chief Executive Officer Tim Cook wanted to make more money from apps that relied on Apple devices to reach their customers. Apple had long taken a commission on apps that charged an initial download fee, but in 2014 it began requiring subscription services like Spotify to pay a cut of the recurring revenue it made when customers subscribed through its app.

Subscriptions account for about 90% of Spotify's sales, and it wasn't even close to turning a profit, even without Apple taking that cut. But if Spotify didn't allow in-app payments, Apple's rules forbade Spotify from asking its customers to sign up through its website, where the company wouldn't have to pay Apple a commission.

In 2015, Apple unveiled Apple Music, a direct competitor to Spotify that came at the same price. Apple didn't have to worry about the cost of App Store commissions.

By this time, Gutierrez knew most of the major lawyers in Silicon Valley. Soon after taking the Spotify job, he flew to Cupertino, Calif., to meet with Apple's general counsel, Bruce Sewell. The ▶

◀ Gutierrez in Spotify's Miami office

"So many people I was talking to were using Apple products and admired the company"

◀ companies failed to find a compromise, and Apple threatened to kick Spotify off the App Store and withheld approval for updates that patched up security vulnerabilities.

With the blessing of CEO Daniel Ek, Gutierrez took the lead in developing and executing Spotify's counterpunch. He began gauging the willingness of regulators in the U.S. and Brussels to pursue an antitrust case. Gutierrez saw Europe as a better bet, given the relative dormancy of antitrust enforcement in the U.S. It didn't hurt that Spotify was a European company and Ek one of the Continent's most successful entrepreneurs.

Apple insisted that Spotify was asking for new rules. But Gutierrez argued that Apple had only tightened the screws when it started dominating the market. Spotify shared confidential financial information with officials to show how Apple's policies affected its profitability and the rate of subscription growth.

Gutierrez bided his time until he thought European officials would be receptive. In 2019 he filed a complaint, and the European Commission responded by opening an antitrust investigation. In April the commission sent Apple a statement of objections, laying out evidence of what it saw as the company's abuse of power, a signal it's likely to take action against the company. "The Commission's argument on Spotify's behalf is the opposite of fair competition," said the Apple spokesperson in a statement.

As confident as Gutierrez feels about Spotify's own litigation, he now says the best chance for reforming the tech industry is through new laws. To push for policy changes, Spotify has rallied other developers into a group called the Coalition for App Fairness, which includes dating-app developer Match Group Inc. and the consumer-electronics company Tile. In its U.S. lawsuit, coalition member Epic Games unearthed internal documents that could be damaging to Apple even if it loses.

Gutierrez is careful to distance himself from Epic's litigation, because he sees the coalition as an advocacy group rather than a legal defense fund, but he says he's unconvinced by Apple's claims that it doesn't know how much money the App Store generates. "This is not like the budget for printer toner," he says. "This is a multibillion-dollar business."

The chances of new regulations or laws in the U.S. look better than ever. In April, Gutierrez appeared before a Senate panel to press his case. At the same time, he's been a chief advocate in Europe for a bill that would impose new restrictions on five of the world's biggest technology companies.

The landscape looks a lot different than it did when Gutierrez first began talking about Apple. His actions "have spawned a lot of the other Apple-related activity across the globe," says Thomas Vinje, who's worked with Gutierrez on antitrust issues in Europe. "It's a snowball Spotify got rolling." —*Lucas Shaw*

THE BOTTOM LINE Spotify's argument that Apple and Google are abusing their power over mobile app stores could lead to serious changes in the tech industry.

SPACs, the Final Frontier

● Richard Branson's company is a leader in the private space industry and has helped pioneer its risky financial model

For years, executives at Virgin Galactic said the company's founder, 70-year-old Richard Branson, on his own test flight before it could provide rides to paying customers. On July 11, Branson flew to the edge of space, in a trip conspicuously timed to take place just before a similar voyage planned for Amazon.com Inc. founder Jeff Bezos.

Branson and Bezos see their flights as the start of a new stage in commercial space travel. But Virgin Galactic Holdings Inc. has been a pioneer for the space industry in other ways, too. In 2019 the company went public by merging with a special purpose acquisition company, or SPAC, whose shares were already trading on public markets. The then-obscure tool that has since become a popular way for risky companies to go public before they could pull off a traditional initial public offering.

"There is a lot of hype around space. It's cool, and people want to invest in things that are cool"

Because SPACs have already gone through an IPO, the private companies they merge with don't face the same onerous process, and their financial projections haven't been subject to the same regulatory scrutiny. This makes SPACs a tempting vehicle for space companies, whose gravity-defying exploits capture the imagination of the kind of investor who envisions a startup accelerating into the financial stratosphere in record time.

Backers of SPACS see them as a way to get resources for innovative young companies. "When you're a startup, if you can't have access to capital, you crash and burn," says Craig McCaw, whose SPAC, Holicity Inc., recently merged with

VIRGIN GALACTIC

satellite-launch-services company Astra Space Inc.

But the space SPAC trend could be counterproductive, says Meagan Crawford, co-founder and managing partner of the Space Fund, a venture capital firm that holds stakes in SpaceX and others. "There is a lot of hype around space. It's cool, and people want to invest in things that are cool," she says. But she cautions that many of the companies currently seeking listings are too early for ordinary investors and don't represent "the best of what space has to offer."

The quarterly earnings calls for companies that have no prospect of making money can be bizarre. Virgin's executives periodically give investors some version of the line "Since there were no flights in the quarter, we did not generate any revenue." On quarters when there have been test flights, they remind investors that those flights produce no revenue.

Virgin now says it will start revenue-generating commercial passenger service next year, putting it 13 years behind schedule. When Astra carried out its latest rocket-launch test in December, the results were mixed, with its craft reaching space but not quite making it into orbit. Nevertheless, the company, which announced in February it was merging with McCaw's SPAC, says it can start commercial launches this year and is projecting revenue of $4 million for 2021.

Other space companies make optimistic projections they can't always meet. Take space transportation provider Momentus Inc., which puts an extraterrestrial spin on buzzwords from the earthbound tech industry to offer such services as "last mile in-space delivery," "rideshare launch," and "satellite as a service." In October it announced it would merge with a SPAC, Stable Road Acquisition Corp., in a transaction valuing it at $1.2 billion. It predicted 2021 revenue of $19 million.

But the Federal Aviation Administration in May denied a key application that Momentus needed to launch vehicles as part of a SpaceX mission the following month, saying its corporate structure raised

▲ Branson waves before takeoff

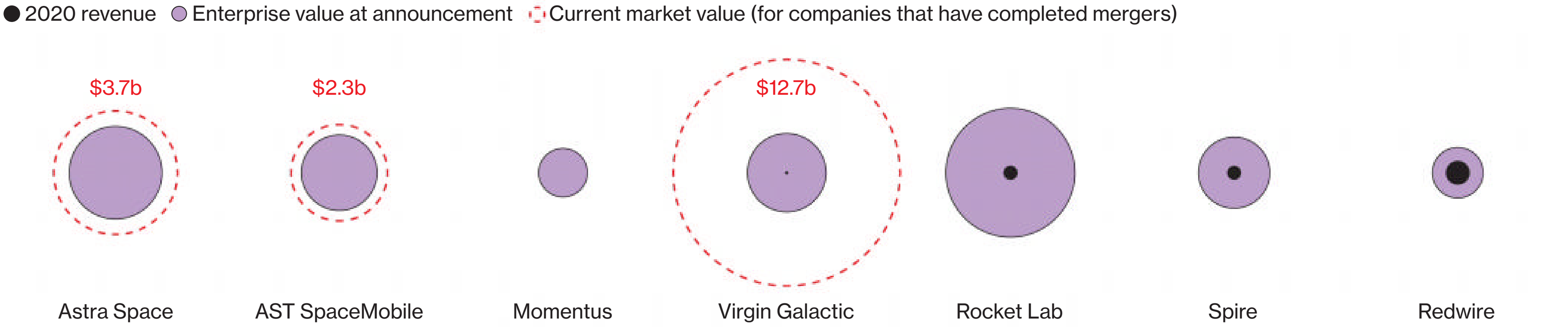
national security concerns. Stable Road resolved the issue by having Momentus's co-founders, who are Russian, divest their ownership stakes. The setback forced the company to revise its revenue projection to $0, and next year's to just $5 million.

On July 13, the SEC announced charges against Stable Road, Momentus, and others involved in the SPAC, citing misleading claims about Momentus's technology and national security risks. The companies settled, paying over $8 million in penalties. The deal "resolves the SEC's concerns with historical statements," said Brian Kabot, Stable Road's chief executive officer, in an email, adding that the company was "confident that our investors have accurate information today." Momentus replaced its CEO the day after the settlement.

Companies without useful revenue numbers are sometimes loath to provide other information. AST SpaceMobile Inc., for instance, plans to sell satellite broadband internet service for smartphones and says it won't have any revenue until 2023. On its website, it warns investors they will learn little about the technology itself, saying it is "highly proprietary, and exactly how it works cannot be disclosed."

Investors appear to be growing wary. The latest Momentus deal entailed cutting the startup's ▶

SPACs in Space



DATA: COMPANY REPORTS; COMPILED BY BLOOMBERG

◀ value by more than half, and Astra's shares are down more than 10% since it announced its merger.

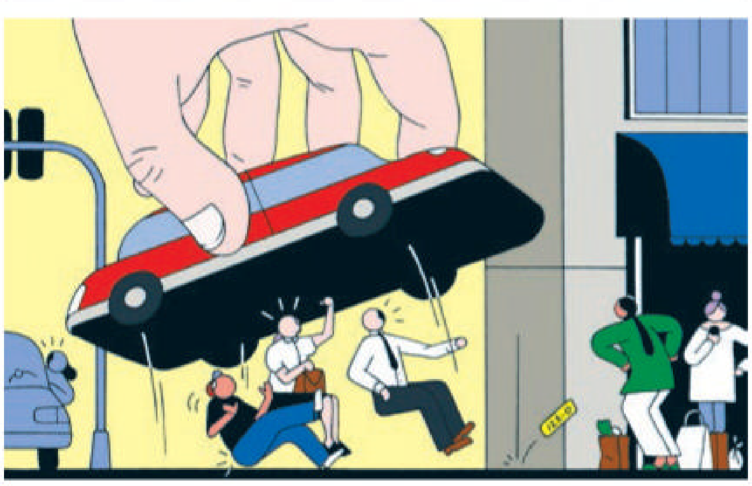
The ramifications could extend beyond individual investors, says Crawford, is the risk to the reputation of the broader industry. "If these companies fail, it will turn the markets against the space industry in general," she says. "It's going to affect the ability of the good companies to go public."

Soon after its successful flight, Virgin announced it would sell as much as $500 million in new shares. But if it was expecting a reward from investors, it was wrong. Its stock price plummeted. —*Sarah McBride*

THE BOTTOM LINE Space companies have used a financial tool to go public that allows them to make optimistic projections, and they don't always reach their own lofty expectations.

China's Ride-Hailing Shake-Up

● Didi gets caught up in Beijing's effort to rein in powerful tech companies



China's sudden removal of Didi Global Inc.'s ride-hailing services from app stores in the country has spooked riders and drivers while energizing rivals who see a rare opportunity to chip away at a leader holding 90% of the market.

Four days after Didi's initial public offering in the U.S. on June 30—the second-largest ever for a Chinese company—China's cybersecurity regulator told app stores to remove Didi, saying an investigation had uncovered problems with the way it collects and uses personal information. The move was the latest escalation in China's effort to rein in powerful tech companies, which has already generated significant uncertainty about how freely they'll be able to operate.

It could also mean big changes to the country's ride-hailing industry. With 377 million annual active users and 13 million drivers providing 25 million rides each day in China, Didi is a vital part of the nation's transportation infrastructure. The company has paid more than 600 billion yuan ($93 billion) to drivers since 2018, mostly in China. The service continues to function for existing customers, but new ones can't sign up, and it's not clear how the situation will evolve.

Didi's dominance has left the industry vulnerable to disruptions to its key player. Drivers, many of whom work part time without full employee benefits, fear a loss of income, while riders are worried about being left stranded. "Without Didi on the table, the rebalance of supply and demand could be confusing and take a long time," says Tony Wang, a frequent rider.

Sheng Gang, who drives for Didi in Shanghai, says orders have fallen by about 30% since the announcement of the probe. Didi's prices fluctuate with demand, and Sheng says he's been able to count on making about 1.5 times the normal rate during evening rush hours. That increase evaporated since the ban, another sign of weak demand.

Didi has now twice warned of "adverse impact" to its operations from the app store removals. Representatives for Didi declined to comment.

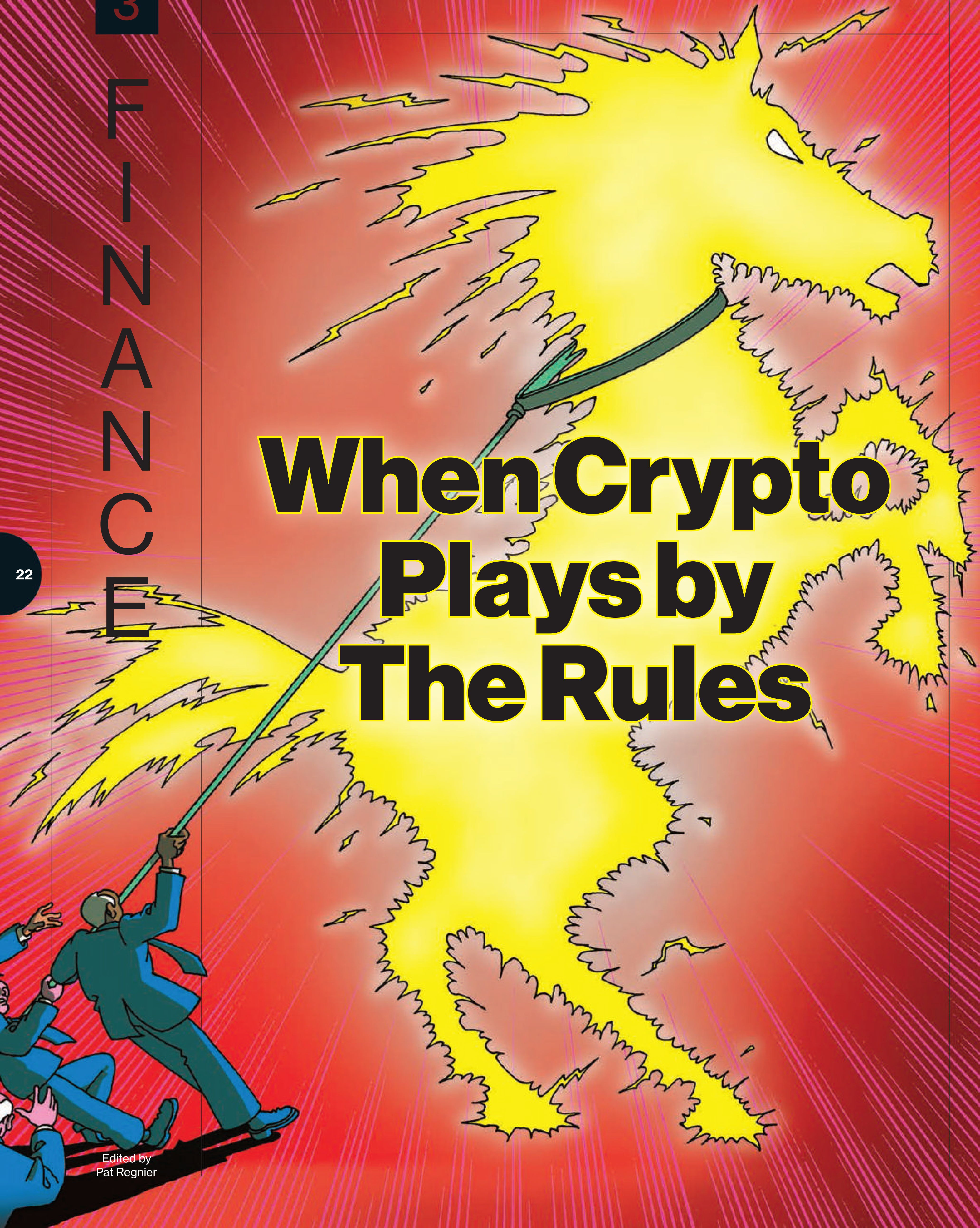
Downloads for rivals such as Caocao Chuxing and Dida Pinche have spiked on Apple Inc.'s China App Store, in some cases more than doubling, according to research firm Sensor Tower.

Even before the security flap, rival services had been trying to poach Didi users with lower fares. They've also been texting drivers promising incentives, including cash giveaways. The e-commerce and delivery service Meituan—which faces its own antitrust probe—offered a weekly bonus of as much as about $500 for drivers who complete a certain amount of orders and more than $100 as a referral bonus, according to a text message sent to drivers seen by Bloomberg News.

Loyalty to Didi doesn't run deep among drivers, who complain that pay has gotten worse as it's consolidated its power. "It's simple for us drivers: Whichever platform offers the most money, we go ahead and drive for that," says Sheng. Riders are similarly flexible, willing to take whichever ride-hailing platform seems to work best. "It's not like we are going back to hailing randomly on the street," says Weilin Chen, a 24-year-old student in Beijing. —*Bloomberg News*

THE BOTTOM LINE The Chinese ride-hailing market may be upended by a crackdown against Didi that's unsettled users and given competitors a chance to gain ground.

ILLUSTRATION BY CHARLOTTE POLLET. DATA: COMPILED BY BLOOMBERG



When Crypto Plays by The Rules

Edited by
Pat Regnier

● U.S.-based exchanges are embracing regulation to set themselves apart from Binance

In the wild world of cryptocurrency exchanges, one strategy never seemed to pay off: embracing regulation. Take Gemini, started by twins Cameron and Tyler Winklevoss. While it was plastering posters in New York subways a few years ago, declaring there was "Finally, a regulated place to buy, sell and store crypto," an exchange called Binance—with no clear headquarters and a mysterious structure—quietly took the top spot among the world's crypto venues.

Suddenly, touting adherence to the rulebook looks very smart. Although Binance Holdings Ltd. turns away American customers, it's now said to be facing probes from U.S. agencies. In late June the financial watchdog in the U.K. told a Binance affiliate it wasn't authorized to carry out regulated activities in that country. The pressure on Binance raises the odds that several exchanges pledging to comply with tough U.S. regulations may soon find themselves operating with less competition in some of the world's biggest economies. "We're playing the long game," says Cameron Winklevoss. "We're trying to be the fastest tortoise in the race."

Warnings and lawsuits by U.S. authorities in recent years had already winnowed the list of platforms catering to U.S. consumers. There's Coinbase, Kraken, Gemini, and Bittrex, among a few others. There's also Binance.US, which says it's separate from the global Binance platform and has licensed the name and some technology from Binance.

Coinbase Global Inc. published audited financials and beefed up its compliance operations as it listed shares in New York this year. Kraken got a regulated bank charter in Wyoming as it, too, prepares to go public. And Gemini's parent, Gemini Trust Co., helped create the Virtual Commodity Association, which is supposed to root out bad behavior and prevent fraud and manipulation—reminiscent of the self-regulatory groups set up by Wall Street.

The idea is that if an exchange appeases U.S. authorities, it can probably operate just about anywhere and more easily lure institutional investors, such as hedge funds, family offices, and pension funds. But with each step a platform takes, it goes further toward emulating the staid financial world, where internal controls, industry groups, and regulators hold sway. "The Catch-22 is that the crypto system was set up to avoid big banks," says John Griffin, a professor of finance at the University of Texas at Austin's McCombs School of Business. But "rather than having this autonomous universe free of government regulation, we have crypto exchanges playing the role that traditional exchanges and governments play in traditional markets."

There's already a rich history of boom and bust in the relatively new world of crypto exchanges—and plenty of reason for traders to be worried about who they can trust with their assets. Mt. Gox is the most famous example. The Japan-based platform imploded in 2014 after losing thousands of customers' coins. Quadriga CX abruptly shut in 2019, owing clients hundreds of millions of dollars in crypto. The three founders of Seychelles-incorporated BitMEX, once the biggest crypto derivatives exchange, were charged by U.S. prosecutors in 2020 with flouting banking laws intended to ensure that the platform isn't used for illegal purposes while serving U.S. customers. All three have pleaded not guilty.

Binance Holdings vaulted from unknown to a powerhouse a few years ago and has sat high on global rankings ever since. This year, as the Biden administration settled in, probes emerged. The U.S. Department of Justice, the Internal Revenue Service, and the Commodity Futures Trading Commission are all said to be examining aspects of the business, according to Bloomberg News. The specifics of the inquiries are unknown, but they've included officials who look into whether companies have allowed money laundering. The company hasn't been accused of any wrongdoing.

"As Binance.com continues to grow, we remain committed to working collaboratively with regulators around the world," the company said in a statement provided by a spokesperson. "We take our legal obligations very seriously and we continue to invest in our compliance program." The company said that includes building robust systems for catching money laundering and hiring former government officials to advise it on regulatory matters.

Binance remains the global venue to beat. Its daily spot trading volume is more than 100 times that of Gemini's, according to CoinMarketCap, which is owned by Binance but generally is considered the leading source of crypto trading data. Even a midsize exchange can be worth billions. The Gemini exchange is worth $4.1 billion, according to estimates by the Bloomberg Billionaires Index. Coinbase sports a market value of more than $50 billion.

With new cryptocurrencies emerging daily, one of the biggest conundrums facing exchanges is deciding which ones to allow users to trade. Listings sometimes require technology upgrades and time to vet whether coins run afoul of laws, says Dave Ripley, the chief operating officer of Kraken. But restraint can leave an exchange's risk-loving users on the ▶

ILLUSTRATION BY BAPTISTE VIROT. DATA: COINMARKETCAP, AS OF JULY 14

◀ sidelines when hot coins take off. For example, Coinbase started trading Dogecoin only in June, years after the token's creation in 2013 and several weeks after its market value soared above $90 billion. The price has since tumbled.

One way U.S. exchanges can stay in regulators' good graces is fairly easy: by simply not offering more-heavily regulated products such as derivatives contracts based on crypto. Venues also have to take care to avoid certain kinds of coins. Things can get dicey if watchdogs decide a coin is just a way to sell an investment in a business while sidestepping regulations. The question that arises constantly is, "Is this an unregistered security?" says Jason Urban, global co-head of trading at Galaxy Digital Holdings Ltd., which operates an over-the-counter trading desk. If it is, the coin could end up being off-limits to U.S. investors. "There really isn't a lot of clarity from the regulators, at least domestically," he says.

Even if greater regulation helps established U.S. players take business from offshore operators, there's an emerging challenge from so-called decentralized finance, or DeFi. This technology has allowed developers to set up coin exchanges that run on code, where users trade assets with no middleman. After years of frustration over Washington's pace in developing a regulatory regime, Gemini is moving out of a U.S.-centric model and expanding overseas. "One thing that is clear: The U.S. landscape is moving at a very slow pace," says Cameron Winklevoss. "The U.S. will get there, but we can't wait around for that." *—Katherine Chiglinsky, Olga Kharif, and Matthew Leising, with Tom Maloney*

THE BOTTOM LINE Staying inside U.S. regulators' lines can help crypto exchanges attract big Wall Street clients, but for now offshore trading venues still dominate the global market.

Mixing Markets, Faith, and Instagram

● A celebrity preacher in Indonesia shows that meme stocks are a global phenomenon

If you're looking to invest in Indonesia, you can read about the local economy, analyze companies from the bottom up, or maybe call a broker for ideas. Or you could just check out the latest social media post from one of the country's most popular clerics.

Jam'an Nurchotib Mansur isn't your run-of-the-mill *ustadz*, or Muslim teacher. As a young man, he spent some time in jail. Today, at 45, he runs an asset management business on the side, and led a deal to invest in a local bank. When he's not preaching, he posts stock picks to his social media accounts, where 13 million followers tune in for inspiration.

▲ Mansur says he's trying to help people with his social media stock picks

"I don't understand stock trading, but I usually look at his postings for ideas," says Fithriyah, a 35-year-old who follows Mansur's Instagram account and started investing only this year. "He is an ustadz, who always preaches for self-discipline and not to become greedy, so I trust him." (Like many Indonesians, Fithriyah doesn't have a last name.)

In November, the preacher, who's also known as Yusuf Mansur, said on Instagram that he thought a money-losing state-owned airline, PT Garuda Indonesia, would recover once the pandemic ebbs. The company's stock surged as much as 45% over the next week. A month later, Mansur was talking up air transport servicer PT Garuda Maintenance Facility Aero Asia. Those shares jumped 55% over the next two days.

Such posts have the power to create (and destroy) billions of dollars in equity value. Indonesia is the world's fourth-most populous nation, and its stock market—which at $495 billion is worth more than Singapore's or Mexico's—is gaining momentum after relaxing regulations to attract fast-growing startups. The first of Indonesia's tech unicorns is expected to debut later this year.

Around the world, media personalities are becoming market influencers, and vice versa. Mansur's reach in Indonesia makes him reminiscent of figures in the U.S., such as Tesla Inc. co-founder Elon Musk or the entrepreneur and reality-show judge Mark Cuban, who have egged on investors in cryptocurrencies. Or Cathie Wood, the fund manager who's become a celebrity in her own right.

Like the U.S., Indonesia has seen a convergence of social media with a new interest in trading by small investors. Retail investors accounted for about a third of daily trading in Indonesia's stock market as of June 2020. A year later, that has almost doubled to

PHOTOGRAPH BY RONY ZAKARIA FOR BLOOMBERG BUSINESSWEEK

60%. About 80% of these people are 40 or younger.

For large institutional investors, the emergence of influencers around the globe as a stock market force is something to watch carefully and factor into stock analyses. "It used to be just blips on the radar that you assumed would smooth out over time," says Shane Swanson, senior market structure analyst at Coalition Greenwich. "It's not the case anymore." In Indonesia, Bernadus Wijaya, chief executive officer of Jakarta-based PT Sucor Sekuritas, is encouraging fellow analysts to hop on to social media as well to get in front of retail traders. "We need to follow this trend or be left behind," he says.

Investors who follow Mansur should be ready to ride the roller coaster familiar to traders in other media-fueled investments. Despite their rally in late 2020, shares of Garuda Indonesia recently halted trading as the company struggles to repay its debts. Shares are down 51% from December's peak.

Mansur says he's trying to help people: "I am simply encouraging Indonesians to become investors and make good use of available opportunities." He says he doesn't get compensated by the companies for mentioning the stocks to his followers, and jokes that none of them have called to thank him.

In at least one case, his influence and his financial interests came together. Mansur led a consortium last month to buy 250 million shares of PT Bank MNC International, owned by Indonesian businessman Hary Tanoesoedibjo. As part of the deal, he pledged to promote the bank's digital banking products to 10 million people in his network, with an initial goal to add 1 million customers in three months. Bank MNC shares surged as much as 13% after the news, which he posted about on Instagram. Mansur says this and a property project are the only two companies he had agreements with.

Born to a relatively wealthy family in Jakarta, Mansur graduated from university with a degree in Shariah, or Islamic law. A business he started early in his working years landed him in debt. When he couldn't repay his business partners, they took him to court and he was jailed. In an interview, he declines to discuss details of the matter but says he was "young and reckless" and the experience changed him. He discovered *sadaqah*, a core foundation of Islam, which encourages charity and kindness. That prompted him to write a book about his experience in jail, which became a hit.

In 2017, Mansur established an investment management firm called PT PayTren Aset Manajemen, which makes investments compliant with Shariah. Indonesia has the largest Muslim population in the world, with more than 85% of the country's 270 million people practicing the faith.

Mansur is not the only social media stockpicker in the country. President Joko Widodo's 26-year-old son, Kaesang Pangarep, shared a technical analysis of a bank stock earlier this year with his 2.1 million Twitter followers, sending the price 15% higher.

Indonesia Stock Exchange Director Hasan Fawzi says there's nothing wrong with influencers giving tips because they help attract new investors, which is good for markets. "He was really just promoting nationalism by recommending state-owned company stocks," says Fawzi when asked about Mansur. "But we have talked to these influencers and asked them to educate their followers properly, and in accordance with the regulation, and to pay more attention to the fundamental aspects of the companies." Regulations require accuracy and that information is spread fairly to prevent insider trading.

Indonesia's securities watchdog, the Financial Services Authority, has no specific rule governing media figures in the market, according to spokeswoman Sekar Putih Djarot. It does, however, have a program with the exchange to offer guidelines so that influencers know how to promote a stock without breaking trading rules.

Some want authorities to draw a red line. More than 6,000 signatures were collected on an online petition in February calling for the exchange and regulator to ban celebrity stockpickers known as pom-pomers. Mansur was not named in the petition, which cited another influencer. "So many of us have lost money and hundreds of millions of rupiah, even billions, have gone into their pockets," according to the post by a user identified as "Retail Unite Against Pom-pom from Rukumolagi."

"I am simply encouraging Indonesians to become investors"

Mansur rejects the pom-pom label. He says he picks stocks for long-term potential, not for short-term profit. He says his goal is to educate. It's what he calls his "Mansurmology" philosophy. There's a #Mansurmology hashtag on Twitter where people post stock charts, articles, and memes. Fithriyah, the novice trader, says she made money from stocks that Mansur promoted and plans to keep following his advice because "I believe in Mansurmology."

Aditya Prabawa, a 33-year-old real estate developer, says he booked profits on two of Mansur's picks but lost some on a third. "We need to closely monitor the stocks that Ustadz mentioned and get out as soon as you make some gains, otherwise you could lose money, fast," says Prabawa. "Trading in these speculative stocks is only half investment. The other half is pure gamble." —*Fathiya Dahrul and Soraya Permatasari*

THE BOTTOM LINE Retail trading has exploded in Indonesia, and small investors are getting their ideas the same way many in the U.S. do: by following celebrities and social media.

Working Women Are Losing Ground in China

● Gender discrimination is on the rise, a side effect of Beijing's push to boost birthrates

When a marketing director at an internet startup in Beijing told her bosses she was pregnant in 2017, they congratulated her. Then, she says, they began sending her on business trips with increased frequency. After some months they demoted her and hired another person to fill her position. When she had to take sick leave because of complications with her pregnancy, the company refused to pay her salary and removed her from the email system, leaving her little choice but to quit, she says.

Four years on, Liu Tao is still deep in a legal battle with her former employer. That name is a pseudonym she uses to speak about her case, to avoid losing out on future job opportunities or being bullied online, which has happened to other Chinese women who've sued their employers for gender discrimination. The ordeal has taken a toll on her finances—driving her to the brink of bankruptcy—and on her mental health: She says she contemplated suicide in January 2018 after a tribunal rejected the first of three labor dispute arbitration requests on the grounds of insufficient evidence. Her son was just 4 days old at the time. "It's been an excruciating process," says the 37-year-old, who's seeking a public apology and 50,000 yuan ($7,728) as compensation for the emotional pain she's endured. "All I want now is justice," she says, "and that no more women will have to suffer what I did."

Although there are no official statistics on workplace discrimination in China, interviews with lawyers, recruiters, academics, and labor activists point to a notable pickup in cases of employers declining to give jobs and promotions to women. Economists who analyzed data from a single large city found the gender pay gap for new hires has widened more than 20% since 2013, when the government began allowing some families to have two children. And the ratio of female to male workers has dropped the most among major economies in the past four years, according to data compiled by the World Bank.

It's a problem policymakers will need to grapple with now that China's government has eased restrictions further to allow couples to have three children as part of an increasingly desperate effort to reverse falling birthrates. "The three-child policy will certainly be a huge blow to working women," says Liu Minghui, a law professor at China Women's University and a public-interest lawyer who's representing Liu Tao (the women are not related). "Companies already don't want female workers under the two-child policy—now they are going to discriminate even more."

China can't afford to have women dropping out of a workforce that's already shrinking as its population ages rapidly. The country has one of the highest labor force participation rates for women in all of Asia, at 61%, but that number has been trending down since the 1990s. Raising the rate by 3 percentage points would deliver a $497 billion boost to the economy, equivalent to 2% of gross domestic product, according to a 2019 study by PwC.

A former human resources manager at a Beijing-based internet company says she witnessed the environment for women deteriorate during her five-year stint there. Managers commonly sidelined female employees after they got pregnant, and they pressured one to resign by dispatching her on frequent business trips, says the woman,


● Liu Tao

PHOTOGRAPH BY LI WEI FOR BLOOMBERG BUSINESSWEEK. DATA: WORLD BANK; HSBC

Edited by Cristina Lindblad

who requested anonymity for fear of retaliation. "We became less willing to hire female workers after 2016," she says, referring to the year the one-child policy officially ended. "For positions that required long hours, I didn't even bother to open the résumés I received from female candidates."

One of the biggest reasons behind the growing discrimination is employers' reluctance to pay for maternity leave, according to corporate recruiters. By law, women in China are entitled to at least 98 days of leave with full pay, but the benefit is only partially funded by the state. Also, women are seen as less likely to commit to long working hours after they have children because they lack access to child care. Plus, they shoulder a bigger share of domestic duties, spending an average of 126 minutes on housework a day, compared with 45 minutes for men, a national survey in 2018 showed.

China's tech industry, the source of many of the country's most coveted jobs, has become a notoriously unfriendly place for working mothers. "The growing push among the tech companies, most famously, to force workers to work excessively long hours is another trend that disproportionately affects women, because it's still the women who are expected to do all the housework," says Geoffrey Crothall, communications director at advocacy group China Labour Bulletin.

China already has laws that ban gender-based discrimination in employment. Nevertheless, the central government felt compelled in 2019 to lay out specific rules related to hiring: Prospective employers may no longer ask female job candidates about their marriage and childbearing status, demand pregnancy tests, or post help wanted ads that specify a gender requirement or preference.

The rules don't seem to be having much effect. According to a survey of more than 7,500 women released in March by Zhaopin Ltd., an online recruitment firm, as many as 56% had to field intrusive questions in job interviews, and 30% said they encountered employers who only wanted men. Pop Mart International Group Ltd., a Beijing-based toymaker, apologized last month after it came under intense criticism on social media for asking female job candidates to write down whether and when they planned to have children on an application form. "The enforcement of existing laws and regulations is still very poor, and even the government itself is widely discriminatory in its hiring," says Yaqiu Wang, China researcher at Human Rights Watch. Some 11% of the government job postings for civil servants in 2020 specified a preference or requirement for men, according to a study by the advocacy group.

Few women have taken employers to court for discrimination, because it's both time-consuming and expensive. Plus, the odds of winning are slim, and the compensation is usually too low to justify the effort. "It's extremely difficult for women to defend their rights through legal channels, because many judges are not even aware of the problem," says Guo Jing, an activist who's set up a hotline to provide free legal help to working women.

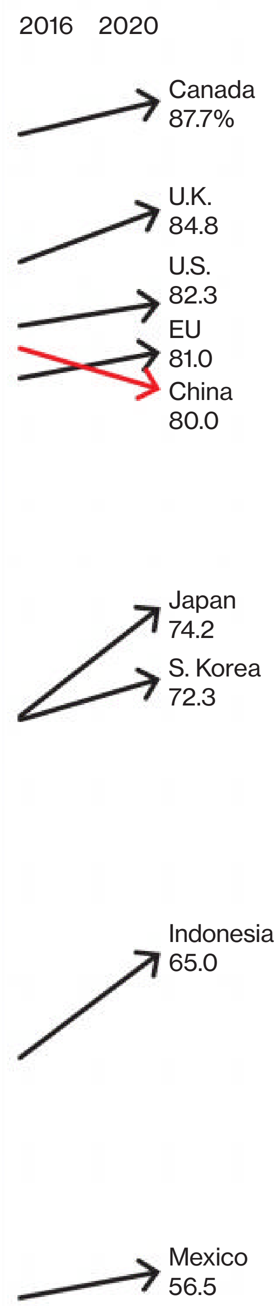
In 2014, Guo sued a vocational school in the city of Hangzhou for discriminating against female candidates, because it considered only men for a secretary position. She prevailed and received 2,000 yuan in compensation from the school, becoming the first plaintiff to win a judgment in a gender-discrimination-in-hiring case in China.

In Liu Tao's case, a Beijing court ruled in favor of the company in December and rejected her appeal earlier this month. The court accepted the company's argument that each of its actions was a normal business decision and decided there wasn't enough evidence to prove discriminatory intentions. Nineteen Chinese legal experts wrote a dissenting opinion on the case, saying judges should look at behaviors in a systematic way and avoid taking a too-narrow approach.

Liu Tao is determined to keep fighting and will appeal the latest ruling. "If no one sues companies that discriminate against women, they will only become even worse," she says. "But if every woman can fight for their rights, surely things will change for the better with time." —*Yujing Liu*

THE BOTTOM LINE China's government needs to move more forcefully to curb gender bias in hiring and promotions if it's to succeed in its goal of getting women to have more babies.

▼ Women's labor force participation as a share of men's



"For positions that required long hours, I didn't even bother to open the résumés I received from female candidates"

Can't Hide From Diaper Inflation

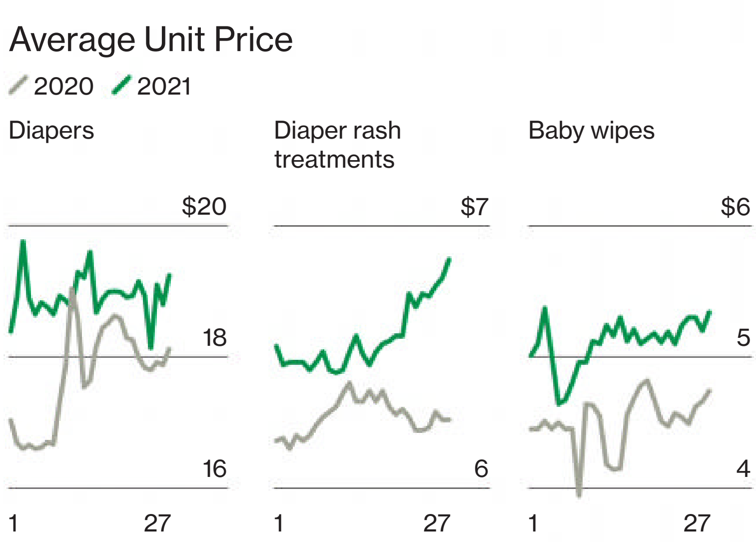
● Lower-income households are struggling to absorb double-digit price increases

Each box of diapers demands another sacrifice from Richard Dixson's family. First it was forgoing his wife's trips to Whole Foods for vegan products. Now his 8- and 6-year-old granddaughters won't be attending summer camp. The guardian of four won't see any relief until his twin 3-year-old grandsons are done running through pullups that Dixson says cost almost $300 a month.

Families that were already struggling during the pandemic are facing a heavier burden as inflation makes an unavoidable expense costlier. Overall consumer prices rose 0.9% in June, the biggest jump since 2008, and are up 5.4% over the past 12 months. Discretionary purchases such as cars, apparel, and restaurant meals can be delayed. But diapers won't wait. "It's not like we're making cuts in areas of disposable income," says Dixson, 59, who lives in Kansas City, Mo. "We're making cuts on necessities. We feel it every week."

The average unit price of disposable diapers rose 14% from January 2020 to January 2021 and has remained elevated ever since, according to data from Nielsen. Packages that were priced at about $25 last year now can cost $40—and they come with fewer diapers inside. Indeed, baby-care items from rash ointments to wipes have seen double-digit increases in the past 12 months, and companies have indicated prices will rise again before the end of the year. On top of that, diapers are taxed in 36 states, anywhere from 2.5% to 7%, according to the National Diaper Bank Network.

America's diaper duopoly makes the impact of price increases almost inescapable. The most popular brands—Huggies, Luvs, Pampers, and Pull-Ups—are all made by either Kimberly-Clark Corp. or Procter & Gamble Co., which together account for 70% of the U.S. diaper market. In earnings calls, executives have said price increases are necessary to protect profit margins, which are being eroded by the rising costs of raw materials.



WEEK 1 ENDS THE FIRST SATURDAY OF THE YEAR. DATA: NIELSENIQ

Dixson, an employee at the nonprofit Community Action Agency of Greater Kansas City, has been going to the HappyBottoms diaper bank to supplement his purchases since the twins were born in 2018. Once a month he receives 30 training pants per child. Each is meant to last about two to three hours. In desperate straits, Dixson has considered stretching his stash by changing them less often. "I never would have thought I'd think that way," he says.

One in three U.S. families couldn't afford enough diapers even before the pandemic, a figure that's grown significantly since, says Jennifer Randles, an associate sociology professor at California State University at Fresno.

Diaper banks across the U.S. report a surge in demand. Joanne Goldblum, chief executive officer of the 200-member National Diaper Bank Network, says distributions have increased 68% during the pandemic. In New York, a diaper drive at the end of a school's academic year was complicated by $20 markups on Huggies on Amazon.com—even donors couldn't afford them. At a bank in San Antonio, registrations for potty-training classes jumped as much as 15% in the past two months.

The problem is bound to get worse in the 26 states whose governors are cutting off federal pandemic unemployment benefits months before they're set to expire in September. In Missouri, where they lapsed in mid-June, the managers of HappyBottoms have been scrambling to raise money as they brace for the aftermath.

Organizers might not be able to provide more than the usual per-child allotment of 50 diapers—or 30 pullups—if they're too expensive. And the staff of 12 won't grow, though the bank is already expecting to surpass last year's total of more than 45,000 distributions. Along with giveaways directly from its warehouse, HappyBottoms has started drive-thru events and home deliveries to meet the need.

● Share of the U.S. diaper market controlled by Kimberly-Clark and Procter & Gamble

70%

FROM TOP: CHASE CASTOR/BLOOMBERG, BESS ADLER/BLOOMBERG

"It's scary," says founder and Executive Director Jill Gaikowski. "Most of our families are working two to three jobs, and they still can't afford diapers."

Diapers have come a long way from a simple cloth swaddling held together with safety pins. Modern disposables use a so-called core and chassis construction that involves multiple layers of cellulose and superabsorbent polymers that can soak up many times their weight in fluids. Global pulp prices have jumped more than 75% since 2020's lowest level in August, thanks to rebounding demand in Asia and tight supplies among major global producers.

P&G told investors during its latest earnings report to expect price increases by September, and they could be in the mid- to high-single-digit percentages. Almost all of Kimberly-Clark's increases took effect last month.

That means each of Brandon Noye's diaper runs has been costlier than the last. The 28-year-old father of three from Pensacola, Fla., has watched prices of P&G's Pampers go from $24.99 for about 200 in November to $40 for 168 in May. "It just doesn't make sense that I have to spend so much for less," Noye says.

Noye's wife became a stay-at-home mother during the pandemic and hasn't rejoined the workforce because day care is too expensive. Some months the family must choose between diapers and phone bills. Sometimes they put off the cable bill. It helped that their 3-year-old finished potty training in March, but they still have twin 7-month-olds.

▲ Dixson (top) with his 3-year-old grandsons; NGOs such as Little Essentials in Brooklyn, N.Y., are experiencing soaring demand for diapers

The Noyes, while strapped, are managing. But the pandemic is creating a "perfect storm of inequity" for many families, says Randles, the sociology professor. "These aren't bad parents," she says. "Kids get access to what their parents can afford. It says a lot about us as a country that so many families are struggling with this."

The financial burdens could be alleviated to some degree this month. As part of President Joe Biden's American Rescue Plan, the first wave of expanded child tax credits was set to be distributed to 39 million families on July 15. Eligible households will receive monthly payments of as much as $300 for children under age 6 and $250 for dependents from 6 to 18. —*Gerald Porter Jr., with Fabiana Batista*

THE BOTTOM LINE Soaring paper pulp prices have led diaper manufacturers to push up prices, forcing many households to rely on giveaways from charities.

Cornered By His Own P

● Can the GOP's Anthony Gonzalez survive a primary fight after defying Trump?

BILL CLARK/CQ-ROLLCALL/GETTY IMAGES

In a world without Donald Trump, Representative Anthony Gonzalez of Ohio would be a rising star in the Republican Party: son of a Cuban immigrant, standout wide receiver at Ohio State University, first-round draft pick of the Indianapolis Colts, graduate of Stanford's business school, and just 36 years old.

He *was* a star—until he voted with nine other House Republicans to impeach Trump for inciting the Jan. 6 Capitol riot. Then he wasn't.

Practically overnight, Gonzalez became persona non grata for many in his own party. Josh Mandel, an Ohio Republican running for U.S. Senate, branded him a "traitor" who should be "eradicated from the Republican Party." Max Miller, a former Trump aide from Ohio, dubbed him "RINO Turncoat Tony" and filed to run against him in the Republican primary next spring.

In late June, Trump, who relishes punishing his GOP critics, quickly endorsed Miller and held his first big post-election rally, in Wellington, Ohio, to trash Gonzalez as "a fake Republican and a disgrace to your state," adding, "Every single Republican needs to vote him out of office."

Gonzalez isn't fazed. "I didn't watch a single minute of the rally," he says. "I took my wife to a nice Italian dinner and was in bed by 9:30 p.m."

Even so, his impeachment vote trails him everywhere, not least because Trump and his acolytes keep bringing it up. "It's created a lot of political noise," Gonzalez says. "In politics today, the angriest, loudest voices tend to get the most coverage and airtime, so you have to find a way to look through all that noise and find what's true and valuable for your constituents."

He intends to do just that. Unlike many elected Republicans who've come in for Trump's wrath, Gonzalez isn't retiring or backing away from his vote. But neither does he flaunt it and wave a red cape at the bull the way his Republican colleagues Liz Cheney of Wyoming and Adam Kinzinger of Illinois like to do. He's simply a guy who voted his conscience and is trying to get reelected to a third term from his Republican-leaning district southwest of Cleveland.

This makes him an object of intense curiosity to political insiders in both parties, who believe Gonzalez's fate next spring could shed a great deal of light on whether Trump's strength with Republicans is as enduring as it appears to be—or if there's a chance that serious, credentialed Republicans who aren't totally in thrall to him can finally reassert some measure of control over their party.

Edited by
Amanda Kolson Hurley
and Rodney Jefferson

"The Max Miller-Anthony Gonzalez showdown is a little bit like Groundhog Day," says Scott Tranter, a Republican strategist who's done work in Gonzalez's district (though not for either candidate). "If Miller wins, it's like the groundhog sees his shadow and we know Trump's influence extends for another season. But if Gonzalez holds on to his seat, then maybe spring has arrived for the GOP."

It's fair to say that the expectation among the political cognoscenti is that Republicans are in for a long winter. Inside sentiment is running against Gonzalez and the other Republican House members who asserted their independence from Trump. "I'd be surprised if more than three of the 10 Republicans who voted for impeachment are still in Congress in 2023," says David Wasserman, a House expert at the nonpartisan *Cook Political Report*. Gonzalez "has a shot because there's still time. But he's the underdog, no question. Republican primary voters are likely to side with Trump. It's his party."

Gonzalez makes for an interesting test case because he has a strong claim, at least by traditional standards, for why voters should want to reelect him. Namely, he's doing exactly what he said he would do. His 2020 campaign centered on two big themes: defeating Covid-19 and distributing vaccines to all who want them, and "physically rebuilding our country by enacting a major infrastructure bill," as he put it. Today the U.S. is rapidly reopening as vaccinations spread and the economy picks up steam. And in late June, President Joe Biden announced a bipartisan agreement for a $579 billion infrastructure deal that's funded through a public-private financing mechanism that Gonzalez has long touted and helped develop through his work with the bipartisan House Problem Solvers Caucus.

He won't lack for resources, either. Gonzalez says his fundraising this year has produced the best two quarters he's ever had. While there's no escaping his detractors (literally—they seek him out in airports and supermarkets), he says he's regularly approached by a much more discreet class of voter who quietly supports his stand on impeachment and his carrying out the things he promised to deliver. He's betting they'll show up for him when it counts, even if they don't make nearly as much noise as his critics. "Politics is a weird animal," Gonzalez says. "It's different than business. But I do believe that if you do good work and deliver results, ultimately you get rewarded."

His congressional tenure could very well hinge on whether enough of these silent supporters turn out for the Republican primary. Many experts are skeptical they will. "There's a new name for Republicans that believe Gonzalez was right—it's 'Democrats,'" says Wasserman. "They're not going to be voting in a Republican primary."

If Gonzalez seems oddly sanguine about his prospects, it isn't because he doesn't see the threat that lies before him. Rather, he appears to have a healthier relationship with his own political ▶

Republican House Members Who Voted to Impeach Trump

Representative	State	Share of district's vote in 2020	Trump won district	Has 2022 primary opponent
Liz Cheney	Wyo.	69%	●	●
Dan Newhouse	Wash.	66	●	●
Adam Kinzinger	Ill.	65	●	●
Anthony Gonzalez	Ohio	63	●	●
Tom Rice	S.C.	62	●	●
Jaime Herrera Beutler	Wash.	56	●	●
Fred Upton	Mich.	56	●	●
John Katko	N.Y.	53		
Peter Meijer	Mich.	53	●	●
David Valadao	Calif.	50		●

2022 PRIMARY OPPONENTS AS OF JULY 12.
DATA: BLOOMBERG GOVERNMENT, STATE ELECTION OFFICES, BLOOMBERG REPORTING

◀ mortality than a typical member of Congress, who's intent above all else on keeping hold of his seat. Gonzalez isn't—and so he's free to act without the fear that governs the behavior of so many of his colleagues. This equanimity, he reckons, is due to his having successfully reinvented himself after a promising football career was cut short by multiple injuries. He'd like to stay in Congress. But he doesn't need to.

These days, most Republicans heed the word of Trump. Gonzalez, though he's a bit chagrined about it, draws instead on the wisdom of a Hall of Fame football coach.

"I try not to use football analogies," he says, "but Bill Parcells had a way of talking about pro football. He'd say, 'The train's always running. You're lucky enough to be on the train right now, so you've gotta do your best to have the impact that you want to have. But at some point we're going to throw you off the train, and the train's going to keep moving without you.' That's how I see this job: I'm on the train, and I believe we're at a really important time in the country."

Gonzalez's impeachment vote made that clear. He's banking on voters' willingness to look beyond it. In the meantime, whether or not the train carries him beyond 2022, he's discovering his current career has become the full-contact affair his last one was. —*Joshua Green*

THE BOTTOM LINE Blasted as a "RINO," Gonzalez faces an uphill climb to stay in Congress. His fate in next spring's primary will gauge how entrenched Trump's influence over the GOP is.

Saudi Arabia's Slow Religious Revolution

● Hard-line fatwas are frowned upon as the kingdom shifts from theocracy to autocracy

As an agent of Saudi Arabia's powerful religious police, Ahmad Alghamdi thought he'd finally found the perfect job. He would order stores to close during prayers, tell men to go to the mosque, and ask women to adjust their veils. He'd previously had short stints as a customs official, accountant, and teacher, but those jobs didn't sit well with the sheikhs, or religious scholars, whose doctrine he followed.

Yet not long after joining the formidable

muttawa in his 20s, he grew disillusioned, he says, with what was a pillar of the kingdom's establishment. He wasn't convinced its heavy-handed practices were grounded in Islamic law.

Today, Alghamdi, now 56, is a sheikh who advocates for freedoms that his former superiors had banned, such as allowing men and women to mix in public, or to listen to music, or even to celebrate Valentine's Day. He can speak without fear of retribution because the kingdom's de facto ruler, Crown Prince Mohammed bin Salman, is chipping away at the power of the doctrine known as Wahhabism that's underpinned his family's rule in the birthplace of Islam. The shift from theocracy to autocracy is dividing Saudis like Alghamdi from those who complain it could undermine the kingdom's status in the Muslim world.

"This is a revolution that's long overdue," says Alghamdi, speaking by telephone from Mecca. "There should be space for religious debate but not scholars imposing one school of thought on society."

Religion shaped Saudi Arabia into a place like no other. The nation is home to the two holiest Muslim sites, in Mecca and Medina, and its constitution is the Koran. Wahhabism, a stringently conservative strain of Sunni Islam, defined the kingdom for decades. But it runs counter to Prince Mohammed's now 5-year-old plan to diversify the economy away from oil by 2030.

The crown prince wants to draw foreign investment and build the kingdom's entertainment and tourism sectors, which face stiff competition from Saudi Arabia's more permissive neighbors such as the United Arab Emirates. Fatwas, or religious edicts, of the kind that Saudi clerics used to issue—inciting hatred against Westerners, claiming that driving can damage women's ovaries, and banning excavations of pre-Islamic historical treasures—aren't in sync with the new goal.

"We cannot grow, we cannot attract capital, we cannot have tourism, we cannot progress with

ILLUSTRATION BY RAMI TANNOUS

such extremist thinking in Saudi Arabia," Prince Mohammed said in an interview with a local TV station in April. "If you want millions of jobs, if you want unemployment to decline, if you want the economy to grow, if you want your income to improve, you must eradicate these projects."

In his quest to tighten his grip on power, Prince Mohammed muzzled opposition voices, jailing women who'd lobbied for the freedoms he's introduced, as well as activists who've been mildly critical of his plans and clerics such as the popular sheikh Salman Al-Odah. Most prominently, the 2018 murder of *Washington Post* columnist Jamal Khashoggi on the prince's watch drew international condemnation, hobbling his Vision 2030 plan.

But the changes continue. In the past five years, women have been allowed to drive—ending the only ban of its kind in the world—as well as travel without the consent of a male guardian and serve as special security guards at the Prophet's Mosque in Mecca.

The government announced in February that it's working to overhaul the judicial system, which is rooted in Islamic law, by the end of the year, partly to encourage investors long deterred by the perceived arbitrariness of the kingdom's courts.

The crown prince is introducing the changes that touch on religion "piecemeal," in contrast to Vision 2030's public goals and deadlines, according to Kamran Bokhari, director of analytical development at the Newslines Institute for Strategy and Policy in Washington. "He's almost trying to see what he can get away with, and there's no discernible pattern for this," he says.

That strategy has its risks. In May a directive ordered mosques to lower the volume of loudspeakers and switch them off after the call to prayer instead of broadcasting the full service. Fridays and sermons during the Eid holiday are exempt, though that didn't stop a storm of protest on social media. The Consultative Council, a body appointed by the king that serves as a quasi-parliament, was going to vote on a proposal to allow shops to remain open during prayers, again, except on Fridays. But the discussion was postponed two hours before it was scheduled to start.

A 25-year-old man who gave his name as Mazen and works in the military says Saudi Arabia is in danger of losing its identity. "Parties that go on for hours with music blaring so loud it keeps people up are now acceptable, but a few minutes of prayers cause noise pollution?" he asks. Saudi businessman Abdulaziz, 32, says it's now tough to distinguish what should be allowed and what not. "I don't know if I was on the right path before or whether the new path they are creating is the right one," he says. "It's like my head has been hit with an electric shock."

On a recent visit to a pharmacy in the capital, Riyadh, the pharmacist told a woman he couldn't dispense medicine because it was prayer time. She insisted; he refused. The reason, he said when asked later, was that he didn't want to be reported by the religious police.

The declining power of the religious establishment has been evident for a while, though. In 2016, shortly after Prince Mohammed began his meteoric rise to power, he clipped the wings of the muttawa. Agents could no longer arrest people, chase them, or demand their documents. It's quite rare to see them in malls now, and when they do go they're allowed only to advise rather than admonish people. In an effort to show their softer side, agents gave out colorful balloons embossed with the commission's logo to visitors at a book fair in 2019. A lot of their activity takes place on social media, where they urge people to protect themselves from the coronavirus and publish quotes from prominent scholars.

The leadership of Prince Mohammed, 35, comes in greater contrast to the kingdom's regional adversary, Iran. In June that country elected Ebrahim Raisi, 60, as president. The hard-line cleric was a staunch supporter of the 1979 Islamic Revolution that brought Ayatollah Ruhollah Khomeini to power.

Indeed, it was that event that became one of the catalysts for the Saudi government to give free rein—and more money—to its religious institutions and export its brand of religion to Europe, Pakistan, and other places. It didn't want to appear less Islamic than its Shiite rival. By the 1980s, the religious establishment had become so entrenched that it controlled every aspect of social and legal life despite attempts by the late King Abdullah to loosen its grip.

Sheikhs would be consulted on everything from whether a woman could shape her eyebrows to how men should avoid engaging in *khilwa*, being alone with the opposite sex. Teachers would warn children that their faces would turn black and worms come out of their mouths if they failed to pray five times a day.

In that environment, Alghamdi was seeking to live a model life. In 1988 he joined the Committee for the Promotion of Virtue and the Prevention of Vice, which oversees the religious police, in Jeddah. Soon he discovered that practices such as spying on people or roughing them up after arrest were based on interpretations of clerics. ▶

"I don't know if I was on the right path before or whether the new path they are creating is the right one"

◀ When he complained, he was assigned to a desk job for three years, though he later rose to chief of the Mecca region.

His career started unraveling in 2009, when King Abdullah University of Science and Technology was founded as Saudi Arabia's first coeducational university. Alghamdi supported it. Amid complaints from hard-line clerics, his home was stormed by a group of young men who demanded to mix with the female members of Alghamdi's family as punishment.

After leaving the force in December 2011, he started to speak out. He used Twitter to respond to followers who wanted to know if it was acceptable for women to pluck their eyebrows or to expose their hands and faces. He said yes to both. When conservatives challenged him to show the face of his wife, he appeared on television with her in 2014. The backlash on social media was brutal, he says.

Alghamdi, who's now retired, dismisses those who say Saudi Arabia is straying from true Islam: "They're either afraid of change or have personal interests—or want to control society by intimidation." The question is whether the religious hard-liners regain their clout. *—Donna Abu-Nasr*

THE BOTTOM LINE The Saudi crown prince sees curbing the religious establishment as necessary for development. Saudis are divided on changes such as turning down mosque loudspeakers.

When Covid's End Means A Return to Prison

● Inmates sent home under the Cares Act find themselves in limbo

The cafeteria at the federal prison camp in Fairton, N.J., is rarely the site of much celebration. But one afternoon in the spring of 2020, the room was buzzing. A provision of the pandemic-relief package passed by Congress had given some of the inmates the chance to leave early and serve time under home confinement.

With dozens of prisoners gathered in the cafeteria, a Federal Bureau of Prisons official read aloud a list of inmates who'd qualified for the program. The names were greeted with high-fives and cheering. Among them was Robert Lustyik, an ex-FBI agent who was about halfway through a 15-year sentence for bribery. "It was a feeling as if I had won the Heisman Trophy," Lustyik says.

A few weeks later, Lustyik, 59, moved back in with his wife and two children in Sleepy Hollow, N.Y., next door to the cemetery where Washington Irving is buried. Over the past year, he's started a personal-training business out of his garage and has complied with all the rules of home confinement, wearing an ankle bracelet and checking in with prison officials every day.

But as the pandemic approaches an end, the clock is ticking for Lustyik and thousands of other federal prisoners released under the Coronavirus Aid, Relief, and Economic Security Act, or Cares Act. In the waning days of the Trump administration, the U.S. Department of Justice's Office of Legal Counsel issued a memo outlining its interpretation of the law's home-confinement provision: Once the government declares the pandemic has ended, the memo said, many of the inmates will have to return to prison.

The memo left Lustyik "heartbroken," he says. Typically, the Bureau of Prisons releases inmates to home confinement toward the end of their sentences—and forces them to come back only if they violate the strict terms of early release. Under expanded powers granted by the Cares Act, the bureau made thousands of nonviolent offenders eligible last spring, even if they'd served only half their sentences, as long as they met certain criteria, such as good behavior or high vulnerability to Covid-19. When he left Fairton, Lustyik says, a prison counselor told him he was leaving for good.

Despite the protests of prisoner advocacy groups and Democratic lawmakers, the Biden administration has so far declined to rescind the memo. According to Bureau of Prisons statistics, roughly 4,400 inmates are on home confinement under the Cares Act, with about half close enough to finishing their sentences that they probably won't have to go back. That leaves about 2,000 inmates who may be forced to return to prison.

"The waiting is horrible," says Kevin Ring, the president of Families Against Mandatory Minimums, an advocacy group that's fought the Justice Department policy. "Some got home and immediately got a job and started going to school.

PHOTOGRAPH BY SCHAUN CHAMPION FOR BLOOMBERG BUSINESSWEEK

Others really have focused on reconnecting with their families and, in a lot of cases, helping take care of families."

Over the past few months, the Justice Department has declined to say definitively what it will do with those prisoners. "This will be an issue only after the pandemic is over," a department spokesperson said in a statement.

That stance has left people like Brian Carr wondering how long their freedom will last. Carr, 31, was given a seven-year sentence in late 2015 after he pleaded guilty to drug dealing. His whole life had felt like a series of accumulating setbacks, he says—until he found out last year that he could leave prison. When he called his mother to share the news, his hands were shaking with excitement. "I couldn't even remember her number by heart, and I know her number by heart," he says.

Now living in Baltimore, Carr plans to enroll in technical school and eventually start a logistics company that transports cars to dealerships across the country. A return to prison would put all that on hold. He'd also have to figure out a way to break the news to his young children. "That's going to be hard to explain," Carr says. "They're gonna feel like I did something wrong again, and I actually didn't."

For some of the prisoners released last year, it's taken months to acclimate to living at home. In December, Jackie Broussard welcomed back her daughter, Stephanie White, after she was released under the Cares Act. "She wouldn't open a door, she wouldn't open a refrigerator, she wouldn't ask for anything; she wouldn't really talk," Broussard says.

Since then, White, 32, has slowly adjusted to her new life, getting a job operating a forklift at a warehouse near her mother's home in Fort Worth. But two and a half years remain on her sentence for a drug conviction. "I'm going to be terrified the day the federal government says the pandemic is over," Broussard says.

Most experts agree it's unlikely the Biden administration will reverse the Justice Department memo. A person involved in crafting the opinion defended its conclusions, describing the analysis as a straightforward process of statutory interpretation, carefully vetted by both political appointees and career officials in the Office of Legal Counsel. The Cares Act granted the Bureau of Prisons the authority to offer home confinement to a wider swath of the prison population. But the statute's language can be read as narrowly tailored, restricting that expanded authority to the "emergency period" of the pandemic.

The government has further options that could spare released inmates a potentially traumatizing return to federal prison. President Joe Biden could grant clemency to prisoners who've been on home confinement during the pandemic, or Congress could pass legislation making it clear that the inmates can stay home after the crisis ends.

▲ Carr

"They've been vetted by the Department of Justice and the Bureau of Prisons as being low risk, and most have already served a significant amount of time in prison," says Shon Hopwood, a criminal justice expert at Georgetown University. "I don't think anyone—DOJ included, and even the Bureau of Prisons—thinks that, as a matter of policy, it's wise to send those people back."

Regardless of what happens to the prisoners released last year, the Cares Act may offer a model for longer-term solutions to mass incarceration. Before the pandemic, the Bureau of Prisons had the authority to transfer inmates to home confinement for just the final six months of their sentences. But the prisoners who were released under the Cares Act have almost all followed the rules, with only 190 sent back for violations. "Somebody should be looking at broadening the BOP's authority permanently," Hopwood says. "Putting people on home confinement—that is still punishment. But it costs a fraction of taxpayer money that incarceration does." *—David Yaffe-Bellany*

THE BOTTOM LINE The vast majority of prisoners at home have complied with the rules. Advocates say this shows that home confinement could help reduce mass incarceration.


WE WILL
NEVER
STOP
INNOVATING FOR A
HEALTHIER WORLD
There is much to be done in healthcare, and when it comes to COVID-19, we are leveraging our resources and expertise in ways that can make a real difference. For example, we're equipping front-line workers with our state-of-the-art, mobile X-ray and point-of-care ultrasound systems to facilitate diagnoses and help prevent spread of infection.
In our further contribution to ending the pandemic, we're accelerating clinical trials of our antiviral drug. We are also expanding our contract bioprocessing facilities and strategically making partnerships to help ensure, through our manufacturing capabilities, a steady supply of vital medications and vaccines are available for people around the world.
As long as there are healthcare needs to be met, we will NEVER STOP.
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Four Checkups A Year—Plus Free Rides

Oak Street says it can reduce health-care costs and make a profit while serving Medicare patients

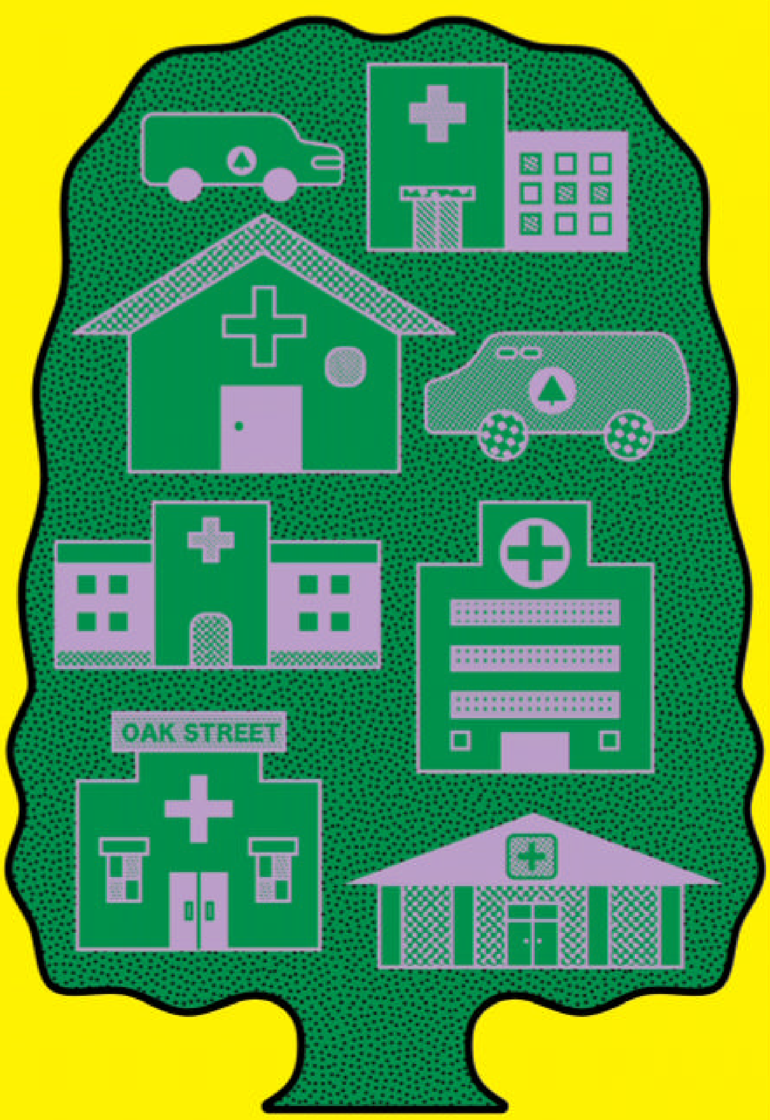


ILLUSTRATION BY INKEE WANG

Inside a sleek new health clinic in one of New York City's poorest neighborhoods, Ramon Jacobs-Shaw is wondering whether his next patient will show up. A Harvard-trained physician who spent most of his career working in large academic medical systems, he took a job last September as a senior medical director for Oak Street Health Inc. The 9-year-old company aims to reinvent care for Medicare patients with low incomes and chronic health problems.

The clinic in Brooklyn's Brownsville neighborhood stands out with its bright green sign, wide plate glass windows, and airy lobby. The neighborhood, where more than two-thirds of residents are Black, has one of the shortest life expectancies in the city, a decade less than those of the wealthiest precincts.

Jacobs-Shaw's patient that day had just been in the hospital. Oak Street tries to see patients soon after they're discharged to prevent a repeat visit. "If there was something that led to that hospitalization, how do we fix that problem all the way at the root?" Jacobs-Shaw asks.

The clinic is one of more than 90 Oak Street centers in 15 states, and there are plans for many more. The company says its high-touch approach—frequent checkups, preventive screenings, meetings with social workers, and free rides to the office—can reduce patients' medical costs. And Oak Street's contracts with insurance companies that offer Medicare health plans allow it to pocket some of those savings in exchange for assuming the ▶

July 19, 2021

Edited by Rick Schine and Rebecca Penty

◀ financial risk of caring for the elderly and disabled.

Investors are taking a chance on the approach: Although Oak Street has yet to turn a profit, its share price has almost tripled since going public last year. The company is now valued at $14 billion. Several other upstarts with similar business models, such as Cano Health Inc. and Agilon Health Inc., have gone public in recent months. And industry giants such as UnitedHealth Group Inc. and Humana Inc. are pursuing the same strategy.

Oak Street's reported annual health outcomes per 1,000 patients

	Medicare benchmark	Oak Street
Hospital admissions	370	183
30-day readmission rate	19%	11%
Emergency department visits	1,091	535

Oak Street says the potential market includes more than 60 million people eligible for Medicare, whose health costs exceed $800 billion a year. Yet others question whether investing more in primary care to prevent costly episodes later on can save money. Oak Street and its peers "stop short in showing that they can actually reduce overall health-care spending, and it's not clear that they can," says Kevin O'Leary, a Minneapolis-based health-care analyst.

Oak Street Chief Executive Officer Mike Pykosz was one of three colleagues from Boston Consulting Group who founded the company in 2012. They wanted to design clinics with a formula that could be replicated across the country, starting with two centers in Chicago. Oak Street centers have a distinct look and feel, with shared design touches such as similar shades of green and wood flooring. Doctors, nurses, and other staff are linked through software called Canopy that tracks patients' needs like screenings and vaccinations. "We're opening up centers the same way every time," Pykosz says.

The company employs about 3,500 and treats a total of 109,000 patients in cities such as Cleveland, Dallas, and Detroit. Oak Street says those patients go to hospitals about half as often as the general Medicare population. Griffin Myers, Oak Street's co-founder and chief medical officer, says the challenge is not providing treatment but winning patients' "trust and building relationships."

Oak Street's business model is possible because of the way it gets paid. Doctors and hospitals traditionally have fee-for-service arrangements, where each test, procedure, or hospital trip generates a payment. The most intense specialty care is often the most lucrative. Critics say this system directs too much time and money to expensive, needless services, while other valuable care—such as preventive screening—is neglected.

Oak Street and others flip this model through agreements with private plans that receive a monthly per-patient fee from Medicare. The plans then pass most of that fee on to Oak Street for patients who sign up. The company takes on the risk for those patients' total cost of care.

This setup lets Oak Street profit if its members' medical costs are below what Medicare pays. To avoid costly hospital visits, the company seeks to deliver a high "dosage of primary care," Myers says. It aims to see its most vulnerable patients about every three weeks. Even the healthiest members are encouraged to visit primary-care providers every three months.

Oak Street executives say this approach saves money, though a report last year in the journal *Health Affairs* cautioned it could increase total spending. Medicare pays health plans more for taking care of patients with greater documented health problems. The higher payment is intended to keep plans from cherry-picking healthy members. But it means Oak Street and its health plan clients boost monthly revenue by documenting their members' health conditions, even if they're not able to reduce their medical costs. "These organizations are living in a relatively cash-rich environment, where they can take those dollars and invest in trying to do good for their patients," says Amol Navathe, who sits on the Medicare Payment Advisory Commission and is a health economist at the University of Pennsylvania.

Oak Street also faces questions about whether it can turn a profit. It's losing money as it invests in expansion. The company reported revenue of $883 million last year and a net loss of $192 million. New centers cost $1 million and take up to a year to build. A clinic usually takes two to three years to reach profitability.

The Brownsville location, opened in October, has only about 600 patients. Centers at full capacity serve more than 3,500. Heather McBride, a 59-year-old Brooklynite who joined Oak Street last year, has been on Medicare since a car accident 15 years ago required a transplant in her small intestine and left her disabled. She has a full-time aide, spent a year in the hospital, and has needed costly air ambulance rides to the Pittsburgh transplant center where her original operation was done.

She visits Oak Street several times a week for exercise classes, traveling in a company green van. She says her doctor's attentiveness has prevented return hospital visits. And she's impressed by the kindness of the staff. "I could only say, 'wow,' when I first came there."

Jacobs-Shaw, the director, says he sees the impact on patients. "They value that we're in a community like Brownsville, Brooklyn, and our patients often say to us, 'I'm so glad that you're here,'" he says. —*John Tozzi*

THE BOTTOM LINE Oak Street Health says it can profit by offering its Medicare members preventive primary care to reduce health-care costs. Investors have responded by valuing the company at $14 billion.

ILLUSTRATION BY INKEE WANG. DATA: COMPANY IPO FILING (OAK STREET HEALTH); COMPILED BY BLOOMBERG (NOVO NORDISK)

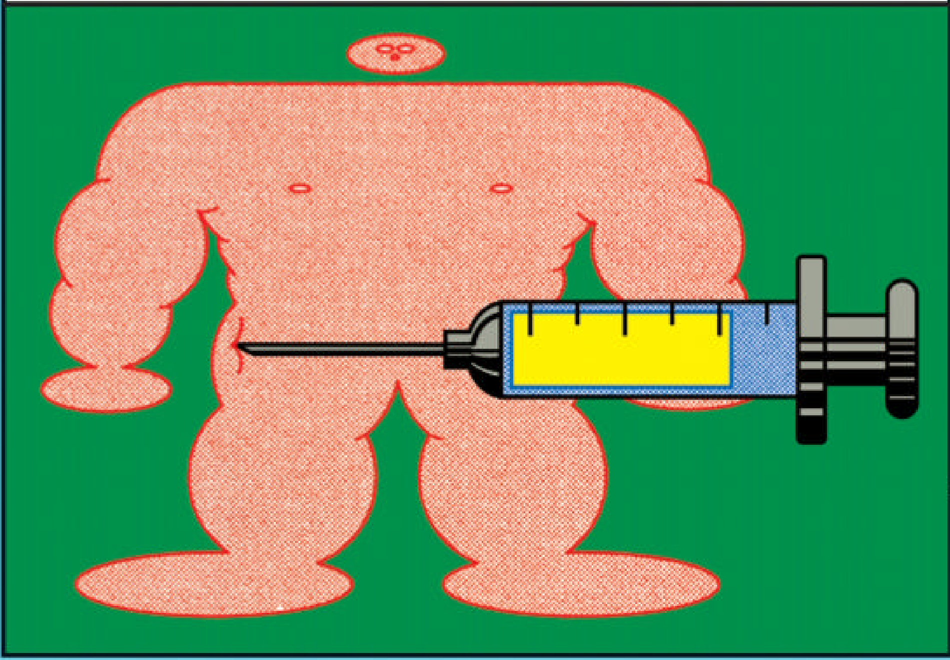
Finally, a Weight Drug That May Work

The FDA has given Novo Nordisk's Wegovy a green light, opening up a potentially huge market

When a new obesity medication from the Danish drugmaker Novo Nordisk A/S began selling in the U.S. in June, it became the most effective weight loss drug on the market. Wegovy helps patients lose an average of about 15% of their body weight, almost double the rates demonstrated by other prescription treatments, according to study results. That translates to a loss of about 20 to 70 pounds for eligible patients. Only costly and invasive bariatric surgery has shown the ability to eliminate more pounds.

Wegovy works by activating parts of the brain that regulate appetite. Novo, a major manufacturer of diabetes medications, is pinning its hopes on new weight loss meds to diversify its business, and Wegovy, which the Food and Drug Administration approved on June 4, is its most promising offering yet. With more than 100 million people categorized as obese, the U.S. is a potentially huge market for Wegovy, which costs $1,350 for four weekly injections and is being pitched as a long-term therapy.

The drug's success will depend on overcoming insurers' resistance to weight loss treatments. "Obesity drugs tend to have difficulty getting insurance coverage, because we don't see obesity to be a disease," says Caroline Apovian, the co-director of the Center for Weight Management & Wellness at Brigham & Women's Hospital in Boston who serves on Novo's scientific advisory board.

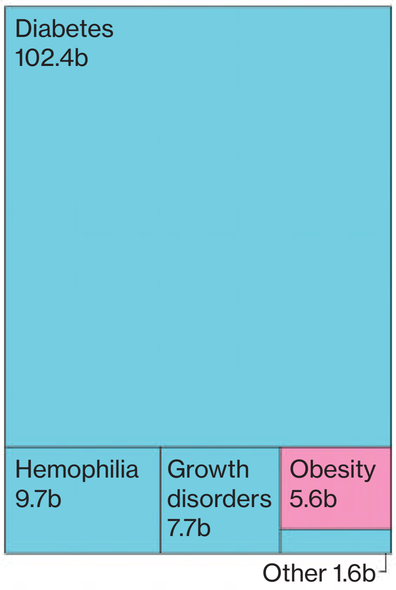


Insurance companies, pharmacy benefit managers, and employers determine whether health plans cover weight loss drugs, and which ones. Today only about half the clients of Cigna Corp.'s Express Scripts unit and Prime Therapeutics LLC, two major pharmacy benefit managers, reimburse for weight loss drugs. Express Scripts recently added Wegovy to its largest formulary, covering about 24 million people. Insurers Anthem Inc. and CVS Health Corp.'s Aetna don't typically cover weight loss drugs, but both have indicated Wegovy will likely get some coverage. Others have yet to decide.

Although "it's not for everyone," Wegovy has a role to play in treating obesity, says Amy Bricker, president of Express Scripts. She says she's optimistic that treating obesity will lower costs for Express Scripts' health plans.

Still, doctors and patients tend to be skeptical of new weight loss drugs, especially after earlier treatments had serious safety issues. Nausea and diarrhea were some of the most common Wegovy side effects found in studies. The drug will also come with a warning about potential thyroid cancer risks. Wegovy is one of some 10 FDA-approved weight loss therapies, a list that includes inexpensive generics and Saxenda, a Novo drug introduced in the U.S. in 2015. That medication is expected to have around $1.1 billion in global sales next year, after which its patents expire and revenue is expected to fall.

Novo Nordisk 2020 revenue, in Danish kroner



Novo is working to identify patients who best respond to Wegovy, building on results from clinical trials showing that about a quarter to half of participants shed 15% or more of their body weight. Another hurdle will be persuading people to keep taking the drug. Patients in the U.S. typically stay on Saxenda for only about six months. That may be because patients discontinue use after experiencing side effects, after their weight loss slows, or after facing insurance bottlenecks. For Wegovy, coverage is "going to build over time," says Doug Langa, president of Novo's U.S. business. "We know we're going to need that to really unlock the potential." —*Emma Court, with James Paton*

THE BOTTOM LINE Novo Nordisk, a supplier of drugs to treat diabetes, hopes to increase diversification with a new weight loss drug. But persuading insurers to go along may take some doing.

AI vs. Viruses

When a woman riding on her motorcycle in rural northern Thailand spotted a cow frothing at the mouth, she pulled over, snapped a few photos, and reported it on a mobile app. Local health authorities stepped in to limit the spread of foot-and-mouth disease to three cows, and farmers averted millions of dollars of potential losses, which would have been catastrophic for the village. The platform used in that 2016 case is now poised to expand to other countries in Asia and Africa, with Covid-19 putting such projects in the spotlight and underscoring the importance of heightened surveillance and quick action, especially in small communities. "Covid tells us that we need eyes and ears in these places," says Patipat Susumpow, who developed the early warning system.

● WHAT'S NEXT?
Patipat's Participatory One Health Disease Detection was among the projects awarded a total of $8 million in June by the Trinity Challenge, an initiative dedicated to preventing pandemics. Covid-19 has killed about 4 million people, roiling economies and exposing the vulnerabilities of health systems. The next pandemic could be by orders of magnitude worse. Facing that daunting possibility, researchers are accelerating work to detect and stop the transmission of disease with new technologies, expanded monitoring, improved data analysis, and enhanced vaccine development.

Governments in particular need to sustain investment, says Sally Davies, the former chief medical officer of England who started Trinity, a coalition of technology companies, universities, and other organizations focused on using data to stop emerging pathogens from triggering outbreaks. "To snuff something out is much easier and cheaper than moving slowly," Davies says. "My real worry is once we're through this, in another two or three years, how quickly will they forget?"

● HOW MUCH WILL IT COST?
The urgency is mounting, but spending on pandemic prevention still needs to increase by about $15 billion a year, a doubling of current levels, to adequately boost preparedness, according to an independent panel established by the Group of 20 developed nations.

Here are five efforts under way to give governments, scientists, and companies a head start before the next deadly pathogen emerges:

❶ PARTICIPATORY ONE HEALTH DISEASE DETECTION
The Thai platform arms local farmers with a mobile app that lets them flag diseases, helping officials quickly spot threats with pandemic potential that could pass from animals to humans.

❷ BLOOD COUNTS!
This U.K. effort aims to use artificial intelligence to analyze 3.6 billion blood tests that are already performed globally each year, creating an early detection system for infectious disease outbreaks.

❸ MEDSHR INSIGHTS AND EARLY WARNING SYSTEM
The project, based in London, plans to use AI to sift through research, electronic medical records from 1.5 million doctors in 195 countries, and social media to identify outbreaks.

❹ ALL-IN-ONE CORONAVIRUS SHOTS
The Coalition for Epidemic Preparedness Innovations, with a $3.5 billion plan to avert future pandemics, is funding the development of vaccines targeting all coronaviruses, as well as shots aimed at SARS-CoV-2, the virus that causes Covid-19.

❺ HUB FOR PANDEMIC AND EPIDEMIC INTELLIGENCE
The World Health Organization and the German government are creating a center in Berlin dedicated to using advanced technologies to predict, prevent, and detect health threats. ——*James Paton and Randy Thanthong-Knight*

ILLUSTRATION BY INKEE WANG

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▲ A clean room at Moderna's plant in Massachusetts

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For Moderna, going from startup to world-leading vaccine maker was challenging enough. Bringing messenger RNA to flu shots, cancer treatments, and more will be even harder

By Robert Langreth
Photographs by Philip Keith

A year ago, Moderna Inc. was an unprofitable company with no marketed products and a promising but totally unproven technology. None of its experimental drugs and vaccines had ever completed a large-scale trial. Experts were divided on how well the mRNA-based Covid-19 vaccine it was about to enter in a Phase III trial would stack up against older, more established vaccine technologies.

This year, Moderna could deliver 1 billion doses of its Covid shot and bring in $19 billion in revenue. It's become the rare biotech to hit the big time without being gobbled up by, or splitting profits with, a larger, more established company. Its market value—which hit $100 billion for the first time on July 14—exceeds that of stalwarts such as Bayer AG, the German inventor of aspirin, and biotech peers such as Biogen Inc., founded three decades prior.

The speed with which Moderna and its primary mRNA competitor, a partnership between Pfizer Inc. and BioNTech SE, devised their shots has made a major contribution to the fight to end the pandemic. With strong efficacy, steady supply, and no show-stopping safety scares (officials are carefully monitoring rare heart inflammation cases in teenagers and young adults), mRNA shots have become the vaccines of choice, at least in countries that can get them.

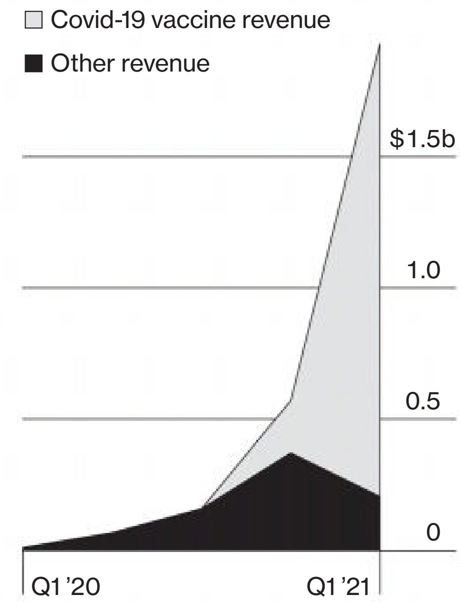
But for Moderna Chief Executive Officer Stéphane Bancel, the Covid vaccine is just the beginning. He's long promised that if mRNA works, it will lead to a giant new industry capable of treating most everything from heart disease to cancer to rare genetic conditions. Moderna has drugs in trials for all three of these categories, and Bancel says his company can also become a dominant vaccine maker, developing shots for emerging viruses such as Nipah and Zika, as well as better-known, hard-to-target pathogens such as HIV.

In the past 40 years, more than 50 new human viruses have been discovered. Only three have authorized vaccines. Bancel views that as an opportunity. "We are going to totally disrupt the vaccine market," he says during a late May interview at Moderna's Cambridge, Mass., headquarters, which fills a 10-story building north of the MIT campus. The Swiss drugmaker Novartis AG occupies labs in an adjacent building, and Pfizer and Merck & Co. have offices a few blocks away.

Bancel, who's 48, wears a pressed blue shirt, dark blue jeans, and a black Hermès belt. An avid runner, he appears even trimmer in person than on his frequent virtual conference appearances. He repeatedly jumps to his feet during the interview to graph on a whiteboard how the Covid outbreak could evolve. One chart forecasts seasonal waves, declining each passing year but still significant. Another projects the possible decay of vaccine efficacy over time, with mRNA shots like his starting in the best position but gradually declining. The take-home message coincides neatly with Moderna's business prospects: Countries may want to stockpile booster shots soon. "My mother is 72, and she has leukemia," he says. "I don't want her to go through the fall without a boost."

The company has vaccines for 10 viruses that are in, or about to be in, human trials. These include three types of Covid-19 boosters that are in midstage trials, a seasonal flu shot that began its first human study in July, and HIV shots that are slated to begin studies later this year. The furthest along besides the Covid shots combats cytomegalovirus, a ubiquitous bug that spreads through bodily fluids and is a common cause of birth defects; it's set to begin a Phase III trial this year in women of childbearing age. In the long term, Moderna is aiming to develop an annual supershot that could suppress numerous respiratory ailments, including Covid, the flu, and others. "Our goal is to give you several mRNAs in a single shot at your local CVS or GP every August or September," Bancel says.

Moderna's mRNA Mojo



Now comes the difficult part: delivering on that promise while keeping ahead of just about every other vaccine company in the world as they rapidly invest in mRNA. In the future, Moderna won't have the pandemic to highlight mRNA's most obvious advantages over older technologies—speed and flexibility. Future vaccines and drugs will usually have to go through the U.S. Food and Drug Administration's normal approval process, meaning longer follow-ups to gather data and 6- to 10-month review timelines. That time frame will provide space for mRNA-wielding rivals and older technologies to compete.

Pfizer, with its partner BioNTech, has become an mRNA manufacturing juggernaut and expects to produce 3 billion doses this year; it has also dominated foreign distribution of mRNA vaccines so far. Another vaccine, from CureVac NV in Germany, which took a different approach to mRNA, performed tepidly, proving only 48% effective in Phase III trial data released in June, but still another, from China's Walvax Biotechnology Co., will soon begin Phase III testing in seven countries.

More established technologies are reasserting themselves, too. On June 14, Novavax Inc. said its recombinant protein vaccine was 90% effective in a nearly 30,000-person trial in the U.S. and Mexico, with relatively few side effects—results that more or less matched those of the best mRNA shots. Vaccine giants Sanofi and GlaxoSmithKline Plc are in Phase III trials on their own protein-based Covid vaccine, which could hit the market by yearend.

Mani Foroohar, an analyst at SVB Leerink LLC, calls Moderna's accomplishments with the Covid vaccine "truly breathtaking." But he also says it's far from certain whether such vaccines will have clear efficacy advantages with other viral diseases. And how big a role the technology could play in treating noninfectious diseases such as cancer is unknown. So though public expectations are boundless, he says, "the revenue opportunity is not."

BANCEL: ADAM GLANZMAN/BLOOMBERG. DATA: COMPILED BY BLOOMBERG

The reply, for Bancel and the others pouring money into tiny RNA strands, lies in those two key advantages of speed and adaptability. At their heart, mRNA vaccines are a modular technology; they deliver the genetic code telling cells how to make the virus proteins that provoke an immune response, and the cells do the hard work from there. Now that Moderna is profitable and sitting on almost $8 billion in cash—Bancel's own stake, including options, is worth around $7 billion, according to the Bloomberg Billionaires Index—it can move quickly and aggressively into numerous new applications simply by changing the genetic code it puts into the mRNA. While Moderna's shot appears to be holding up well against the currently surging delta variant, for example, it's a straightforward process for the company to incorporate mutations into the vaccine if needed. "We don't have to introduce new technology or new processes," Bancel says. "It's exactly the same thing."

When Bancel left the top job at the French diagnostics company BioMérieux SA and became the second employee at Moderna—the name is a mashup of "modified" and "RNA"—a decade ago, the idea that messenger RNA could be medically useful was radical. At the time the molecule, which evolved to carry protein blueprints from DNA in the cell's nucleus to the compartments that synthesize proteins, had a reputation among lab scientists as fragile and hard to work with. When mRNA is artificially inserted in the human body, the immune system identifies it as a threat and attacks it. And because mRNA's function is temporary, enzymes found throughout the body can break it down. Neither are desirable outcomes for a drug or vaccine.

Starting in 2005, two researchers at the University of Pennsylvania, Katalin Karikó and Drew Weissman, managed to slightly modify mRNA so it generated less of an immune reaction in the body. The finding drew little recognition at the time, but it turned out to be a critical advance. (Katalin left Penn to join BioNTech in 2013.) In 2010 a trio of Harvard and MIT scientists funded by venture firm Flagship Pioneering picked up on the idea and founded Moderna, bringing Bancel on the next year. Moderna and BioNTech later licensed the Penn technology.


▲**Bancel**

Bancel recalls telling his wife before he changed jobs that there was a 5% chance the mRNA concept would succeed, but if it did, it would be huge. When Bancel pitched Moderna's now-president, Stephen Hoge, on the company the following year, Hoge says, his reaction was, "He's either brilliant or crazy." Hoge was then a McKinsey & Co. partner with a medical degree, and he was interested in doing something that would have more societal impact. He slowly came around to Bancel's view that mRNA therapy, if it worked, "was really going to transform medicine."

The concept behind mRNA vaccines is simple. When the shots bring those protein-making instructions to cells, they effectively turn them into microscopic vaccine factories in their own right. This allows developers to streamline what is normally a messy manufacturing process. Many flu vaccines, for example, are made inside chicken eggs, and even newer genetically engineered vaccines still require growing viral proteins inside vats of live cells. Bypassing such steps lets mRNA vaccine manufacturers shift gears fairly quickly. It also appears to be relatively easy for them to make complicated vaccines involving multiple viral proteins.

"Everything with mRNA is just simpler," says Barney Graham, deputy director of the Vaccine Research Center at the National Institute of Allergy and Infectious Diseases (Niaid), whose lab has been formally collaborating with Moderna since 2017. "For me, making vaccines that are as simple as possible is the way to go." Graham says gene-based shots such as mRNA vaccines are particularly well-suited to fighting viruses, because they seem to be adept at producing the so-called killer T-cells that destroy virus-infected cells.

Before Moderna could create an mRNA-based product, it had to crack the problem of how to protect the molecule from the body's defense systems. By modifying the RNA, the Penn researchers had figured out how to dampen the hair-trigger immune response it provoked, but their approach would be useless if it were broken down by enzymes before it could reach cells. The key to solving that problem turned out to be adding protective lipid nanoparticles to surround the mRNA molecules—essentially creating "balls of fat with little bits of RNA mixed in there," says Kerry Benenato, a chemist who left AstraZeneca Plc to join Moderna in 2014.

When Moderna started working on this approach in 2013, it had been tried mostly on much smaller types of RNA molecules, and there were concerns about side effects. "People had decided they were toxic," Hoge says. Nanoparticles contain synthetic fats, and in early iterations some of those fats tended to accumulate in cells, building up over time and potentially causing liver damage or other side effects.

Benenato's assignment was to devise nanoparticles that could safely and efficiently carry the mRNA into cells, release the payload, and then quickly break down. When she started, the chemistry involved in using nanoparticles with mRNA was so unexplored that there were few published scientific papers to guide her. She and her team made one tweak after another, pinpointing changes that improved tolerability without harming their ability to deliver mRNA. By 2015, Moderna had made a breakthrough, finding a series of lipid molecules that fit the bill. "Then it was off to the races," Benenato recalls. They patented the formulas and started deploying them in vaccines.

In its early years, Moderna had focused on therapeutics, including programs for cancer, heart disease, and other lucrative areas. The company gradually turned to vaccines as ▶

“The smart countries are saying, ‘I’d rather be two months too early than two months late’”

◀ Bancel realized they would be the best way to prove mRNA technology worked. You have to inject only a couple of doses to stimulate a long-lasting immune reaction.

Working with Graham’s team at Niaid, Moderna began formulating a Covid vaccine as soon as Chinese scientists released the coronavirus RNA sequence in early January 2020. Later that month, Bancel asked his manufacturing chief what it would take to make a billion vaccine doses in 2021. “He looked at me like I was insane,” Bancel recalls. The Moderna plant had never made more than 100,000 doses of anything in a year. The U.S. government agreed to pay $955 million for the vaccine trials and initial small-scale production, but Bancel says he couldn’t initially persuade any country to pay for a full scale-up. Moderna instead raised $1.3 billion in a May 2020 stock offering for the purpose. The move allowed the company to take its leap onto the world stage—and laid the groundwork for what comes next.

▲ **Workers in one of Moderna’s clean rooms**

Moderna produces its nanoparticles and mRNA in a former Polaroid factory in the Boston suburb of Norwood, 15 miles south of its headquarters. The plant, which opened in July 2018, has been running around the clock since November. It looks less like a factory than like a cross between a tech startup and a molecular biology lab. Dozens of operations and quality-control workers dressed in casual clothing occupy a large warren of open-layout desks in the front of the building. Covid vaccines are produced in clean rooms, some of which are visible behind glass panels in the back. There are nine of these clean rooms making the shot here, up from three in December, and six more are scheduled to be running by the end of the year. The suites, which are roughly 1,000 square feet each, were built for flexibility, with mixing reaction vessels, chromatography instruments, and other equipment on wheels so they can be easily reconfigured.

The process starts with pieces of DNA called plasmids that Moderna brings in from a contract manufacturer. These plasmids contain the genetic blueprint for the Covid-19 spike protein. In one set of clean rooms, the spike protein DNA is synthesized into mRNA using a technique called in vitro transcription. It’s basically the laboratory version of a process that normally occurs in cell nuclei.

The mRNA solution can be made in a matter of hours, says Scott Nickerson, a senior vice president who oversees the site. It then takes several days to purify unreacted enzymes and other extraneous material. From there, the purified mRNA goes to a separate set of clean rooms, where workers spend another few days formulating it with the lipid nanoparticles. The final product is frozen in sterile bioprocessing bags, encased in a protective shell, and shipped in temperature-controlled trucks to Catalent Inc.’s plant in Bloomington, Ind. There the vaccine is diluted, put into vials, labeled, and shipped. When Moderna started making the Covid vaccine in commercial quantities last year, the process took as long as 19 days to complete. Now it takes only 10 days to prep a batch for shipping to Catalent.

Last May, Moderna signed a 10-year deal, since expanded twice, with Lonza Group AG, which is expected to produce the bulk of its European supply at factories in Switzerland and the Netherlands. Moderna also made pacts this year with Sanofi, Samsung Biologics, and Thermo Fisher Scientific to bolster the vial-filling capacity that Catalent and Laboratorios Farmacéuticos Rovi in Spain currently provide. Increasing so-called fill-finish capability will become important as a greater share of the population is vaccinated and doctors can’t find enough patients to use up the larger vials now in use, which contain between 10 and 15 doses.

Moderna’s production this year, 800 million to 1 billion doses, will amount to only about a third of Pfizer and BioNTech’s output. Pfizer had “100 times more people” at the start of the pandemic, along with existing plants it could retool for vaccine production, Bancel says. Moderna’s head count has almost doubled since last year, to 1,500. Next year, with more capacity and a significant portion of its output potentially going into booster shots and pediatric formulations that use lower doses, the company and its partners expect to produce as many as 3 billion doses, approaching Pfizer and BioNTech’s projected 2022 supply of 4 billion. If Novavax meets its production goals, Sanofi’s protein-based vaccine also works, and companies such as Johnson & Johnson and AstraZeneca solve their manufacturing bottlenecks, at some point next year the world could shift from being desperately short of Covid shots to swimming in them.

As the virus settles down to a more manageable threat over the next few years, Covid vaccine sales may decline—perhaps precipitously. Morningstar Inc. analyst Karen Andersen says this market could top out at $72 billion worldwide this year, slip to $65 billion in 2022, and plummet to $8 billion a year after that. The extent of the slide will depend on how many people need booster shots, how often, and whether Moderna, Pfizer, and others will be able to raise prices to compensate for a smaller market. The science on booster shots is still unsettled—it's not yet clear how often, or even whether, they'll be needed in large numbers.

Moderna has three types of boosters in Phase II trials, including a lower-dose version of its existing vaccine, one booster that's been customized against the beta variant that was first spotted in South Africa, and a third that combines both. More variants can be added if necessary. The process for the beta booster went even faster than for the original shot. Design work started on Jan. 22, with Moderna ultimately switching out some of the chemical "letters" in its original mRNA vaccine, so they correspond to the spike protein in the beta variant. Manufacturing began three days later, and the first trial dose was administered on March 10—only 47 days in all, compared with the 65 for the main vaccine.

Moderna is already cutting deals that encompass potential booster doses, including a June order from the U.S. for 200 million additional shots in late 2021 and early 2022. Despite the uncertain need for boosters, Bancel's pitch is that it's best to be prepared for an evolving virus. At an investor conference in early June, he told everyone that "the smart countries are saying, 'I'd rather be two months too early than two months late.' "

Beyond Covid, most of Moderna's experimental vaccines remain in early stages of human trials. An exception is the shot for cytomegalovirus. No vaccine exists for this virus now, and the shot could turn into a multibillion-dollar product if it works. Moderna also plans human trials this year of a vaccine against another complicated pathogen, Epstein-Barr virus, which causes mononucleosis.

Influenza is an obvious target, and a shot for that could be combined with Covid boosters, locking them into an existing annual market. With the Pfizer-BioNTech alliance also slated to start trials on a flu shot later this year, researchers say they're hoping the mRNA vaccines can improve on existing versions, which must sometimes begin production six months in advance based on experts' assessment of which strains are likely to circulate. The shorter lead times required to make mRNA shots could, in theory, let health officials more closely match flu strains and improve upon typical 40% to 60% efficacy rates. "The mRNA vaccines have a very high likelihood of being better than the egg-based vaccines we use now," says Andrew Pekosz, a virologist at Johns Hopkins Bloomberg School of Public Health. He adds that the shorter lead times could "shave off months" from the process. But he notes that it's an open question whether there would be a good economic case for mRNA-based flu vaccines if they turn out to be more expensive and only modestly better than the old ones.

Moderna is also targeting a few nasty respiratory viruses that don't have vaccines. These include metapneumovirus, which can lead to hospitalization in infants, and respiratory syncytial virus, which causes more than 175,000 U.S. hospitalizations annually in the elderly and about 50,000 more in young children. In the latter case, Moderna's vaccine will be competing with efforts at GlaxoSmithKline and Johnson & Johnson that draw on other technologies and are further ahead.

Hoge says Moderna could combine as many as a dozen or more viral strains in one shot. The goal is a seasonal vaccine that "eliminates the majority of the respiratory viral diseases that we all suffer from," he says. "The only way that we're really going to get good, broad population immunity against these respiratory viruses is if we can make it feel like your flu shot."

The concept makes sense on paper, according to Tony Moody, a physician-researcher at the Duke Human Vaccine Institute, which is working on mRNA-based flu vaccines. Combinations are "one of the strengths of the technology," he says. He estimates that it would cost only a few dollars more per shot to add the necessary mRNA for a given viral target. "If you could get a combo shot that gives you a degree of protection against a lot of respiratory viruses, I think there would be a market for that," he says. It won't be fast or easy. Researchers will first have to show that the individual vaccines work and then perform studies showing that complex combinations don't compromise efficacy or result in troublesome side effects.

To realize its vision, Moderna will have to move quickly. Competitors are investing heavily to catch up. Sanofi said in late June it would spend €400 million ($475 million) annually on mRNA research, focusing on stable vaccines with few side effects. With emergency authorizations unlikely in the future, considerations such as side effects and convenience will assume new prominence. Moderna is working on eliminating the complicated refrigeration requirements of its Covid shot. Future products will also have to find ways to reduce the high rates of fatigue, headache, and muscle pain produced by the shot. For the boosters, the company is testing lower doses, which may help.

How broadly mRNA can expand beyond vaccines into the far larger and more lucrative therapeutics market remains to be seen. There will be additional technical hurdles to surmount. To treat chronic diseases, for example, companies will have to prove that they can deliver the therapies to the target organs and that mRNA can be administered safely. And to develop cancer vaccines, mRNA researchers will have to solve the thorny problem of teaching the immune system to distinguish between specific tumors and healthy cells. Many previous approaches have failed.

The good news is that mRNA's adaptability also makes it easier to try out many possibilities. Within a few years, Moderna could have 60 drugs and vaccines either in human trials or nearing them, according to Bancel. If it works out the way he hopes, mRNA will make inventing vaccines and drugs a bit more like creating software. "We use the same four-letter code" for every vaccine and drug, Bancel says. "We can scale the number of products we have in development at a pace that has never been done before." B

As Covid-19 devastated Mexico, the government obscured the facts about cases, deaths, and vaccinations

By Nacha Cattan and Vernon Silver

How to

Mexican President Andrés Manuel López Obrador
in the April 26 edition of his daily news conference

Forget a Pandemic

Every weekday morning, Mexico's president holds a rambling televised celebration of his supposed successes: a news conference with special guests, video clips, and slick graphics that often has the air of a variety show. Until mid-January one of the favored features was a giant graphic that showcased Mexico's undisputed progress as the first Latin American nation to vaccinate its citizens against Covid-19. Then the data turned bad. Pfizer Inc., at the time Mexico's only supplier of Covid shots, halved, then completely stopped, deliveries. Vaccinations remained unchanged for almost a month; deaths surged. The vaccine tracker got yanked from the show.

Mexican viewers didn't know it from watching President Andrés Manuel López Obrador's daily discourse, but Mexico was becoming one of the world's deadliest Covid hot spots. The government's alternate version of reality included an undercounting of cases and deaths, something it belatedly acknowledged in March when it announced that Covid-related deaths were far higher than the official count, which stood at about 234,000 as of July 5. More expansive estimates can be derived from excess deaths, the epidemiological term for increased mortality compared with an average year. In one such analysis, the University of Washington's Institute for Health Metrics & Evaluation places Mexico's Covid deaths at about 540,000.

During his morning broadcast on Jan. 18, López Obrador swerved around an uncomfortable truth: Pfizer had just shunted Mexico to the back of the line for limited supplies while it closed a plant in Belgium for upgrades. He spun a different tale: that he was altruistically acceding to a (nonexistent) request by the United Nations to give up shots so Pfizer could boost production to supply poorer nations "that don't have the economic possibility to buy vaccines." AMLO, as the president is known, claimed that he approved the Pfizer cut because "it would be unjust and inhumane and contradictory" not to. "We have to walk together, be supportive," he said. On his YouTube channel, the news conference was titled "Redistribution of Covid-19 vaccines is an act of solidarity."

What was actually happening was entirely out of Mexico's hands. Yes, Pfizer's retooling of its Belgian factory would eventually lead to greater global supply. But in the short term, the company made decisions about where it would send its vials and where it wouldn't. It chose to make cuts in Latin America and Europe while sending millions of shots to Israel. The difference was that Israel had just signed a data-sharing deal with Pfizer, which would flood the country with its vaccine to test its real-world effectiveness—good for science and, of course, Pfizer.

The methods of estimating Covid's true death toll vary, but study after study show Mexico among the world's hardest-hit countries. For average monthly excess deaths during the pandemic, Mexico is third, behind Ecuador and Peru, according to a Bloomberg analysis of figures collected by Our World in Data. (As of July 6, Mexico has about 54% more deaths on average than over the previous five years; Ecuador is at 67% and Peru at 136%.) In other published tallies, Mexico has ranked third or fourth in the world for total excess deaths.

Last winter the carnage in Mexico City was palpable. Black smoke billowed around the clock from overwhelmed cemetery crematoriums. Funereal bottlenecks forced families to take the remains of their loved ones to other parts of the country for timely disposal. In hospitals the bodies were backlogged on gurneys and in autopsy rooms. It took until May for Mexico's hospitalizations to drop to 13% of capacity, from 90% in January, and the positivity rate, once the world's highest at roughly 50%, to fall to 17%.

"Many patients didn't have a chance to even make it to a hospital or wound up in a hospital that wasn't prepared," says Francisco Moreno, head of internal medicine at Centro Médico ABC, one of Mexico's most prestigious private medical institutions. "What I saw was a total collapse of the health system."

And yet, to the world and even some Mexicans, it's almost as if it never happened. If you didn't know that an extraordinary number of people had perished only months ago, it would be easy to see just another sunny summer on the horizon, with bustling boulevards and packed beaches. Some of this collective amnesia is due in part to the actions AMLO never took: While Europe is publicly wrestling with how to reopen to foreign tourism, Mexico never closed air travel from any countries or required any testing or quarantines from visitors. But the forgetting doesn't mean it didn't happen—or can't happen again, soon.

Mexico's first mistake, and probably its biggest, was its coronavirus testing plan. As part of its initial pandemic response in March 2020, AMLO's government didn't offer tests unless a patient had symptoms. The method's power to obscure was the envy of then-U.S. President Donald Trump. "I want to do what Mexico does. They don't give you a test till you get to the emergency room and you're vomiting," Trump groused to top aides last summer, the *New York Times* reported.

Mexico's strategy, which has never officially changed, both failed to keep the virus's spread in check and meant the country's death toll escaped wide notice. When researchers tried to put together more accurate numbers, the government erected barriers. Some researchers had been able to cobble together a rough count of excess deaths in Mexico City based on death certificates, having noticed they were sequentially numbered. The idea was, if you know the latest number on the certificates, you know how many are dead. In March the authorities thwarted that workaround: The certificates were no longer searchable by number, only by name. There are no longer independently available statistics on excess mortality.

Mexico's second big mistake was AMLO's refusal to raise debt to pay for fiscal stimulus or aid to the poor, as the leaders of most major economies did. This reflected the economic quirks of the president himself, who's never possessed

PREVIOUS SPREAD: RAJ VALLEY/ALAMY

a credit card in his name. The son of fabric shop owners from the state of Tabasco, AMLO has shunned luxuries and refused to fly on the presidential Boeing 787 Dreamliner—he's been trying to sell it from his first day in office. His political philosophy was shaped by the disastrous debt default of 1982, which brought inflation to 115%, and the Tequila Crisis of 1994, which produced a sudden devaluation of the peso and a recession.

His government's spending commitments for Covid relief amount to about 0.7% of gross domestic product—less than a third of the average for other developing countries in the Group of 20, the International Monetary Fund says. And those programs have largely been microloans to small businesses. While other countries essentially paid workers to stay home and supported companies so they could preserve jobs, Mexico's policies had the effect of keeping people in circulation to earn a living.

Arturo Herrera, AMLO's outgoing finance minister, argues that the administration saved Mexico from weakened public finances that would have had worse repercussions down the road, leading to cuts in social services. Had Mexico spent like Canada or Germany did on Covid stimulus, he said in a February interview with Bloomberg News, the additional debt would have exceeded all government funding for public universities and high schools. AMLO has also argued that his government inherited a broken hospital system and had to expand its capacity in a short time period to handle the health crisis, which is where it focused much of its attention, rather than on testing.

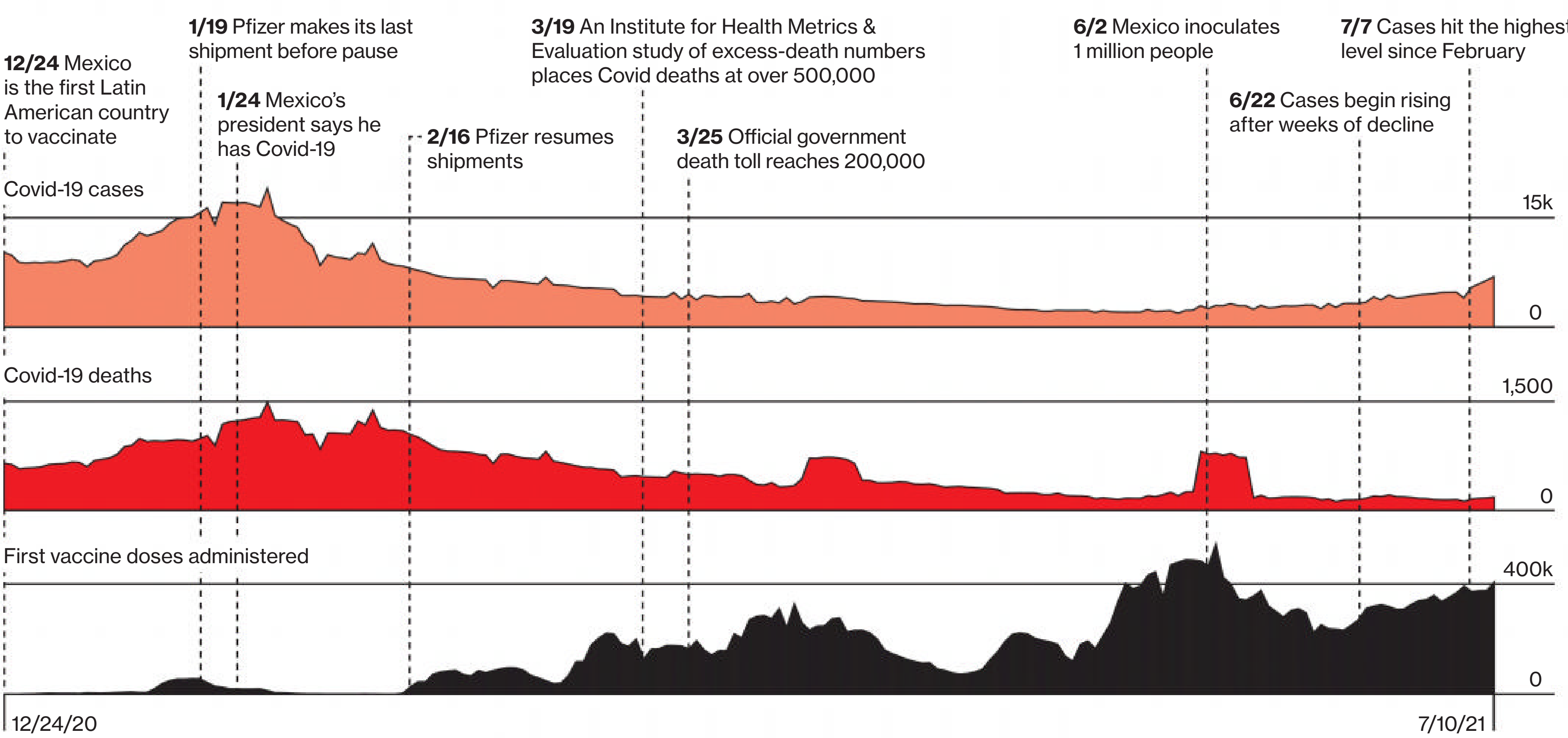
Throughout the first wave, in the spring and summer of 2020, Hugo López-Gatell, the nation's virus czar, kept saying Mexico was beating back the outbreak, though it wasn't. "The epidemic is slowing down," he declared in a May 5, 2020, news conference. "We've flattened the curve." When confronted with data showing the curve was in fact continuing to go up, he said what he really meant was the slope would have been steeper if it weren't for the social distancing policies he'd implemented. When a second wave of infections hit Mexico City toward the end of 2020, he and the mayor resisted ordering a shutdown, even as the city's hospitals overflowed with patients. In January the government denied that the capital's hospitals were full. Yet Bloomberg News found that paramedics had to drive their ambulances around through the night to find scarce unoccupied beds.

The midnight searches for beds were among the worst tales the city's doctors, nurses, and paramedics described during the height of the second wave. One patient waited 11 hours in an ambulance, running through several oxygen tanks, until a bed was available. A medic drove a patient six hours to Aguascalientes state, northwest of Mexico City, to find a bed. A hospital ran out of the medication it used to sedate patients being fitted with ventilators.

Doctor Gerardo Ivan Cervantes, head of epidemiology at Hospital MAC, in the central Mexican city of San Miguel de Allende, describes dealing with four patients who suddenly couldn't breathe on their own, sending staff into a scramble to buy ventilators for them. As the small, private facility searched for the equipment, doctors took turns manually pumping oxygen into the patients' failing lungs with hand-squeezed bag masks. "There were four people pumping for each patient," Cervantes says. "It's too tiring for just one person." The effort dragged on until the ventilators arrived four hours later. ▶

Mexico's Covid Odyssey

Figures are seven-day rolling averages



COVID CASE AND DEATH DATA ARE CONFIRMED NUMBERS. DATA: OUR WORLD IN DATA; COMPILED BY BLOOMBERG

San Miguel Xico Cemetery in Valle de Chalco was expanded in March to accept Covid victims

◀ For Cervantes, it was just one of many long stretches in close contact with the coronavirus; he treats more than 10 Covid patients a day. Months later he's in another long stretch: waiting to get a vaccine.

Mexico was on the cusp of hope on Christmas Eve. On the holiday known as Nochebuena, or the Good Night, it became the first nation in Latin America to administer a Covid vaccine. Broadcast from a Mexico City hospital, intensive-care nurse María Irene Ramírez got the Pfizer shot in her arm. The country couldn't have been more grateful.

A week later the New Year's adventures of virus czar López-Gatell provoked doubts about the Mexican government's credibility in leading the way out of the crisis. Before the holidays, López-Gatell, who's also deputy health minister, had told citizens to stay home to curtail infection. Yet in a photo taken on Dec. 31 as he boarded a flight to the beach resort of Huatulco, López-Gatell, ready for relaxation in a tennis cap and gray fleece, is seen standing with his mask pulled below his chin, talking on his phone. The photo went viral on Mexican social media, followed by a second shot of him sitting under the thatched roof of a beach restaurant with a woman, both of them maskless, as waves broke onto the nearby sand.

López-Gatell defended his actions, saying he went to visit family and obeyed local restrictions, which were more relaxed than those in Mexico City. On Jan. 6, AMLO praised him in his daily televised news conference, calling him "honest, honorable" as the epidemiologist's smiling face was projected onto a wall. AMLO called attention to his czar's studies at Johns Hopkins University. "A doctorate and a postdoctorate from this prestigious U.S. university. One of the most prestigious!" he said. "On top of that, he's a specialist in pandemics, prepared–and cultured." The episode reached a predictable end weeks later when the Covid czar himself became ill with Covid.

In the midst of this came the almost-monthlong Pfizer drought, which began after the shipment of Jan. 19. According to an analysis performed for *Bloomberg Businessweek* by epidemiologist Shaun Truelove at the Johns Hopkins Bloomberg School of Public Health, the loss of vaccines during that critical period resulted in about 3,500 deaths in Mexico. "Imagine the uncertainty at that moment," says Deputy Foreign Minister Martha Delgado. "If you don't have any for three weeks, even if it wouldn't have been a large amount, it was very onerous, above all because of everything we had prepared, the entire vaccine operation. And public opinion." Pfizer said in a statement that it advised governments in advance of the factory upgrade and completed it in two weeks. The upgrade allowed the company to meet global delivery commitments in the first quarter and exceed them in the second quarter. It also contributed to Pfizer's ability to revise its projected 2021 global output from 1.3 billion doses at the start of the year to its current target of 3 billion, the company said.

After Pfizer's delay, Mexico scrambled to strike vaccine

PHOTO: HECTOR VIVAS/GETTY IMAGES

deals with China, Cuba, and Russia. AMLO had himself caught Covid and was convalescing at his presidential residence on Jan. 25 when he held a call with Russian President Vladimir Putin. Mexico did a fast-track approval of the Russian Sputnik V shot. On Feb. 2 the Mexican government said it had secured 1.4 million doses of Sputnik, an additional 8 million of China's CanSino Biologics vaccine, and up to 2.7 million AstraZeneca shots through Covax, the global distribution program for poorer countries.

On Feb. 8, just days after AMLO returned to work, he announced that he'd struck deals with China's ambassador to Mexico for additional Chinese vaccines. In another deal, his government started negotiating with Cuba to participate in trials of a vaccine developed there. On Feb. 14, Mexico received 870,000 AstraZeneca doses from India. That let Mexico start vaccinating its older adults.

Pfizer doses, 491,400 of them, finally arrived on Feb. 16 on DHL jets from Belgium. By then, Mexico's daily deaths had doubled since the start of the year, to a record high of 1,800. But the vaccine campaign relaunch was problematic. AMLO, the man who disdains urban elites, made a show of sending shots to remote mountain villages and to every state, instead of focusing on urban infection hot spots.

And though they've pocketed Mexico's money, some pharmaceutical companies haven't yet delivered, in part because of global production problems but also because they put Mexico toward the end of the line. AstraZeneca Plc has delivered just 28% of the doses it pledged will reach Mexico by the end of August. Russia has sent just 4.1 million of the 24 million Sputnik doses AMLO initially said had been promised by the end of March. Pfizer appears to be on track, having sent almost two-thirds of the doses due by yearend. Mexicans' desperation for the shots has at times been comical; there have been reports of people in their 30s dyeing their hair and eyebrows gray and using fake IDs to try to get shots meant for senior citizens. It's also driven hundreds of thousands of wealthier Mexicans over the border to receive shots in the U.S. Mexico's travel agent association says members have sold more than 170,000 vacation packages to people looking to fly to get shots.

Front-line medical workers were supposed to be vaccinated first, but many are still waiting. That includes Cervantes, the physician who squeezed a bag mask for four hours to keep patients alive. On May 8 he stood in line at a facility in Guanajuato state from 6 a.m. to 3 p.m., when it ran out of shots. He returned home unvaccinated, and perhaps even more in danger because of the crush of hopeful medical workers. "We were exposed, because the line was long and there wasn't room to keep our distance," he says. As of press time, he still hadn't been vaccinated.

On March 22 news broke that more than 1,000 people in the Yucatán Peninsula's Campeche state had been injected with fake Sputnik vaccines. Recipients included executives, politicians, taxi drivers, and workers at a factory assembling export goods. No one appears to have been hurt, but there was reason to believe the incident was part of a wider problem.

Five days earlier, Mexican customs agents and soldiers searching a private airplane at the Campeche airport had found a white cooler chest wedged between two seats. In the chest were sodas, an ice cream sandwich, and, farther down amid the ice cubes, a plastic bag filled with vials of what appeared to be the Sputnik vaccine. In all, the cooler, plus a second one found on board, contained 1,155 vials, with the equivalent of 5,775 doses. The Russian company that distributes Sputnik said the vaccines were fake. The aircraft's destination, according to the Mexican military, was Honduras, raising the possibility that any fakery has gone regional.

People don't take a chance on black-market vaccines when they believe their government is ready and able to take care of them. The UN's Mexico office has issued fraud alerts about people posing as UN or World Health Organization officials trying to sell vaccines. Mexico's health regulator warned against WhatsApp alerts that tell older adults false places to get shots in Mexico City.

It was in May that things began to feel normal in Mexico. By early June the country was administering doses from six different vaccine makers, including CanSino and AstraZeneca shots that are locally produced (and, in the case of AstraZeneca, exported regionally after a long delay). Pfizer had increased deliveries. Vaccine distribution had been adjusted so more doses were going to places with more cases. Covid clinics were shutting down, testing centers offered discounts, and Mexico City had lifted almost all restrictions—the city was excited by reports that concert halls and other cultural institutions would open soon. On June 2, 1 million vaccinations were given, and by the end of the month, about 26% of the population was covered with at least one shot. In an example of what the government can accomplish when the incentives are sufficiently powerful, 79% of adults in Baja California had received at least one dose. The goal is to open the border with California.

That foreign tourism never stopped only bolsters the sheen of normalcy (though the inaction probably helped bring in the virus via U.S. beachgoers). And the lack of regulations to reverse just helps feed the national amnesia. For those who survived, the president's relentless optimism has largely worked. The latest polls show an approval rating of 56%. AMLO's vaccination program has an approval rating of 62%.

As June turned to July, though, uncertainty returned. Variants of the virus are devastating parts of Latin America, and indications are that Mexico might not escape another wave. On three consecutive days in early July, Mexico City recorded case counts not seen since February. Moreno, at Centro Médico ABC, says he now has 32 hospitalizations, up from eight a few weeks ago, though down from the winter peak of 75. The concert halls didn't open after all. Mexico needs a plan. Adjusting the content of the president's programming may not be enough. *—With Stephanie Baker and Sebastian Boyd*

Savorease crisps are tough enough to scoop a dip but have been engineered to melt fully in the mouth

FOOD FOR PEOPLE WHO CAN'T EAT

A dentist with a culinary diploma has made crispy crackers that don't need chewing. The next step is selling them

By Maureen O'Hagan Photograph by Holly Andres

For the more than 10 million American adults who have trouble swallowing, the average 28,000-product supermarket might as well be a barren wasteland. The typical store stocks just three product lines geared specifically for people with dysphagia, as their condition is known, and they're all ultrasweet liquid meal replacements: Ensure, Boost, and a generic equivalent. These $1.50-a-pop thickened beverages are often stocked less like food and more like toiletries, down near the contact lens fluid and the toothpaste.

Most of us hardly think about how food goes from mouth to gut, but it's a complex process involving the teeth, the tongue, and dozens of muscles and nerves. If even one part of the system isn't working properly, a lot can go wrong. (Food or drink can slide down the wrong pipe, into the lungs, for example.) Dysphagia is common in people with autism spectrum disorders, Down syndrome, Parkinson's disease, dementia, and cleft palate, and it can be a problem for people who have multiple sclerosis, who are undergoing chemotherapy, or who've recently been on an IV feeding tube or a ventilator. Although some overcome dysphagia, others don't. Many are staring down a lifetime of Ensure and Boost, hoping to maybe work their way up to applesauce. Flavors of the nutritional supplement drinks rarely venture outside those of the ice cream family, and none of the options fulfill most people's nutritional needs.

"It's like a silent problem," says Reva Barewal. "We need to make a paradigm shift in how we approach nutrition for people with disabilities." Barewal is a prosthodontist, meaning she specializes in restoration or replacement of teeth or other parts of the mouth. From birth, she suffered profound jaw problems that required years of brutal medical treatments and left her with chronic jaw pain. She's spent much of the past six years trying to develop a wholly new kind of food for people who can't eat the standard way. She started with experiments in her kitchen in Portland, Ore., took notes at conferences and support groups, then worked her products through safety studies and clinical trials.

Her efforts led to Dr. Reva's Savorease, savory little crisps that are tough enough to scoop a dip but have been engineered to melt fully in the mouth, even without the assistance of teeth, normal tongue function, or saliva. They come in several flavors that sell online for $2 to $4 per bag of about 25 crisps through her company, Taste For Life LLC. Most of the initial sales have occurred during the pandemic.

Along with dentistry, Barewal has formal training as a French chef, and she used the tools of both trades to make her self-puréeing products as tasty as possible. Customers' emailed reviews tend toward the effusive. "I want to thank you profusely for offering this creation to patients like me," wrote a reviewer who identified herself as Karen from Georgia and said she normally subsists on purées and smoothies. "What a super product," wrote a customer who gets most of her nutrition through a feeding tube.

Barewal says the science behind the crackers could also be used to make chewing-optional versions of tortilla chips, popcorn, or cinnamon toast. But before she can think about expanding her product line, she needs to raise Savorease's profile and, most likely, a good deal more cash.

Born in Punjab state in India, Barewal grew up in Ottawa in the 1970s. Her mom was an economist with Canada's agriculture department; her father was a government accountant who went on to work for the International Monetary Fund. When she was a child, one side of Barewal's jaw didn't develop properly, which doctors guessed was caused by forceps damage at birth. By age 7, the consequences were pronounced. On her right side, she had a walnut-size space between her upper and lower teeth, and her tongue spilled through the gap. Her parents found a specialist at the University of California at San Francisco, and visits to him began to take the place of family vacations.

The treatment Barewal endured as a child sounds downright medieval. The specialist fitted her with a series of appliances called Bionators to stretch the jaw and stimulate growth. She spent a decade in braces and headgear, including an upper and lower retainer that trapped her tongue in a bulb, preventing her from talking. At age 16, a surgery that shaved the jawbone on the other side to give her a more symmetrical appearance left her in a full facial cast, breathing through a straw for days. "I was a brown girl in a very White city who was disfigured and undergoing massive amounts of therapy in the '70s," she says. "It was a hard start."

Even today, some foods remain exhausting for Barewal to chew, and jaw pain is common. But she credits her childhood struggles with teaching her to maintain focus, even when progress seems impossibly slow. "I don't want this to be a pity project about me," she says. "I use my experience as a lightning bolt to get shit done in this world."

After earning a dental degree at age 23, Barewal moved to British Columbia, lured by the area's spectacular skiing. There, she spent about a year earning a culinary school diploma while practicing general dentistry. She went back to school again in her 30s, earning a master's in biomedical sciences plus a three-year certificate in prosthodontics. She describes the field as a "Sherlock Holmes kind of dentistry" that tries to find solutions to the multilayered problems some people suffer.

One such patient, a retired nurse named Jan Blake, was referred to Barewal around 2009 after chemo and radiation for tonsillar cancer brought on a cascade of other issues. The treatment not only left her with serious dry mouth, but also paralyzed her tongue on one side and destroyed some of her roots, leading to tooth loss and a collapsing of her mouth. All of this made it very hard for her to eat. "Did you know," Blake asks, "that when you aspirate a bite of food and you cough, it can come out your nose?" She felt self-conscious during mealtimes, and, being a passionate cook, she found the liquid meal replacements profoundly depressing.

Barewal studied the problems in Blake's mouth. Which teeth could be saved and which had to go? How could the ▶

◀ team re-create a biting surface to improve chewing? Could they shore up the gums? Her work dramatically changed Blake's mouth and enabled her to eat more foods, though the retired nurse says eating still isn't easy.

Throughout and after the treatment, Barewal fixated on how the problems affected Blake's quality of life: the challenges that eating everyday meals posed, the lack of pleasure Blake received from food, her sense of being far outside the norm. "All the social problems I had to deal with because of my jaw," Barewal says, "it makes you want to help people with problems feel like they fit in."

In her prosthodontic practice, Barewal kept seeing patients like Blake, and she read studies showing that people with dysphagia tend to get fewer nutrients than their peers. Many develop protein malnutrition, which causes more problems with their health and overall quality of life. For people who struggle to chew or swallow, finishing a burger and fries can feel like eating a plate of jerky with a side of cardboard. Some fear trying to swallow even an aspirin.

Barewal (right) and Ball teamed up in 2016 to start testing formulas

Menu options remain extremely limited. Other specialty products marketed online to people with dysphagia typically share the same goopy sweetness (ice cream, pudding) or are purées sold in the form of frozen puck-size disks—a puck of turkey, a puck of green beans. In 2015, Barewal began experimenting in her kitchen with possible alternatives to sugary shakes and puréed pucks.

Toward the end of 2016, Barewal approached the Food Innovation Center, a kitchen, lab, and consumer testing site funded by Oregon State University that companies large and small hire to help them develop products. Some, including ice cream flavors from Salt & Straw, helped put Portland on the foodie map. Chef Jason Ball, the center's product developer, had worked in fine dining in New York, Chicago, and London. At the Oregon lab, he's developed fish jerky and kelp pickles; keto pasta and vegan "meats"; niche ice cream flavors and spoonable smoothies. That is to say, a lot of high-end yuppie food.

Barewal's idea posed a tougher challenge than your typical kelp pickle. She wanted a snack with some crunch to give a person with dysphagia the chance to take a gentle bite. It had to melt in the mouth to prevent choking. It had to be nutritious, incorporating protein, fiber, and vegetables instead of synthetic vitamins and gobs of sweetener.

Meeting these goals, Ball says, was as much about recipe development as it was about food science. He began with a curious ingredient called aquafaba. For most of us, aquafaba is just a fancy name for the liquid you drain from a can of beans. But not that long ago, chefs began valuing the mucilaginous bath for a certain property that's unusual in plant-based ingredients: You can whip it up to create a foam. The aquafaba-foam eureka moment (egg-free meringues!) is generally credited to Joël Roessel, a French singer who blogged about his bean-liquid whipping experiments in 2014. Vegans went wild. Ball thought aquafaba's foam-ability, along with its nondairy nutritional profile, had potential for Barewal's product, too.

Of course, you need more than whipped bean water to make a cracker. Ball had to figure out how to turn the foam into a crispy snack that could be manufactured at scale. Plus, Barewal wanted to add protein and flavor. Extra ingredients can weigh down the foam, turning it into more of a puddle. Ball would have to solve that problem, too.

As he and his team experimented, they invited dysphagia sufferers, swallow therapists, a dietitian, and a geriatrician to the lab to ensure that they weren't overlooking any needs. This volunteer brain trust met every month for two years.

With other products, Ball and his colleagues hit on the right formulation after a few dozen tries. To create Dr. Reva's Savorease, he says, "we must have gone through hundreds." They landed on the basic recipe in 2018 and settled on the present formula a year later.

To produce the crackers, small circles of the foam are dispensed onto trays and then heated in a dehydrator to remove water and crisp them up. The concept is similar to a standard meringue, in which egg whites form the whipped base and sugar helps stabilize the foam. Ball's team experimented with a long list of natural stabilizers before finding the magic ingredients, which Barewal won't disclose. Her patent is pending.

Free samples are a typical first step for new food products, especially those without a big conglomerate's marketing muscle. Savorease was officially introduced at the American Speech-Language-Hearing Association conference in Orlando in November 2019, and swallow therapists gathered at Barewal's sample table, asking questions. They were floored. To them, it wasn't just a savory snack. It could be a therapeutic tool to help patients learn or relearn to

FROM LEFT: PHOTOGRAPHS BY HOLLY ANDRES FOR BLOOMBERG BUSINESSWEEK (4); BOTTOM: PHOTOGRAPH BY HOLLY LYNTON FOR BLOOMBERG BUSINESSWEEK chew without the hazards inherent in conventional solid foods.

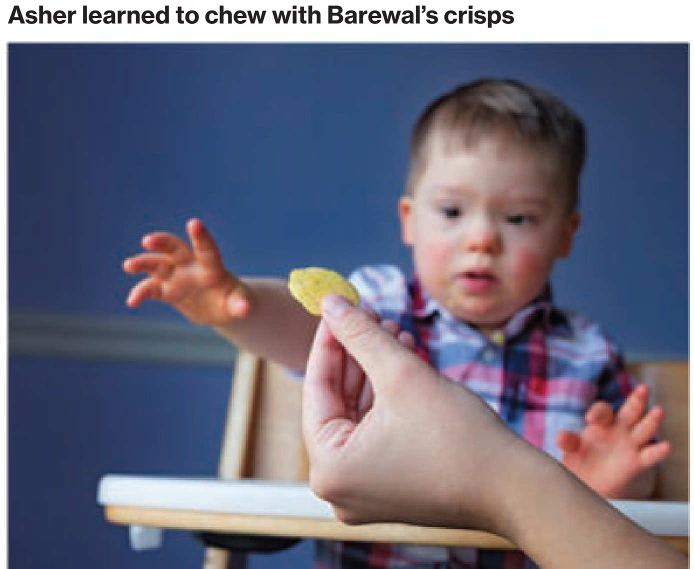
Savorease comes in foil pouches in three flavors: carrot, chicken vegetable, or snap pea, with accompanying easy-to-swallow dips. Combined with the dip, each serving delivers about 200 calories and 8 grams of protein. When popped into the mouth, the light, crispy crackers deliver a hit of umami before they dissolve into purée and quickly clear from the palate. It's a striking, somewhat odd sensation. Within one *Bloomberg Businessweek* household with no dysphagia patients, the verdict was that the flavors are fine but aren't about to displace Kettle Chips anytime soon. People with dysphagia or low saliva, however, taste foods differently; Ball's team relied on Barewal's patients for guidance. It's at least conceivable that someone with dysphagia would show up to a party with a bag of Savorease to share, in contrast to, say, a six-pack of Ensure.

Nondairy aquafaba is a key Savorease ingredient

After the product launch, Barewal planned to continue the sampling at Oregon hospitals and nursing homes. She managed to hand out several hundred packages before the pandemic hit. Since then, she's been working nonstop, primarily via Zoom, setting up videoconferences with support groups for people with cancer, Parkinson's, and Lou Gehrig's disease. She sends the participants crackers in advance, and many of them later buy through her website, savorease.com. She's also spent a lot of time educating dentists, geriatricians, dietitians, and others who work with dysphagic patients—speaking to professional groups at Stanford, the National Foundation for Swallowing Disorders, Northwell Health, and more. It's mostly a one-woman operation, with a handful of part-timers plus Ball's occasional guidance on minor formula tweaks or new flavors. The crisps are produced in a local manufacturing facility.

In all, Barewal says, she's sold about 10,000 packages of crackers, mostly to individual consumers or health-care professionals. She's betting on interest from private hospitals, skilled nursing centers, and other facilities as more industry pros learn about the products. She's brought Dr. Reva's Savorease to this point with about $250,000, drawn from grants, her own savings, and family support. (She's also gotten some price breaks from sympathetic vendors.) She's had nibbles from investors, but the idea is so new—and swallowing disorders so unglamorous—that it isn't easy. It's just not nearly as exciting as, say, fake beef that bleeds, which has attracted $1 billion in capital.

Asher learned to chew with Barewal's crisps



"Everybody is making these supercool things for millennials," says Ball about the way foods are developed. "I think we have to approach product development for marginalized populations with the same tenacity."

Barewal is refining her funding pitch. In one recent conversation with a possible investor who urged her to make something more like Smartfood popcorn, she recounted a fact she'd just learned. A swallow therapist had told her Savorease was helping patients coming off ventilators redevelop their eating abilities more quickly. That could help shorten hospital stays. "He perked up," she says. They didn't make a deal, but he's open to possibilities. She estimates that she'd need $1.2 million to scale up, widen distribution, and hire salespeople to get Savorease into more facilities. "Widespread traction isn't there yet," she says. "What we're showing is we have a unique product and that there's a need."

Barewal is also finding new ways to pitch Savorease. Initially, she saw the product as a safe, tasty, and nutritious snack for people who might never again eat normally. Speech-language pathologists showed how it could be used to help people regain some of the abilities they lost, helping them move from purées to minced foods to, hopefully, their old favorites. Now they're also showing how it can help children who've never eaten solid food.

Michelle Dawson, a speech-language pathologist who specializes in pediatric feeding disorders, says Savorease has already proved a critical steppingstone for kids who'd been struggling to develop their chewing strength and swallowing ability. "She's literally changing the stars for some of our kids," says Dawson, recalling the case of a 4-year-old girl who used the crackers to help get off a feeding tube and now eats eggs and toast with her parents.

Dawson recommended the product to Erin Forward, a fellow speech-language pathologist who says she'd spent months struggling to help Asher White, a 2-year-old with Down syndrome, learn to chew. The boy's mom, Barbara, says baby food was the only thing he could safely eat until Forward offered him a Savorease. Asher reached out, picked it up with his little fingers, put it in his mouth, and began to chew. Seeing him manage all of that on his own for the first time, Barbara began to cry. "I just lost it," she says. Then she asked where she could buy more. Ⓑ

A Blossoming Industry

The global trade for flowers cratered in 2020, but small cultivators of peonies, poppies, and dahlias had a banner year—and these farmer-florists say their businesses are only just beginning to grow. *By Cara Parks*
Photographs by Aundre Larrow

Jenny Elliott at Tiny Hearts Farm in Copake, N.Y.

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Edited by Chris Rovzar

Businessweek.com

April 9, opening day for Tiny Hearts Flower Shop in Hillsdale, N.Y., was a long time coming. Buckets of crimson ranunculus and towering boughs of pussy willow lined the walls, brightly awaiting local shoppers. Pails of blue anemones, grown a few minutes away in Copake, ranged from deep indigo to an ethereal gray-blue.

Like so many American businesses, the shop shuttered while the pandemic raged. Owners Luke Franco and Jenny Elliott scrambled to figure out what to do with the 40,000 tulips planted in October 2019 that sprouted into a world where weddings and baby showers were replaced by a smattering of Zoom affairs needing only a token bouquet.

Prior to all this, the picture was far rosier. Local farmers had been making inroads into the cut-flower market, a multibillion-dollar industry whose complicated supply chain brings imported blooms from Africa and South America to the U.S. via the Netherlands. Although 80% of the cut flowers purchased in the U.S. are still imported, the value of domestic floriculture rose 9% from 2015 to $4.77 billion in 2018. The number of producers increased 8% during the same period, according to the U.S. Department of Agriculture.

Floret, founded in 2008, has built a small floral empire and inspired many would-be growers; Pepper Harrow is a very successful operation in Madison County, Iowa; Clear Black, a specialty cut-flower farm in Durham, N.C., focuses on sustainable practices. Franco and Elliott started in May 2011; this year, two of their employees planted their own farms.

These farmer-florists, as they're increasingly known, have thrived by selling and marketing flowers directly to consumers and forming partnerships with floral designers and event companies. The same eco-conscious clientele that boosted farmers markets and locavore restaurants seems eager to hop on board. And Covid-19 may ironically be the ultimate long-term boon to these smaller producers.

Last year just before Mother's Day—one of the tentpoles of the spring flower season—it was almost impossible to buy a bouquet. An imported bouquet, that is. The massive wholesale markets that provided the bulk of the cut-flower supply in the U.S. had gone quiet when florists in many states weren't deemed essential businesses.

As a result, farmer-florists such as Tiny Hearts Farm received a deluge of attention. "The consumer interest exploded," Elliott says. Seattle-based author and domestic flower advocate Debra Prinzing puts it even more bluntly: "The opposite of what we thought was going to happen took place. We saw more people embracing local agriculture and micro-farmers in their community." Official membership in the Slow Flowers network, which connects consumers with local flowers, rose more than a third, to 880, from 2020 to 2021.

The Tiny Hearts Flower Shop in Hillsdale

Commodity flowers—the carnations and imported roses and lilies available at every grocery store—have a considerable environmental footprint. Flown around the world, grown with a heavy dose of pesticides, and farmed with often questionable labor practices, such flowers increasingly stand in contrast to more sustainably produced luxuries. They continue to make up the bulk of flower purchases and are in no danger of vanishing soon, despite seismic shifts in the industry during the pandemic, but there's now room for an alternative.

Plenty of farmer-florists are ready to serve that market through a hybrid business model that allows them to charge more than commodity prices for specialty blooms, such as short-lived ephemerals and vintage varieties. It's harder to grow a delightfully delicate and fragrant peony than it is to churn out dozens of identical lilies, sprayed heavily with chemicals and bred to be stiff and shippable. Growers who take on these added challenges find they can charge a premium by including the design of arrangements in their pricing and selling directly to consumers.

Shoppers proved unfazed spending more on affordable luxuries during the pandemic. "We had blockbuster sales of poppies last year, which only last for about three days in a vase," Elliott says. "People didn't care—they were willing to spend the money."

Florists who don't grow their own flowers are also taking part in this changing floral landscape by teaming up with

To Pluck and to Hold

The blooms that brides are reaching for this year

"CAFÉ AU LAIT" DAHLIAS
A wedding circuit favorite for the past few years, these flowers are large (as big as 10 inches across) and range from pink to cream to, yes, coffee. At times growers have struggled to source the tubers from which they're grown, but the stock has rebounded.

"ENCHANTÉ" SWEET PEAS
These tricolor flowers are a mix of cream, cherry pink, and lavender—a perfect floral confection. To top it off, the delicate beauties are highly fragrant, making them a lovely addition to a bridal bouquet.

"TEASING GEORGIA" ROSES
Old-fashioned roses have more character than tired red stems. "Harvesting their fragrant, delicate blossoms always feels like a luxury," says Erin Benzakein of Floret Flowers in Mount Vernon, Wash., who grows this ombré yellow specimen.

GRAY SHIRLEY POPPIES
Even with a short vase life—"as in, if you look at them the wrong way, the petals fall"—gray Shirley poppies have cult status, which Claire Charny of Clear Black Flowers in Durham, N.C., attributes to "the variety and range of colors in a single flower."

BUTTERFLY RANUNCULUS
Credit the long vase life and the Instagrammable shine on each deep red, blush, or yellow petal for the flower's popularity. "It's actually gotten pretty hard to find for growers," says Jenny Elliott of Tiny Hearts Farm. "Because everyone wants it."

ILLUSTRATIONS BY GEL JAMLANG

farmer-florists and educating consumers on the value of local, sustainable flowers. Taylor Patterson started Brooklyn, N.Y.'s Fox Fodder Farm—which is a floral design studio, not a farm—in 2011. She says her clients are willing to pay up for a delicate, sweet-smelling sweet pea or a short-lived poppy; they understand these limitations make the blooms rare and special.

"It's the same reason you would spend $5 on an heirloom tomato rather than 50¢ on a hothouse-grown one imported from Mexico," says Patterson, who's provided bouquets for fashion clients including Hermès and Carolina Herrera. A mixed bouquet from Tiny Hearts costs $25 at the store; a similar-size arrangement from the local grocery could cost the same but would have added layers of distributors and designers taking their cut, leaving much less for the original grower.

"Buying locally grown, organic flowers may seem like a luxury, but I find that I get the most beautiful flowers at a lower cost than the ones that are imported," says Betsaida Alcantara, a Copake resident and weekly subscriber to the Tiny Hearts community-supported agriculture program. "It made me feel connected to the farmers growing them, despite the quarantine."

Some clients simply want to re-create an aesthetic they've seen on social media, which has added fuel to the movement. Pictures of dahlias plucked directly from the field—the "Café au Lait" dahlia (sidebar) remains an Instagram fave—or armfuls of heirloom daffodils are changing perceptions of floral beauty.

"Social media ramping up during the 2000s has really contributed to the farmer-florist movement," says Marybeth Wehrung, who runs Stars of the Meadow Flower Farm in upstate New York and has seen high-profile producers reach influencer status. "People could see all kinds of different things that they didn't know existed. Books and podcasts are making it really accessible to learn about how to do this—flower production or designing or both."

Prinzing, the author, agrees: "To get the look that you see on Instagram—these dreamy, garden-inspired bouquets—you need those softer, ephemeral, irregular-shaped flowers. And colors that are muted and painterly and look like watercolors." In other words, not "perfect" store-bought blooms.

Wehrung contends that this market still has room to grow. "There have been some big blows to the big farms in Central America and other parts of the world because of climate and Covid," she says. "There's not a gaping hole but sizable openings for domestic U.S. producers to fill that need."

And that's before weddings have even fully returned. Ann Marie Breyer, who grows flowers for New York City floral design company Nectar & Bloom, says that so far this year brides and grooms are much more willing to splurge. "I don't know if that's just the stress and anxiety of having to postpone or if it's more of an appreciation of, well, we didn't get to do this for so long," she says. "I'm sure it's a mix of both."

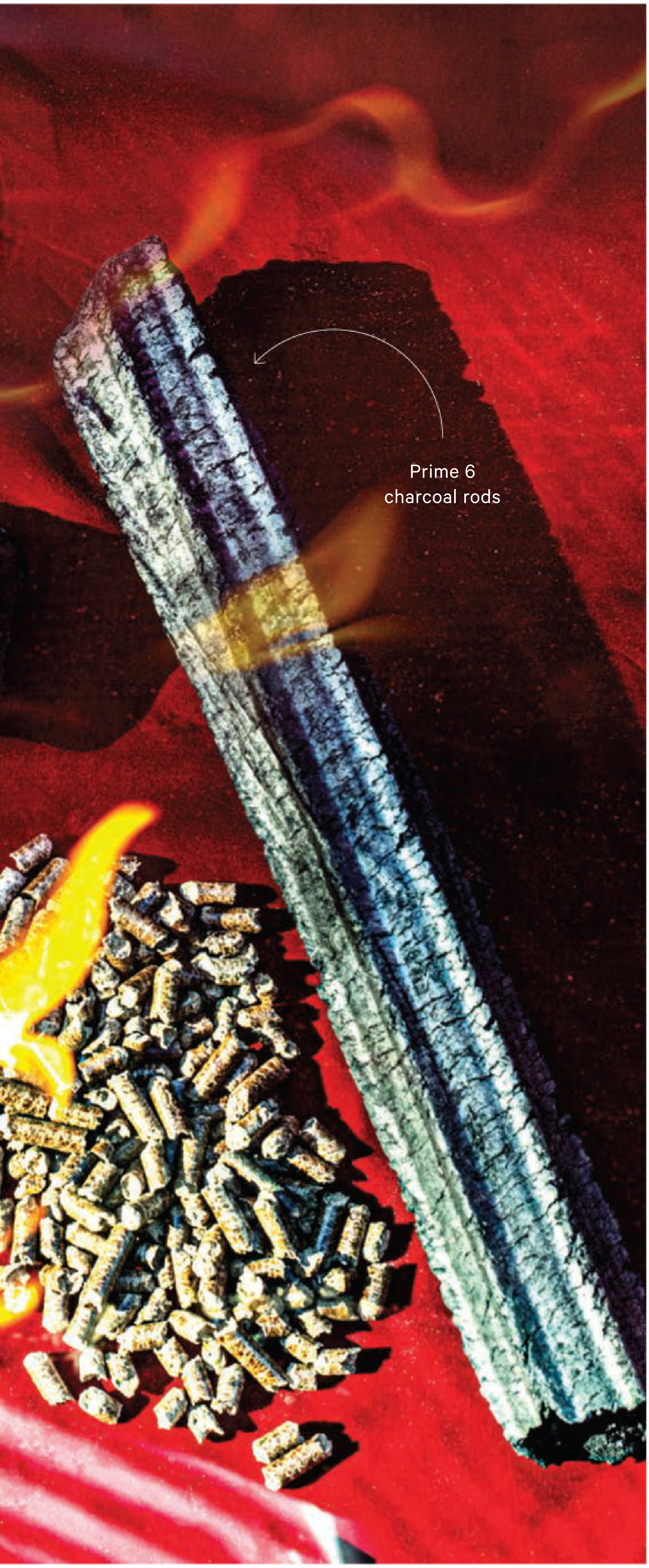
Franco is even more optimistic. "I think weddings are going to come roaring back," he says. "It's going to be the fall of love." B

Better Fuel for Your Fire

Don't get burned: Here are five ways to beef up your grill's heat

By Matthew Kronsberg

Photograph by Naila Ruechel



THE EASY UPGRADE
Grilling with **lump charcoal** instead of briquettes is a bit like driving a stick shift rather than an automatic: Both will get you where you're going, but lump is seen as the more pure experience. Unlike many briquettes, lumps of carbonized wood contain no accelerants or substances such as borax, which can affect taste.
Heat check: Although some briquettes can top out at about 1,000F, lump charcoal can burn as hot as 1,400F. This is mostly because lump's irregular shape allows for more airflow.
Where to get it: Rockwood, based in St. Louis, was started when founder Jonathan Heslop spotted a charcoal plant while working as a medevac pilot. The company makes lump charcoal from Missouri maple, oak, and hickory. The combination lends food a distinct but not overpowering taste. *$23 for 10 lbs; rockwoodcharcoal.com*

THE EXTREME UPGRADE
Pound for pound, good **binchotan** likely costs more than whatever you're cooking over it. Known for providing smokeless, infernal heat, the Japanese charcoal is perfectly suited to cooking yakitori, and other similar-style skewers, to a burnished brown without drying them out.
Heat check: It can reach more than 2,000F and stay there for hours, though it can take upwards of 45 minutes to achieve maximum heat.
Where to get it: This "pro grade" binchotan is made in the oak forests of southern Japan. *$105 for 5 lbs; ippinka.com*

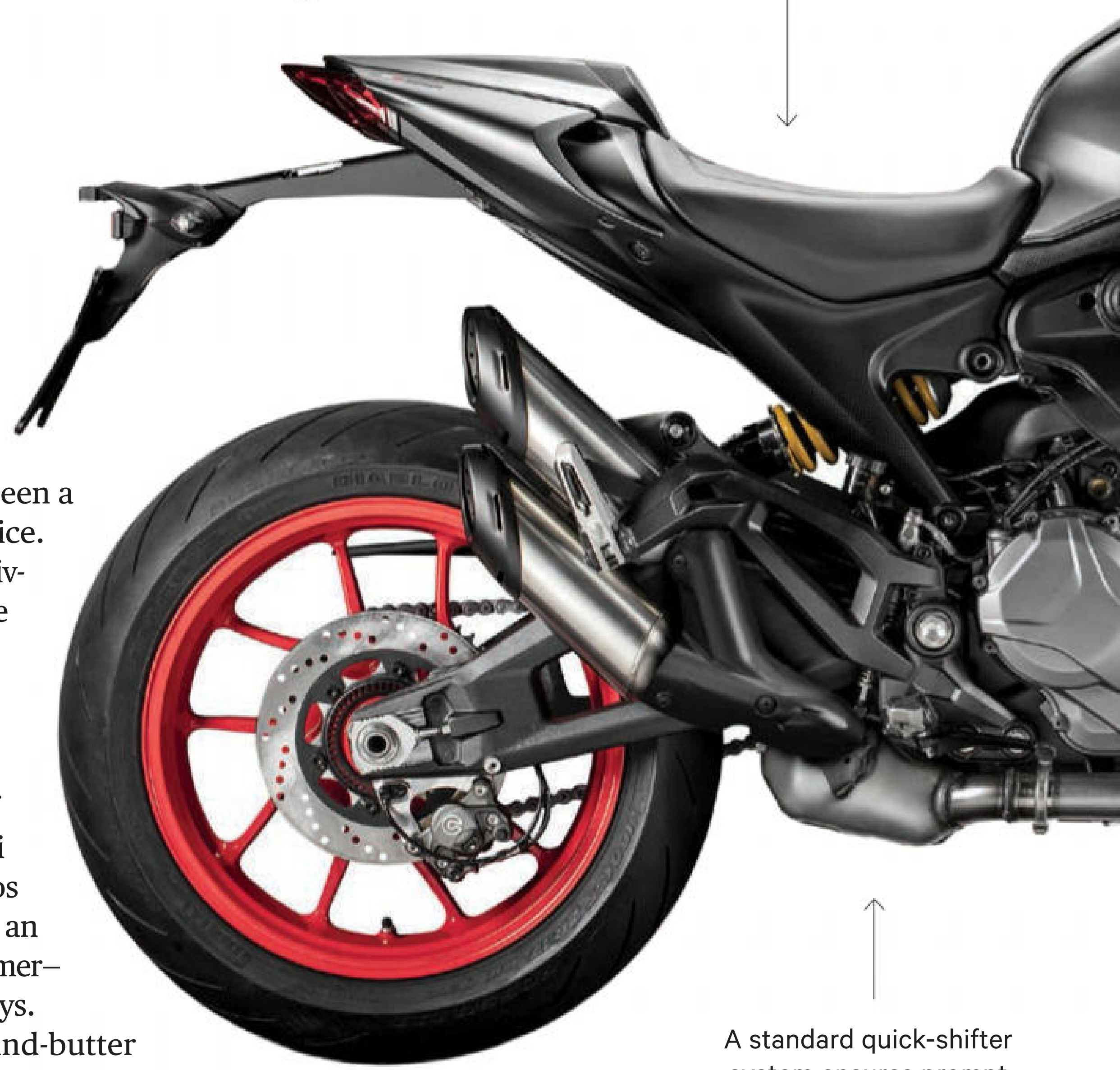
THE OVERSIZE FIRE STARTER
For classic backyard fare—hot dogs, hamburgers, chicken—briquettes are the grilling fuel most people turn to. But not all are created equal: Some **big briquettes** can be twice the size of typical hardware-store versions, with a longer burn time.
Heat check: Briquettes provide more consistent heat than lump, so while they may not get quite as hot, they'll keep you cooking all afternoon.
Where to get it: Jealous Devil's Max XL briquettes are made with quebracho hardwood and a little vegetable starch as a binder—no chemicals or accelerants. *$32 for 20 lbs; jealousdevil.com*

FOR PELLET GRILL OWNERS
Once you start using a **pellet grill**, it's easy to get so taken with the time and temperature controls that you lose sight of the fundamentals: You're still cooking with wood, and the type of wood matters. For Central Texas-style barbecue (hello, brisket!), there's only one real choice: post oak.
Heat check: Although many pellet grills can reach a serviceable 450F to 600F, low and slow cooking—from 150F to 225F—is where these pellets truly shine.
Where to get it: Texas company B&B, which has been keeping grills lit for 60 years, offers its own post oak version of the Hill Country classic. For those who want a dram with their smoked ham, B&B also sells pellets made from used Jack Daniel's whiskey barrels, along with other exotic choices made from hickory, pecan, and mesquite. *$6 for 180 cubic inches (2.95 liters); bbcharcoal.com*

THE UBEREFFICIENT OPTION
Think of **charcoal rods** as the love child of binchotan and briquettes—ultradense and hot-burning but considered more eco-friendly because they're made from lumber or agricultural industry byproducts.
Heat check: Temperatures top out at around 1,400F, perfect for searing steaks and skewers.
Where to get it: Prime 6 packs a lot of cooking power into a small package. The company says 1 lb will burn as long as 3 lbs of lump charcoal and can be extinguished and relit up to seven times. Made from hardwood waste sawdust that's compressed into hollow hexagonal logs, they're then carbonized into charcoal. *$50 for 22 lbs; prime-six.com*

The Monster Within

With its newly exposed engine, Ducati's classic bike is lighter and better than ever. *By Hannah Elliott*



COURTESY DUCATI

Before we start, I should tell you: I am biased.

The first motorcycle I ever rode was a Ducati Monster 796. It was a decade ago when I was learning to ride in the parking lot of an abandoned shopping mall in Dutchess County, N.Y.

A smaller, less powerful bike would have been a more conventional option for a complete novice. But at the time, the Monster's smooth power delivery, good handlebar leverage, taller-than-some seat height, and general user friendliness made riding it a thrilling, memorable experience, even for a beginner.

Ten years on I have yet to buy a Ducati. But I also have yet to be let down by the brand. If I were in the market, I'd buy the 2021 Ducati Monster I recently rode for a week around Los Angeles. It's a great choice for those looking for an affordable, fast, powerful, and easy bike this summer—your ticket to cruising favorite roads on dog days.

This latest evolution of Ducati's bread-and-butter best-seller since 1993—the peak of Italian design—is also the first model in the Monster family to ditch the signature trellis chassis (the metal cage that covers the engines of some sport bikes) since the range made its debut almost 20 years ago. Designer Miguel Angel Galluzzi originally conceived it as something that would be easy to ride but quick and powerful. It was important to Ducati brass that it remain affordable, so they borrowed components from some of the brand's other, more highly tuned motorcycles.

The Monster quickly became the signature muscle bike that defined Ducati. By the early 2000s it made up two-thirds of all its bikes sold worldwide, and the company says it's sold more than 350,000 to date. Count Lewis

The full-LED lighting system adds swiping technology indicators; the newly enlarged rev counter and gear indicator at the center are sharp and clear to read

With a healthy 111 horsepower and a weight of only 365 pounds, the bike moves very quickly

Hamilton and Orlando Bloom as fans.

Adoption of motorcycles as cost-effective private transportation has increased substantially over the past decade, according to the analysis company Fact.MR in Rockville, Md. It projects a global motorcycle market growth rate of 3.5% annually through 2031, following a 14% drop for 2020 because of Covid-19 that affected manufacturers unequally. Ducati's global revenue last year dropped a relatively slim 9% from 2019 following a seven-week work stoppage at the factory in Bologna, Italy. Harley-Davidson Inc. was hit harder, with a year-over-year fall in global revenue of more than 25%, from $5.36 billion in 2019 to $4 billion in 2020.

Credit Ducati's deft navigation in troubled times to a willingness to tinker with icons to attract new riders and keep longtime fans interested. In the case of this bike, the company said it wanted to get "back to the roots of the Monster," which originally lacked the trellis.

The $11,895 Monster I rode around downtown and East Los Angeles looks like a fresh interpretation of the recipe that helped birth the trend of "naked," or stripped-down, bikes in the 1990s. The muscular machine is shaped in Ducati's unmistakable "bison back" form, and the redesigned single headlight at the front feels modern but close to the solo round shape that Monster lovers have long known. Everything including the swingarm and that rear frame has been lightened and elegantly streamlined to further emphasize the cresting front of the bike; it looks as if it's in motion even when it's parked.

Thrumming inside the new Monster is a 937cc L-twin Testastretta engine, which has 111 horsepower (two more than the previous Monster 821) and 68.5 pound-feet of torque (six more than before). Launch control and wheelie control—the one that allows you to wind the throttle to fully accelerate from a standstill without, you know, popping a wheelie—come standard, and that should tell you plenty.

I didn't try those options; I'm taking Ducati's word. The brand doesn't officially share zero-60 mph nor top speed numbers—but, yes, it's stinking fast.

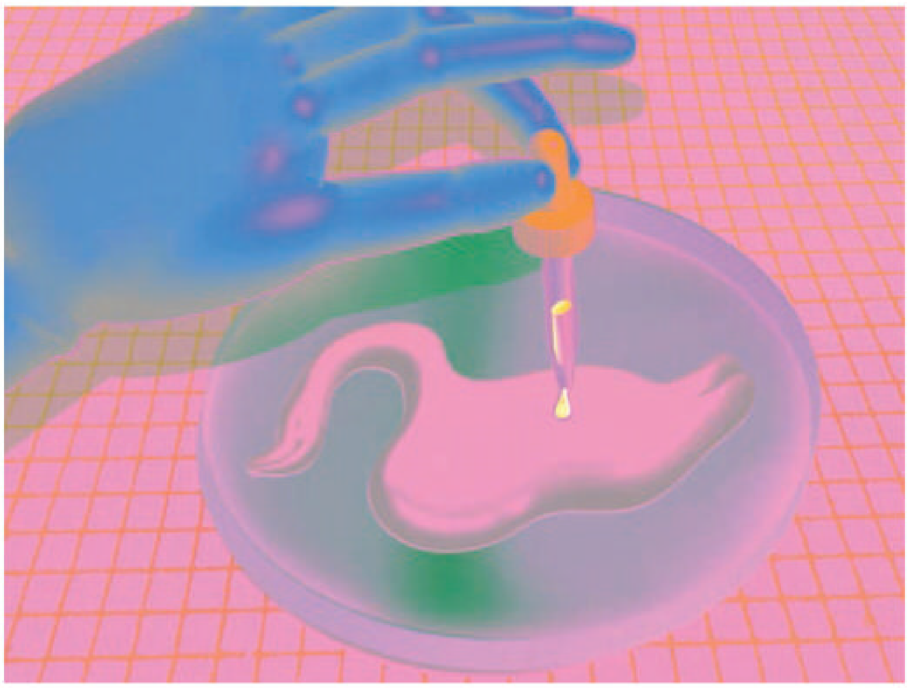
The Monster felt gloriously, impeccably nimble as I ducked through graffiti-littered alleys and abandoned loading zones. As before, its steering agility totally charmed me. The smoothness of the gears and acceleration—without feeling like a hair trigger had been set by a mad scientist—felt liberating.

But the most significant attribute of this year's bike is that it's 40 pounds lighter than the prior version. The entire thing weighs only 365 pounds (166kg), which is 50 to 100 lbs less than several key rivals. Thank the new front setup for that; inspired by racing bikes, it attaches the short aluminum frame directly to engine heads. Ditching that steel trellis chassis alone shaves off 9.9 pounds.

I loved the simplicity of the control panel, which acts as a well-placed central command. Multiple riding modes (sport, touring, and urban) allowed me to change the style to agree with street conditions and my mood. It's all managed via handlebar controls and the 4.3-inch front screen with clear, crisp graphics.

This, to me, is the stuff that conjures the perfect all-around motorcycle for most riders. The new Monster is an everyday companion that's light, easy to handle, responsive, fast, and distinctly beautiful.

They say your first car or motorcycle will always hold a special place in your heart, and the same applies for the latest iteration of this icon: I didn't want to let it go. B



Culture(d)

A French startup seeks to remove the guilt from foie gras with liver grown in a lab

By Agnieszka de Sousa and Geraldine Amiel

Few foods are simultaneously able to raise feelings of delight and repulsion quite as deftly as foie gras. A fatty duck or goose liver that's so buttery it's both delicate *and* rich, foie gras is considered by many as one of the most luxurious foods. In France its consumption is a ritual deeply rooted in the country's tradition and culture—no holiday, from Christmas to Bastille Day, is complete without it. But its decadence makes the brutality of how it's farmed all the more acute: A controversial process known as *gavage*, where birds are force-fed several times a day through metal tubes until their livers swell, is often considered savage.

Animal welfare concerns have spurred more than a dozen countries to ban production. Next year, New York City will follow California in outlawing sales at restaurants, while the U.K. is mulling an import ban. Even in France, a YouGov poll shows that some three-quarters of people say they would prefer the delicacy sans gavage if they had the choice.

"Foie gras is going through an existential crisis," says Nicolas Morin-Forest, co-founder of Gourmey, a Paris-based cultivated-meat startup that wants to tap the expected market gap with an offering that is gavage- and even slaughter-free. "We will be essentially unleashing the full foie gras potential and detangling the product from the controversy."

Gourmey's product is made from duck stem cells harvested from a single fertilized egg, then grown in vitro, a technology embraced by the nascent cultured-meat industry, which by some estimates is set to claw a 35% share of the $1.8 trillion global meat market by 2040. In stainless-steel tanks known as bioreactors, the cells are fed nutrients to multiply and eventually form whatever tissue is desired, be it fat, muscle, or sinew. More than 70 startups globally are working on everything from pork chops to kangaroo meat to bluefin tuna in response to environmental and livestock welfare concerns.

Foie gras, it turns out, is uniquely suited for this kind of substitute. A common hurdle for lab-grown meats is re-creating the fibers and texture of the original product, such as a chicken breast or steak, which can add steps and expense to the process. But foie gras, with its famous fatty smoothness, doesn't come with that expectation. And because it's at the top of the premium scale, lab-grown foie gras can more quickly reach a price parity with the conventionally made product.

Top-quality foie gras could set you back about $176 per kilogram ($80 a pound). "We're at three-figures range per kilogram and need to go to the two-figures range," Morin-Forest explained in an email. "We are on our way to decreasing production cost by 40X in the next months." By comparison, Israel's Future Meat Technologies Ltd. has gotten its lab-grown chicken down to $40 per kilogram vs. about $7.40 for conventional chicken.

As far as taste and texture go, Gourmey manages to deliver. In a private tasting, its pan-seared foie gras was remarkably good. The meat was slightly pink with a caramelized crust, soft and delicate with a flavor and smell indistinguishable from that of a high-quality foie gras. It melted in the mouth exactly as it should.

A second dish—oven-cooked pâté served with raisin-studded wholegrain bread—tasted like any terrine you might find on supermarket shelves. The lab-grown meat did its job. Turns out, like any ingredient, wow factor ultimately rests with the chef.

That's a foodie truism that Gourmey, like rivals such as Eat Just, BlueNalu, and Future Meat, is leaning into to convert customers. "We really want to take cultivated meat into our gastronomy, and we believe chef adoption will essentially be the best label on cultivated-meat products," Morin-Forest says. "The ambition is that in many places cultivated foie gras not only will be the best option, but it will be the only option."

Gourmey just raised $10 million in seed funding from investors including Point Nine and Air Street Capital, as well as the European Commission and France's public investment bank, Bpifrance, a sign of government support for alternative proteins.

With the global foie gras market estimated at $2 billion a year, there may be limits to demand and thereby the extent Gourmey can grow, but Morin-Forest thinks ethical foie gras will open up opportunities for the versatile technology. He plans to tap the $300 billion poultry market next with products such as duck magret and turkey breasts, eventually moving on to less fancy chicken nuggets. Products from its pilot factory in the 11th arrondissement should roll out by the end of 2022. B

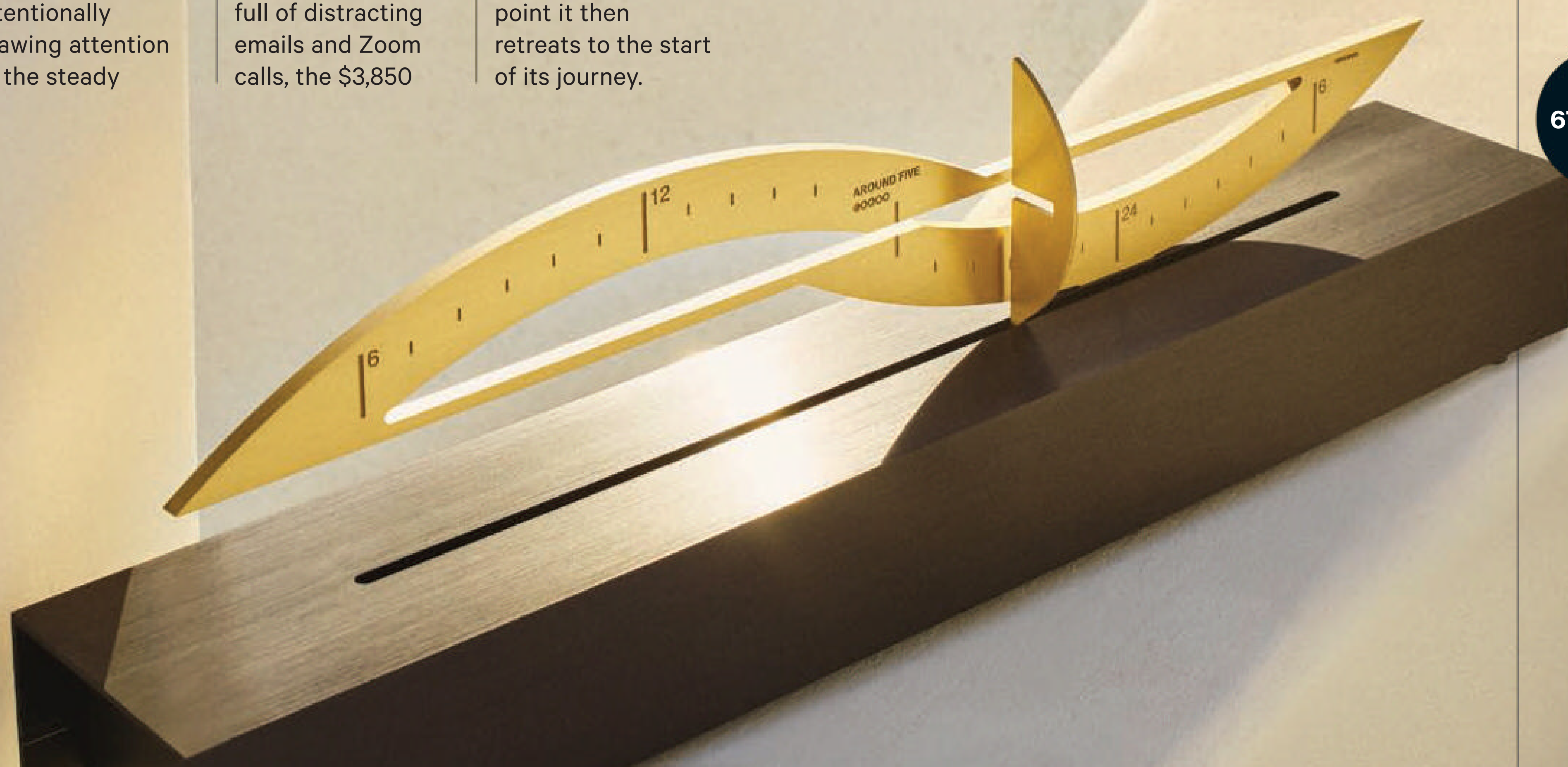
ILLUSTRATION BY OHNI LISLE

Slow Time

A clock that counts the hours in a straight line doubles as a piece of desk art. *Photograph by Joyce Lee*

Time is our most valuable commodity, a sentiment that the novelty office clocks of yore (the famous black-and-white Kit-Cat Klock or perhaps a white-sand-filled hourglass) exploited by intentionally drawing attention to the steady stream of seconds. Those clocks now represent an outdated urgency to get through the workday quickly—who wants to be reminded of how much time they're losing? In a modern world full of distracting emails and Zoom calls, the $3,850 Around Five clock is a calming breath of fresh air. The time is counted in a straight 24-hour stretch by a sail that moves slowly along an undulating wave of hour markers from 6 a.m. to 6 a.m., at which point it then retreats to the start of its journey.

THE COMPETITION
• MoMA Design Stores' Textime clock ($295) skips the seconds, too, telling the time in written words across its face (for example, "It's five forty-five"), with an update every minute. It's a casual conversation starter.
• Swiss watchmaker Jaeger-LeCoultre has been making its line of Atmos desk clocks, which rely on changes in air temperature to wind the mechanism, since 1928. The pink-gold-plated Classic Moon ($9,600) is a timeless addition to any office.
• The La Tour desk clock in gold ($4,360) from august Swiss institution L'Epée 1839 reveals its skeletonized movement in a glimmering tower under a sheath of glass. The hands show the hour and minutes, but without a dial with markers, precision is in the mind of the beholder.



THE CASE
Made of steel-cut extruded brass that's been brushed to a fine finish, the 19.3-inch Around Five has a small footprint. But its Swiss creators, engineer Antoine Lorotte and designer Philippe Vallat, say its clean shapes and simple concept make a big statement about their country's meticulousness and attention to design. Powered by batteries and accurate to plus or minus 2 seconds a day, the stepper motor has a vibration-damping system and is completely silent. You can place the aluminum stand on a desk or in a display case, or purchase a matching frame for mounting on a wall. *$3,850; aroundfiveus.com*

When Infrastructure Spending Was Big

By Justin Fox

After four years of "infrastructure weeks" during the Trump administration that always came to naught, President Joe Biden and a bipartisan group of lawmakers have agreed on a $579 billion package of spending on roads, bridges, transit, clean power, and other infrastructure. It might still come to naught, but it's at least further along than anything of its ilk since the American Recovery and Reinvestment Act of 2009.

The plan is to spend the $579 billion over five years, which amounts to about 0.4% of what the Congressional Budget Office expects gross domestic product to be over that period. Current federal, state, and local government infrastructure spending is, depending on the measure used (there are many!), somewhere on either side of 2% of GDP, so this would be a significant if not exactly historic increase.

For the accompanying chart, I've chosen nondefense government investment in structures as my metric, mainly because the Bureau of Economic Analysis has the numbers on that going all the way to 1901. They show a long mid-20th century infrastructure boom that was interrupted by World War II—when government investment spending accelerated but went almost entirely to military purposes—then a slide in the 1970s and '80s and a lower plateau since.

Infrastructure spending is an investment in the future. If done right, it more than repays the cost, so a spending boost would seem to be good news. But recent research has shown U.S. infrastructure construction costs to be high, relative both to the past and to other rich countries, which could make it harder to achieve a payoff. Ⓑ —*Fox is a columnist for Bloomberg Opinion*

● GLOBAL LAGGARD
U.S. investment in inland transport infrastructure was 0.6% of GDP in 2019, reports the Organization for Economic Cooperation and Development, which ranked near the bottom among developed countries. The figure for China was 5.6%.

● SHORT-TERM THINKING
Investment of all kinds in 2020 accounted for just

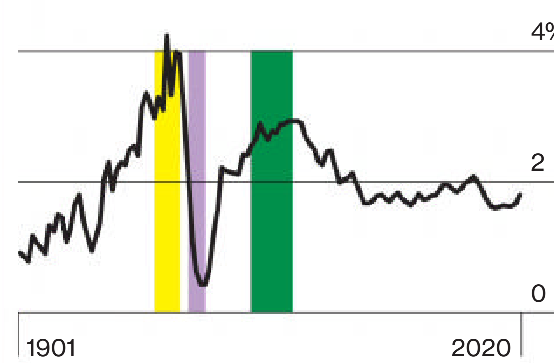
8.7%

of federal, state, and local government spending, down from 24.7% in 1961.

● KEEPING IT LOCAL
Almost 78% of U.S. transportation and water infrastructure spending in 2017 was by state and local governments, according to the CBO's most recent estimates, up from 62.7% in 1977.

● U.S. government investment in nondefense structures, as a share of GDP

New Deal · U.S. involvement in World War II · Interstate highway boom



● PAST PEAKS
New Deal programs drove nondefense government investment in structures above 4% of GDP in 1936. The measure neared 3% during the interstate highway building boom of the 1950s and '60s.

ILLUSTRATION BY GEORGE WYLESOL. DATA: U.S. BUREAU OF ECONOMIC ANALYSIS, MEASURINGWORTH

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