



FINANCE AND DEVELOPMENT

# The Digital Future

MARCH 2021

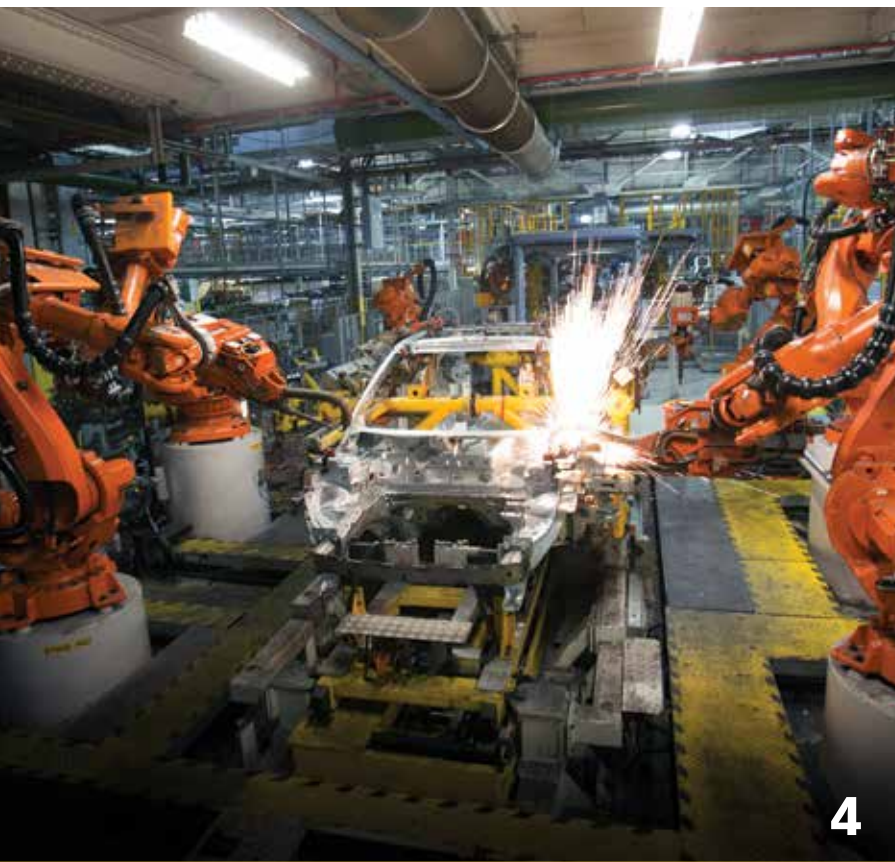
Acemoglu on automation P.4

Africa goes digital P.18

Taxing tech P.54



# Contents



Digitalization is transforming the economy —we should shape it in a way that benefits all.

## THE DIGITAL FUTURE

### 4 Remaking the Post-COVID World

To reverse widening inequality, keep a tight rein on automation

*Daron Acemoğlu*

### 10 Let's Build a Better Data Economy

Our digital footprint generates enormous value, but too much of it ends up in Big Tech silos

*Yan Carrière-Swallow and Vikram Haksar*

### 14 From Financial Innovation to Inclusion

For technology to benefit everyone, private sector innovation needs to be supported by public goods

*Jon Frost, Leonardo Gambacorta, and Hyun Song Shin*

### 18 Africa Goes Digital

In rebuilding after COVID-19, policymakers must invest in innovative technology to leapfrog obstacles to inclusive development

*Cristina Duarte*

### 21 Decoupling in the Digital Era

Absent multilateral cooperation, the global digital economy could splinter, and everyone would pay

*Daniel Garcia-Macia and Rishi Goyal*

### 24 The Global Cyber Threat

Cyber threats to the financial system are growing, and the global community must cooperate to protect it

*Tim Maurer and Arthur Nelson*

### 28 The New Morality of Debt

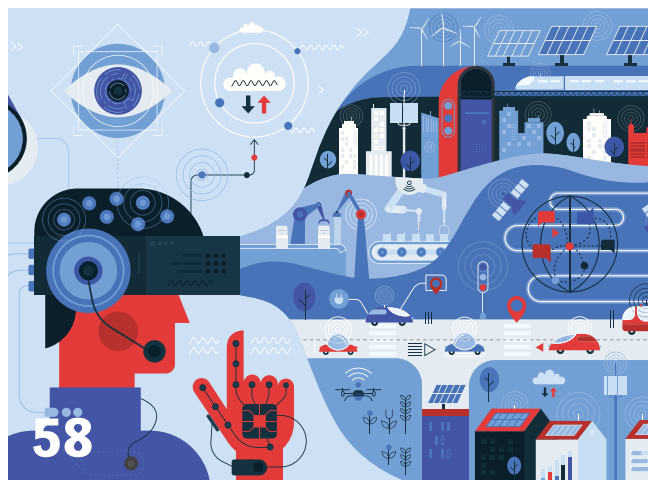
Increased datafication of debt raises ethical questions and calls for a new approach to regulating lending

*Nikita Aggarwal*

### 32 Digital Dollars for Online Tea

The Bahamas, Sri Lanka, and Uganda fight the pandemic's disruption with innovation

*Steven Dorst*



## ALSO IN THIS ISSUE

### 44 Dear Mom, Forget the Cash

An IMF economist explains central bank digital currency to his mother

*Tommaso Mancini-Griffoli*

### 46 Rethinking Economics

The pandemic tests a new policymaking benchmark that includes civil society and social norms

*Samuel Bowles and Wendy Carlin*

### 50 Embracing the Gift of Global Talent

More equal opportunities can make us all better off

*Ruchir Agarwal, Ina Ganguli, and Patrick Gaule*

### 54 Taxing Tech

Digital services taxes take shape in the shadow of the pandemic

*Rebecca Christie*

### 58 Transformative Technology

The shift to a hyperconnected world presents a formidable opportunity—but also risks and challenges

*Herve Tourpe*

44



## DEPARTMENTS

### 36 Straight Talk

#### Averting a Great Divergence

Exiting the pandemic with minimal scarring will require policy action on several fronts

*Gita Gopinath*

### 38 People in Economics

#### The Guru of Globalization

*Prakash Loungani* profiles Tel Aviv University's **Assaf Razin**, early scholar of the promise and perils of globalization

### 42 In the Trenches

#### Radical Inclusion

Sierra Leone's *David Sengeh* is taking an inclusive approach to digitalizing the country's education system and economy

### 61 Book Reviews

*The Power of Creative Destruction: Economic Upheaval and the Wealth of Nations*, Philippe Aghion, Céline Antonin, and Simon Bunel

*The Data Detective: Ten Easy Rules to Make Sense of Statistics*, Tim Harford

*The Great Demographic Reversal: Ageing Societies, Waning Inequality, and an Inflation Revival*, Charles Goodhart and Manoj Pradhan

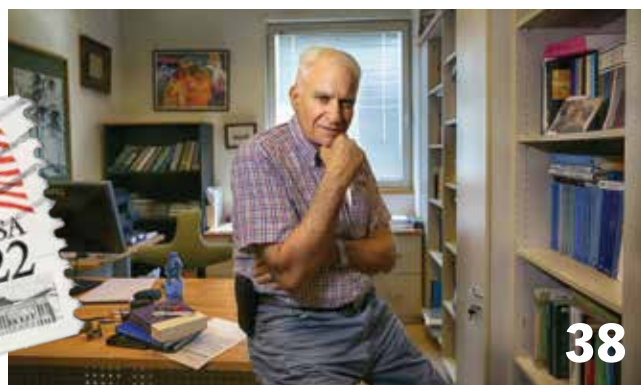
### 64 Currency Notes

#### New Old Idea

Technological innovation is fueling the resurgence of community currencies

*Andreas Adriano*

38





## The Haves and Have-nots

**ACCELERATED BY THE PANDEMIC**, the digital future is coming at us faster than ever before, and maybe faster than we can imagine. In this issue, we explore the possible consequences—the good, the bad, and the gray.

For millions, technology has been a lifeline, changing the way we work, learn, and shop. In a year like no other, it has spurred game-changing digital shifts. Governments moved quickly, using mobile solutions to provide cash assistance; financial technology has helped the survival, and in some cases, growth of small businesses; and the first national digital currency, in The Bahamas, provides a glimpse of the future of money.

But technology can also drive unequal outcomes in education, opportunities, and access to health care and financial services. Automation has destroyed jobs, some permanently. The chasm between the digitally connected and the unconnected—across and within countries and between rural and urban areas—has amplified social and economic inequalities.

Daron Acemoglu underscores that the government can and should play a regulatory role, with incentives for innovation toward “human-friendly” technologies that produce good jobs. Hyun Song Shin and coauthors elaborate on smart policies that can bring more people—particularly the poorest—into the financial system. Clearly, as Cristina Duarte emphasizes, countries must scale up investment in digital infrastructure, such as access to electricity, mobile and internet coverage, and digital ID. Affordable internet access is now almost a basic right.

Still, there are real risks: Tim Maurer focuses on addressing cyber threats to the financial system. Yan Carrière-Swallow and Vikram Haksar suggest that commercial interests must be balanced with protection of privacy and data integrity. Other contributors illuminate digital taxation, data bias and ethics, the need for global tech cooperation, and how the pandemic will alter thinking about economics and the social contract.

Digitalization can transform economies and lives. But innovation needs to have public value and be shaped to bring everyone into the digital age. **FD**

**GITA BHATT**, editor-in-chief



### ON THE COVER

For the March 2021 cover on technology, artist Davide Bonazzi imagines a digitally smart city of the future.



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**FSC FPO**

# Corporate Income Taxes Under Pressure

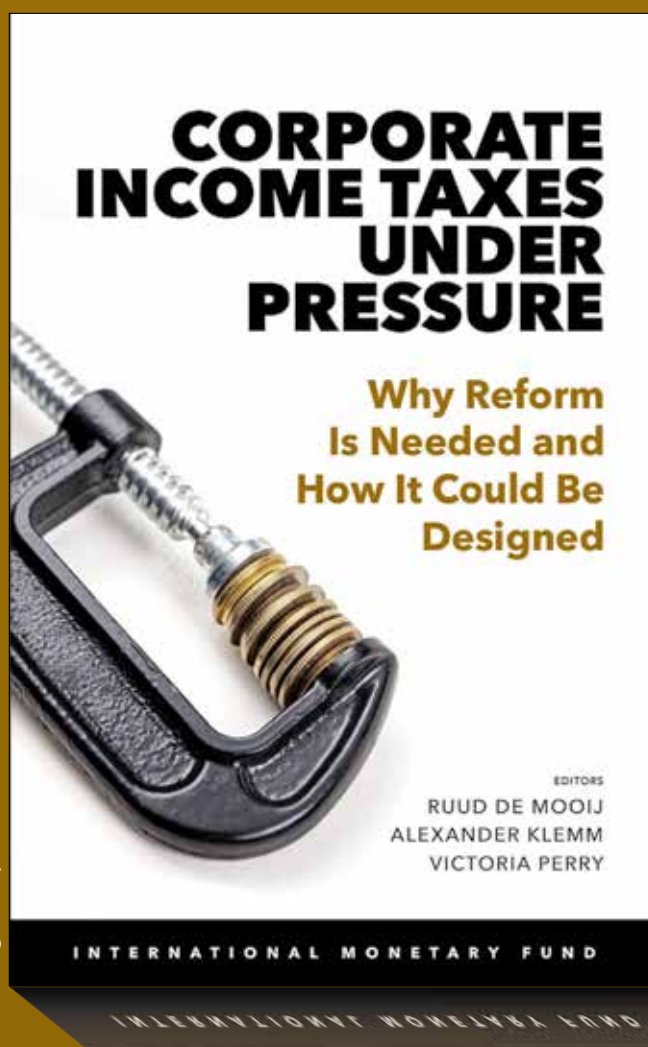
Why Reform Is Needed and How It Could Be Designed

*Ruud De Mooij, Alexander Klemm, Victoria Perry*

International tax issues have long been at the core of IMF research and the IMF has provided much advice on this topic. This volume offers a complete assessment of the current international tax architecture while remaining accessible to a relatively broad audience. It is meant to be a guide to the various facets of international taxation. Many of the topics covered have increased in importance with COVID-19, such as the need for globally coordinated efforts to further reduce profit shifting and tax competition.

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# REMAKING





# THE POST-COVID

# WORLD

To reverse widening inequality, keep a tight rein on automation

**Daron Acemoğlu**

PHOTOS: SIMON DAWSON/BLOOMBERG VIA GETTY IMAGES;  
HULTON ARCHIVE/GETTY IMAGES

he industrialized world, especially the United States, suffered severe economic ills even before the COVID-19 pandemic. Unless we recognize them now, we are unlikely to produce solutions.

Chief among these problems is the nature of economic growth, which has become much less shared since the 1980s. Wider inequality in much of the industrialized world; the disappearance of good, high-paying, secure jobs; and the decline in the real wages of less-educated workers in the United States are all facets of this unshared growth (Acemoglu 2019), which has deepened discontent and sparked protests from both left and right in the years since the Great Recession.

My research with Pascual Restrepo indicates that automation accounts for much of this loss of shared growth, along with such factors as globalization and the declining power of labor relative to capital (Acemoglu and Restrepo 2019). With the next phase of automation rapidly unfolding, driven by machine learning and artificial intelligence (AI), the world's economies stand at a crossroads. AI could further exacerbate inequality. Or, properly harnessed and directed through government policies, it could contribute to a resumption of shared growth.

Automation is the substitution of machines and algorithms for tasks previously performed by labor, and it's nothing new. Ever since weaving and spinning machines powered Britain's Industrial Revolution, automation has often been an engine of economic growth. In the past, however, it was part of a broad technology portfolio, and its potentially negative effects on labor were counterbalanced by other technologies boosting human productivity and employment opportunities. Not today.

The next phase of automation, relying on AI and AI-powered machines such as self-driving cars, may be even more disruptive, especially if it is not accompanied by other types of more human-friendly technologies. This broad technological platform, with diverse applications and great promise, could help human productivity and usher in new human tasks and competencies in education, health care, engineering, manufacturing, and elsewhere. But it could also worsen job losses and economic disruption if applied exclusively for automation.

The pandemic has certainly given employers more reasons to look for ways of substituting machines for workers, and recent evidence suggests they are doing so (Chernoff and Warman 2020).

Some argue that pervasive automation is the price we pay for prosperity: new technologies will increase productivity and enrich us, even if they dislocate some workers and disrupt existing businesses and industries. The evidence does not support this interpretation.

Despite the bewildering array of new machines and algorithms all around us, the US economy today generates very low total factor productivity growth—economists' headline measure of the productivity performance of an economy, which gauges how efficiently human and physical capital resources are being used. In particular, total factor productivity growth has been much lower over the past 20 years than during the decades after World War II (Gordon 2017). Even though information and communication technology has advanced rapidly and is applied in every sector of the economy, industries that rely more intensively on these technologies have not performed better in terms of total factor productivity, output, or employment growth (Acemoglu and others 2014).

The reasons for this recent slow productivity growth are not well understood. But one contributing factor appears to be that many automation technologies, such as self-checkout kiosks or automated customer service, are not generating much total factor productivity growth. Put differently, rather than bringing productivity dividends, automation has been excessive because businesses are adopting automation technologies beyond what would reduce production costs or because these technologies have social costs because they give rise to lower employment and worker wages. Excessive automation may also be a cause of the slowdown in productivity growth. This is because automation decisions are not reducing costs and, even more important, because a singular focus on automation technologies may be causing businesses to miss out on productivity gains from new tasks, new organizational forms, and technological breakthroughs that are more complementary to humans.

But is automation really excessive? I believe so. First of all, when employers make decisions about



## AI COULD FURTHER EXACERBATE INEQUALITY. OR, PROPERLY HARNESSSED AND DIRECTED THROUGH GOVERNMENT POLICIES, IT COULD CONTRIBUTE TO A RESUMPTION OF SHARED GROWTH.

whether to replace workers with machines, they do not take into account the social disruption caused by the loss of jobs—especially good ones. This creates a bias toward excessive automation.

Even more important, several factors appear to have fueled automation beyond socially desirable levels. Particularly important has been the transformation in the corporate strategies of leading US companies. American and world technology is shaped by the decisions of a handful of very large, very successful tech companies that have tiny workforces and a business model built on automation (Acemoglu and Restrepo 2020). Big Tech companies including Amazon, Alibaba, Alphabet, Facebook, and Netflix are responsible for more than \$2 of every \$3 spent globally on AI (McKinsey Global Institute 2017). Their vision, centered on the substitution of algorithms for humans, influences not only their own spending but also what other companies prioritize and the aspirations and focus of hundreds of thousands of young students and researchers specializing in computer and data sciences.


Of course there is nothing wrong with successful companies pursuing their own vision, but when this becomes the only game in town, we must be on guard. Past technological successes have more often than not been driven by a diversity of perspectives and approaches. If we lose this diversity, we also risk losing our technological edge.

The dominance of a handful of companies over the path of future technology has been exacerbated as well by dwindling support from the US government for fundamental research (Gruber and Johnson 2019). In fact, government policy excessively encourages automation, especially through the tax code. The US tax system has always treated capital more favorably than labor, encouraging businesses to substitute machines for workers, even when workers may be more productive.

My research with Andrea Manera and Pascual Restrepo shows that, over the past 40 years, labor has paid an effective tax rate of more than 25 percent via payroll and federal income taxes (Acemoglu, Manera, and Restrepo 2020). Even 20 years ago, capital was more lightly taxed than labor, with equipment and software investment facing tax rates of about 15 percent. This differential has widened with tax cuts on high incomes, the conversion of many businesses to closely held S corporations that are exempt from corporate income taxes, and generous depreciation allowances. As a result of these changes, investments in software and equipment are taxed at rates of less than 5 percent today, and in some cases corporations can even derive net subsidies when they invest in capital. This creates a powerful motive for excessive automation.

A path of future technology centered on automation is not preordained. It is a consequence of choices by researchers who focus on automation applications at the expense of other uses of technology and by companies that build business models on automation and reducing labor costs rather than on broad-based productivity increases. We can make different choices. But such a course correction calls for a concerted effort to redirect technological change, which can happen only if government plays a central role in the regulation of technology.

Let me be clear that I do not mean government blocking technology or slowing technological



progress. Rather, the government should provide incentives that tilt the composition of innovation away from an excessive focus on automation and more toward human-friendly technologies that produce employment opportunities, especially good jobs, and a more shared form of economic prosperity. We do not know exactly what the most transformative human-friendly technologies of the future may be, but many sectors provide plenty of opportunities. These include education, where AI can be used for much more adaptive and student-centered teaching combining new technologies and better-trained teachers; health care, where AI and digital technologies can empower nurses

capital and labor. A first step would be to correct that imbalance. This would go a long way but would not be sufficient by itself. Much more can be done—for example, via R&D subsidies targeted to specific technologies that help human productivity and increase labor demand.

This brings me to the second objection: can the government really effectively redirect technology? My answer is that governments have done this in the past, and in many cases with surprising effectiveness. The transformative technologies of the 20th century, such as antibiotics, sensors, modern engines, and the internet, would not have been possible without the government's support and

## GOVERNMENTS HAVE ALWAYS INFLUENCED THE DIRECTION OF TECHNOLOGY, AND WE ALREADY KNOW HOW TO BUILD INSTITUTIONS THAT DO THIS IN A MORE BENEFICIAL WAY.

and technicians to provide more and better services; and modern manufacturing, where augmented reality and computer vision can increase human productivity in the production process. We have also witnessed during the pandemic how new digital technologies, such as Zoom, have fundamentally broadened human communication and capabilities.

This recommendation may still strike many as unusual. Isn't it highly distortionary for governments to influence the direction of technology? Could they really influence where technology goes? Wouldn't we be opening the door to a new kind of totalitarianism with the state intervening even in technological decisions?

I maintain that in fact there is nothing unusual or revolutionary about this idea. Governments have always influenced the direction of technology, and we already know how to build institutions that do this in a more beneficial way for society.

Governments around the world routinely affect the direction of technology via tax policies and support for corporate research and universities. As I have shown, the US government has encouraged automation through its asymmetric taxation of

leadership. Nor would they have flourished as much without generous government purchases. Even more relevant, perhaps, for efforts to redirect technology in a human-friendly trajectory is the example of renewable energy.

Four decades ago renewable energy was prohibitively expensive, and the basic know-how for green technologies was lacking. Today renewables make up 19 percent of energy consumption in Europe and 11 percent in the United States, and costs have declined in the same ballpark as fossil-fuel energy (IRENA 2020). This has been achieved thanks to a redirection of technological change away from a singular focus on fossil fuels toward greater efforts for advances in renewables. In the United States, the primary driver of this redirection has been modest government subsidies for green technologies as well as the changing norms of consumers.

The same approach can strike a balance between automation and human-friendly technologies. As in the case of renewable energy, change must start with a broader societal recognition that our technology choices have become highly unbalanced, with myriad adverse social consequences. There

needs to be a clear commitment by the federal government to redress some of these imbalances. The government should also address the dominance of a handful of big tech companies over their markets and the direction of future technology. This of course would have other benefits, such as ensuring greater competition and protecting privacy.

The most challenging objection to these ideas is political—the same challenge raised by Friedrich Hayek to the development of Britain’s welfare state in what became his celebrated book *The Road to Serfdom*. Hayek warned against the rise of the administrative state, arguing that it would crush society and its freedoms. As he later summarized it, his concern was that

... extensive government control produces ... a psychological change, an alteration in the character of the people.... Even a strong tradition of political liberty is no safeguard if the danger is precisely that new institutions and policies will gradually undermine and destroy that spirit.

Although Hayek’s concerns were well-placed, he turned out to be wrong. Liberty and democracy were not quashed in the United Kingdom or in Scandinavian countries that adopted similar welfare state programs. On the contrary, by ensuring a social safety net, these systems sparked greater opportunities for individual freedom to flourish.

There is an even more fundamental reason the welfare state did not threaten liberty and democracy. James Robinson and I lay out the conceptual framework in our new book, *The Narrow Corridor* (Acemoglu and Robinson 2019). We explain why the best guarantors of democracy and liberty are not constitutions or clever designs of separation of powers, but society’s mobilization. That requires a balance between state and society that puts the polity in the narrow corridor where liberty flourishes and where the state and society can gain strength and capacity together. So when we need the state to shoulder greater responsibilities, we can also experience a deepening of democracy and greater societal mobilization. This means citizens actively participating in elections and becoming informed about politicians and their agendas (and their misdeeds), civil society organizations

expanding, and media helping to hold politicians and bureaucrats accountable. This is what happened in much of the industrialized world. As the state took on more, democracy deepened and society’s involvement and ability to keep politicians and bureaucrats in check intensified.

Whether society can play its part in forging a new chapter in our history is an open question. A major complicating factor is that new digital technologies have also weakened democracy. With misinformation rising, AI-powered social media creating filter bubbles and echo chambers inimical to democratic discourse, and political engagement waning, we may not have the right tools to keep the state in check. Yet we do not have the luxury not to try. **FD**

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# Let's Build A BETTER DATA ECONOMY

Our digital footprint generates enormous value, but too much of it ends up in Big Tech silos

Yan Carrière-Swallow and Vikram Haksar

**H**umanity has never been so comprehensively recorded. Smartwatches capture our pulse in real time for a distant artificial intelligence (AI) to ponder the risks of heart disease. Bluetooth and GPS keep track of whether some of us shop at gourmet stores and linger in the candy aisle. Our likes and browsing hours on social media are harvested to predict our credit risk. Our search queries on shopping platforms are run through natural language processors to generate uniquely targeted ads whose unseen tethers subtly remold our tastes and habits.

The generation and collection of data on individual human beings has become a big part of the modern economy. And it generates enormous value. Big data and AI analytics are used in productivity-enhancing research and development. They can strengthen financial inclusion. During the pandemic, data on real-time movements of entire populations have informed policymakers about the impact of lockdowns. Contact tracing apps have notified individuals who have been in potentially dangerous proximity to people infected with COVID-19.

But just as data have helped us monitor, adapt, and respond to COVID-19, the pandemic has brought into focus two fundamental problems with how it flows in the global economy (Carrière-Swallow and Haksar 2019). First, the

data economy is opaque and doesn't always respect individual privacy. Second, data are kept in private silos, reducing its value as a public good to society.

## Whose data anyway?

Once the GPS, microphones, and accelerometers in the smart devices located in every pocket and on every bedside table and kitchen counter begin monitoring our behavior and environment, where do the data go? In most countries, they are collected, processed, and resold by whoever can obtain them. User consent is all too often granted by checking a box below lengthy legalistic fine print—hardly a means to serious informed consent. Analysis based on such granular data is a gateway to influencing behavior and has tremendous commercial value. To be sure, this is not a one-way street: consumers get many nice data-driven features for no direct financial cost in exchange. But are they getting enough?

Most transactions involving personal data are unbeknownst to users, who likely aren't even aware that they have taken place, let alone that they have given permission. This gives rise to what is known in economics as an externality: the cost of privacy loss is not fully considered when an exchange of data is undertaken. The consequence is that the market's opacity probably leads to *too much data*

## Why are people willing to hand over their location data in exchange for a weather forecast, but not to share it to protect their health?

being collected, with *too little of the value being shared* with individuals.

By agreeing to install a weather application and allowing it to automatically detect its current city, people might unwittingly allow an app designer to continuously track their precise location. Users who sign up for a weather forecast with a sleek interface agree to share their location data, believing it's just to enable the app's full functionality. What they are providing, in fact, is a data trail about their daily routine, travel itinerary, and social activity. The weather forecaster may never get any better at predicting rain but could end up with a better prediction of the user's creditworthiness than the scores compiled by traditional credit bureaus (Berg and others 2020).

### Privacy paradoxes

Do we care about our privacy or not? Researchers have documented what is known as a “privacy paradox.” When asked to value their privacy in surveys, people frequently rank it as a very high priority. However, in their daily lives, these same people are often willing to give away highly sensitive personal data for little in exchange.

This paradox should have heralded good news for contact tracing apps, which rely on widespread usage to be effective (Cantú and others 2020). Unfortunately, in many countries where use of these tools is voluntary, take-up has been very low. Why are people willing to hand over their location data in exchange for a weather forecast, but not to share it to protect their health while helping fight a global pandemic that has killed over 2 million people? One reason may be that—unlike the weather app makers—public health agencies have designed their contact tracing apps to transparently announce how they will be collecting and using data, and this triggers concerns about privacy. Another reason is that authorizing governments to combine location information with data on a disease diagnosis may be seen as particularly sensitive. After all, knowledge of someone's preexisting condition could lead

to their exclusion from insurance markets in the future or open the door to other forms of stigma or discrimination.

### How to use responsibly

The data generated by our smart devices are essentially a private good held by Big Tech companies that dominate social media, online sales, and search tools. Given how valuable these data are, it is not surprising that companies tend to keep them to themselves (Jones and Tonetti 2020). As more data beget better analysis, which in turn attracts more usage, more data, and more profits, these swollen data war chests fortify their platform networks and potentially stifle competition.

This finders keepers model tends to lead to too much data being collected, but the data are also *insufficiently utilized* exactly when they could be most helpful, kept in private silos while public needs remain unmet. Data sharing can support the development of new technologies, including in the life sciences. Consider how epidemiological research can benefit from scaling up big data analytics. A single researcher analyzing the experience of patients in their home country may be a good start, but it cannot rival the work of many researchers working together and drawing on the experience of many more patients from around the world—the key to the success of a number of cross-border collaborations.

How can data be made more of a public good? Commercial interests and incentives for innovation must be balanced with the need to build public trust through protection of privacy and integrity. Clarifying the rules of the data economy is a good place to start. Significant advances have resulted, for example, from the 2018 implementation in Europe of the General Data Protection Regulation (GDPR), which clarified a number of rights and obligations governing the data economy. EU residents now have the right to access their data and to limit how it is processed, and these rights are being enforced with increasingly heavy fines. But even as researchers

have started to see the impact of the GDPR on the digital economy, there are still concerns about how to operationalize these rights and keep them from being simply a box-checking exercise.

People should have more agency over their individual data. There could be a case to consider the creation of public data utilities—perhaps as an outgrowth of credit registries—that could balance public needs with individual rights. Imagine an independent agency tasked with collecting and anonymizing certain classes of individual data, which could then be made available for analysis, subject to the consent of interested parties. Uses could include contact tracing to fight pandemics, better macroeconomic forecasting, and combating money laundering and terrorism financing.

Policies can also help consumers avoid becoming hostage within individual ecosystems, thus contributing to market contestability and competition. The European Union's late-2020 proposals for the Digital Markets Act and the Digital Services Act have many new features. These include third-party interoperability requirements for Big Tech “gatekeepers”—including social media and online marketplaces—in certain situations and efforts to make it easier for their customers to port their data to different platforms.

Policies also have a role to play in keeping data secure from cyberattacks. An individual company does not fully internalize the harm to public trust in the entire system when its customers' data are breached, and may thus invest less in cybersecurity than what would be in the public interest. This concern has special resonance in the financial system, where maintaining public confidence is crucial. This is why secure infrastructure, cybersecurity standards, and regulation are essential pillars of the open banking policies many countries have adopted to facilitate interoperability in sensitive financial data.

## Global approach

Many countries have been developing policies aimed at a clearer, fairer, and more dynamic data economy. But they are taking different approaches, risking greater fragmentation of the global digital economy. These risks arise in many data-intensive sectors, ranging from trade in goods to cross-border financial flows. In the context of the pandemic, differing privacy protection standards make it harder to collaborate

on crucial medical research across borders—true even before the pandemic—because of the difficulty of sharing individual results of biomedical trials (Peloquin and others 2020).

Global coordination is always a challenge, especially in an area as complex as data policy, where there is a multitude of interests and regulators even within individual countries, let alone across borders. Dealing with the fallout of the pandemic has spurred a new opportunity to ask hard questions about the need for common minimum global principles for sharing data internationally while protecting individual rights and national security prerogatives.

The current moment also affords an opportunity to explore innovative technological solutions. Consider whether jump-starting the recovery in international travel could be facilitated by a global vaccine registry. This could leverage old-fashioned paper-based international health cards but would call for development of standards and an interoperable data management system for reporting and consulting on people's vaccination status—potentially linked to digital identity—as well as agreements on protection of individual privacy and barriers to access for other purposes.

There is a strong case for international cooperation to ensure that the benefits of the global data economy can build a more resilient, healthier, and fairer global society. To find a way forward together, we can start by asking the right questions. **FD**

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*A bank employee explains how to make transactions with a mobile phone using the Aadhaar digital identification system in Hyderabad, India.*

# From Financial Innovation to Inclusion

For technology to benefit everyone, private sector innovation needs to be supported by public goods

Jon Frost, Leonardo Gambacorta, and Hyun Song Shin

**D**igital technology is transforming the financial industry, changing the way payments, savings, borrowing, and investment services are provided and who provides them. Fintech and Big Tech companies now compete with banks and other incumbents across a range of markets. Meanwhile, digital currencies promise to transform the heart of finance: money itself.

But just how much has technology advanced financial inclusion? For sure, in the past year alone, digital finance has helped households and businesses meet the challenges posed by the COVID-19 pandemic. It has also given governments new ways of reaching those who need support.

Progress to date has been impressive. Yet if it is to realize its full potential in bolstering financial



inclusion, private sector innovation must be supported by the appropriate public goods, as innovation has large spillovers to all aspects of economic activity. Public goods provide the underpinnings of financial inclusion.

### Disruptive inclusion?

Financial inclusion can be understood as universal access to, and use of, a wide range of reasonably priced financial services. Inclusion made great strides in the decade between the global financial crisis and the pandemic. Despite a volatile global economy, World Bank data show that 1.2 billion adults gained access to a transaction account between 2011 and 2017. Much of this progress came directly from new digital technologies.

Mobile money is a case in point. Kenya's M-Pesa and similar applications let users send and receive payments on all mobile phones. Over time, providers have broadened their services, offering micro-loans, savings accounts, and insurance against crop failures and other hazards. As of 2019, 79 percent of Kenyan adults had a mobile money account. Usage is rising fast across Africa, the Middle East, and Latin America.

In China, Ant Group and Tencent have reached a respective 1.3 billion and 900 million users with Alipay and WeChat Pay. Payment applications, based on mobile interfaces and quick response (QR) codes, have paved the way for a whole spectrum of financial services, ranging from small loans and money market funds to "mutual aid," a form of health insurance.

In India, public provision of foundational infrastructure has been the main driver, with a far-reaching impact. The digital identity (ID) initiative Aadhaar (Hindi for "foundation" or "base") has given 1.3 billion people access to a trusted ID so that they can open a bank account and access other services. Building on the initiative, a new system lets users make low-cost payments in real time. As Bank for International Settlements (BIS) research shows (D'Silva and others 2019), India has increased bank account access from 10 percent of the population in 2008 to more than 80 percent today. Technology achieved in a decade what might have taken half a century with traditional growth processes.

As COVID-19 imposed social distancing and lockdowns, digital payments became a lifeline for many people. Small businesses were able to

continue accepting payments, and individuals could send money to their loved ones quickly and at low cost. While not everyone was able to access digital payments and financial services, technology helped fill the gaps. In the Philippines, 4 million digital accounts were opened remotely between mid-March and the end of April 2020.

Governments worldwide used new digital infrastructure to reach households and informal workers. In Peru, payments were made through Billetera Móvil, a project that fully integrated the country's largest mobile operators and banks. In Thailand, the government's PromptPay fast payment system fulfilled the same purpose. This success stood in sharp contrast to the practice in some advanced economies, such as the United States, of sending paper checks through the mail.

### The economics of digital innovation

Although the pandemic will leave major economic damage and inequality in its wake, it will help drive the adoption of digital technologies that enable financial inclusion and economic opportunity. But these technologies will not succeed on their own. To understand how digital technology and policies can help, it is helpful to look first at the underlying economics.

At the heart of digital innovations stand a few technological enablers. First are mobile phones and the internet, connecting individuals and businesses with information and providers of financial services. A second enabler is the storage and processing of large volumes of digital data. Finally, advances like cloud computing, machine learning, distributed ledger technology, and biometric technologies play a role.

But at the core of all these innovations is the ability to gather information and reach users at a very low cost. Economists have assessed the range of specific costs that decrease with digital technologies (Goldfarb and Tucker 2019). Two economic features of digital technology help show why these factors have been so powerful and what risks they pose.

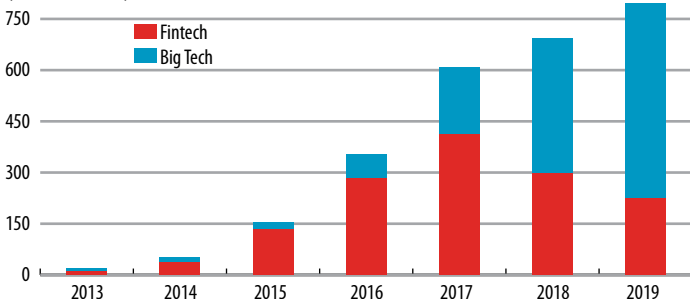
First, digital platforms are highly scalable. Platforms can be thought of as "matchmakers" that help different groups of users find one another. For instance, a digital wallet provider like PayPal brings together merchants and clients who want to make secure payments. The more clients use a particular payment option, the more attractive it

Chart 1

### Big money

Lending from large tech companies is booming worldwide.

(billions of dollars)



**Source:** Cornelli, G., J. Frost, L. Gambacorta, R. Rau, R. Wardrop, and T. Ziegler. 2020. "Fintech and Big Tech Credit: A New Database." BIS Working Paper 887, Bank for International Settlements, Basel.

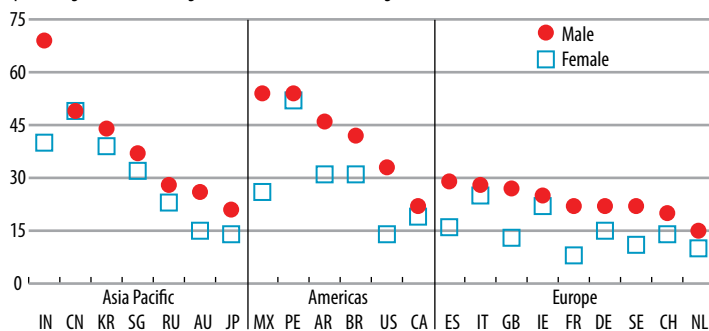
**Note:** 2019 fintech lending volume figures are estimated.

Chart 2

### Privacy, please

Preferences on data sharing differ across and within societies.

(percentage of adults willing to share their data in exchange for better offers on financial services)



**Source:** Chen, S., S. Doerr, J. Frost, L. Gambacorta, and H. S. Shin. Forthcoming. "The Fintech Gender Gap." BIS working paper, Bank for International Settlements, Basel.

**Note:** Data labels use International Organization for Standardization (ISO) country codes.

is for merchants to accept it, and vice versa. This is an example of economies of scale, which allow providers to grow quickly.

Similarly, Big Techs such as Amazon or China's Alibaba can serve as matchmakers to help buyers and sellers of goods find one another, but they can also link merchants with providers of credit and other services. Because of the range of services provided (including nonfinancial), they have information that can be very valuable for their financial offerings. This exemplifies economies of scope, which give the advantage to providers with multiple business lines.

Second, digital technologies can improve risk assessment, benefiting from the same data that are the natural by-product of their business. This is particularly relevant for services such as lending, as well as investment and insurance. Credit scores based on big data and machine learning can often outperform traditional assessments, particularly for "thin-file" borrowers, people or small businesses with little or no formal documentation.

Research by BIS economists and coauthors shows that almost a third of borrowers served by Mercado Libre, a Big Tech lender in Argentina, would have been unable to access credit from a traditional bank (Frost and others 2019). Moreover, firms that borrowed from Mercado Libre enjoyed greater sales and product offerings in the year after they borrowed. Research with data from Ant Group suggests that, by relying on big data, Big Tech lenders have less need for collateral (Gambacorta and others 2019). This can open up access to lending for borrowers who have no house or other assets to offer as collateral, and make loans less sensitive to asset price changes.

Such economies of scale and scope, together with improvements in predictive power, can drive financial inclusion forward by leaps and bounds. Indeed, Big Tech credit has boomed worldwide in the past decade, rising to an estimated \$572 billion in 2019 (see Chart 1). Such lending is particularly important in China, Kenya, and Indonesia, compared with traditional credit markets. It is also growing rapidly elsewhere and may even have ticked up during the pandemic as some Big Techs helped distribute government lending to companies.

However, every silver lining has a cloud, and the advances made possible by big data have drawbacks—in particular, the tendency toward monopolies. In some economies, Big Tech payment providers and lenders have become systemically important ("too big to fail"). The tendency to buy up competitors may choke off innovation. Finally, there is a serious risk that sensitive data will be misused and privacy violated. Smart public policies are needed to mitigate these risks, while allowing the potential of digital technologies to be fulfilled.

### Closing the gaps with smart policy

How should policymakers adapt to this brave new world? How can they reap the benefits of digital innovation for financial inclusion, while mitigating

the (very real) risks to financial stability and consumer rights? Five sets of policies are needed.

- **Building inclusive digital infrastructures:** Initiatives such as India's Aadhaar digital ID are a stepping-stone to accounts and more sophisticated services. Fast retail payment systems based on open public infrastructure that ensure a level playing field are essential. Examples include the Faster Payments System in Russia, CoDi in Mexico, and PIX in Brazil—these facilitate instantaneous and low- or zero-cost digital payments between individuals and businesses or governments. Central bank digital currencies, now being tested in China and other countries and already operational in The Bahamas, can play a similar role as a common platform on which private providers can build services.
- **Introducing common standards to bolster competition:** Many countries have countered digital monopolies with standards that let users carry their data across various platforms. This makes different providers “interoperable,” supporting consumer choice and competition. Much like the basic protocols at the heart of the internet, these common standards are a critical public good that allows private markets to flourish.
- **Updating competition policies:** In the digital age, traditional measures of competition in markets, and traditional antitrust tools, may no longer be adequate. For instance, monopoly behavior may manifest itself through capture of data rather than high prices. Without regulatory intervention, markets may see new barriers to entry and new anticompetitive practices. As the growing scrutiny of mergers and acquisitions and of digital gatekeepers shows, there may be a need for new and more forward-thinking ways of keeping digital finance markets competitive and contestable.
- **Strengthening data privacy:** Laws on data generated by digital services are often not well-defined, meaning that tech companies have de facto control over sensitive data. Users must be given more control and agency. Privacy laws enacted in the European Union and practices regarding user control of data embedded in India Stack offer potential models. Recent research finds that men are generally more willing than women to share their data in exchange for better financial services offers (Chen and others, forthcoming) (see Chart 2).

Younger users are also more open to sharing than older users. Defining rules for data use that fit all of society will be a challenge—and will likely require legislation.

- **Getting policymakers of all stripes to work together:** Digital technologies in finance concern not only central banks and regulators but also those in charge of competition and data protection. Central banks and financial regulators must work hand in hand with competition authorities and data privacy authorities. Moreover, policies in one country are very likely to affect users in other countries. By coordinating their policies within and across borders, authorities can work to harness the benefits of digital technology and ensure that these accrue to all.

## Central banks and financial regulators must work hand in hand with competition and data privacy authorities.

If public goods are appropriately designed, and if policymakers cooperate, digital technology can be harnessed to bring more people—particularly the poorest—into the financial system. Broad diffusion of technology may help make societies not only more efficient, but more equitable and better prepared for the digital future. Innovation must be shaped to benefit everyone. **FD**

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## Africa Goes Digital

*In rebuilding after COVID-19, policymakers must invest in innovative technology to leapfrog obstacles to inclusive development*

**Cristina Duarte**



COURTESY OF CRISTINA DUARTE

**AFRICA HAS ENJOYED** strong economic growth for most of the 21st century, mainly because of robust global demand for primary commodities. But the “Africa Rising” narrative that accompanied this growth is mostly a story of rising GDP, which is overly one-dimensional. In fact, Africa’s economic growth has failed to generate many good jobs—postponing, once again, the benefits of the demographic dividend of a large working-age population. Because there are fewer old and young people that require support than people of working age, the dividend is supposed to free up resources that can be devoted to inclusive development.

Instead, African policymaking continued its now nearly half-century belief that achieving “development” is limited to managing poverty—in

other words, equating the business of development to poverty reduction. The shift from the industrialization agenda of the early post-independence period to one of poverty reduction is a major reason for the continent’s economic malaise. As the African Innovation Summit (2018) put it, the development agenda shifted from socioeconomic transformation to the lowest common denominator, managing poverty.

To generate economic growth that leads to sustainable development, Africa must shift its focus to retaining and creating wealth, better managing its resources, fostering inclusiveness, moving up on global value chains, diversifying its economies, optimizing the energy mix, and placing human capital at the center of policymaking. For this to happen, African policy must foster investment in research, development, and innovation (R&D&I) to reboot the continent’s economic structures and catch up technologically with the rest of the world. Innovation, and the digital information technology that accompanies it, has become a necessary component of any effort to address such challenges as food security, education, health, energy, and competitiveness. The world is driven by innovation: unless African policymakers reap the potential benefits of R&D&I, the global divide will keep growing. The problem is that innovation is talked about and debated, but not strategized.

### **An opportunity to go digital**

It is here, paradoxically, that the COVID-19 pandemic, despite all the economic and social devastation it has caused, provides an opportunity for African countries to innovate and go digital. African countries will have to rebuild their economies. They should not merely repair them; they should remake them, with digitalization leading the way.

So far, civil societies seem to be more ready than policymakers to embrace digital technology. With no help from government, the digital technology industry has grown in Africa—through incubators and start-ups, tech hubs and data centers.

Information and communication technology (ICT) activities are spreading across the continent, and young Africans are responding with digital technology to the challenges posed by COVID-19. For example, at an ICT hub in Kenya, FabLab created Msafari, a people-tracking application that can trace the spread of infections. A similar application, Wiqaytna6, was developed in Morocco. In Rwanda, the government is demonstrating what enlightened policies can achieve. The country has invested heavily in digital infrastructure—90 percent of the country has access to broadband internet, and 75 percent of the population has cell phones. Early in the pandemic Rwanda parlayed that technological prowess into developing real-time digital mapping to track the spread of COVID-19, expanded telemedicine to reduce visits to clinics, and created chatbots to update people on the disease.

These are promising endeavors, but digitalization is not widespread in Africa. Rwanda is the exception. Only 28 percent of Africans use the internet, a digital divide that prevents the continent from taking full advantage of digital technology's ability to mitigate some of the worst effects of the pandemic.

That slow spread of internet technology also makes it difficult for the continent to leapfrog obstacles to sustainable development. To generate transformative growth, digitalization cannot be left mainly to civil society and the private sector. The socioeconomic divide in Africa feeds the digital divide, and vice versa. Digitalization needs to be scaled up forcefully by policymakers to unlock structural transformation.

### Digital divide

When assessing the digital divide, it is important to remember that the issue is about more than access to the internet. How internet usage benefits the user is also a factor. The goal of digitalization should not just be greater consumption; it should enhance civil societies' resilience, which demands a clear regulatory framework and an educated population.

In Africa, it's not just internet connectivity that's missing. So are other basics—including electricity, literacy, financial inclusion, and regulations. The result is that people are unable to use the digital solutions that are available. Furthermore, a good share of African populations still struggle with such life-threatening problems as conflict and food



*Students at the Institute of Engineering in Dar Es Salaam, Tanzania, 2017.*

insecurity, which make daily survival their only goal. Millions of Africans are not only on the wrong side of the digital divide, they are on the wrong side of many divides—lacking basic health and public necessities such as electricity, clean water, education, and health care. COVID-19 has exacerbated their plight because lockdowns and social distancing have made many public services accessible only online. The terrible truth is that these hundreds of millions of people have been left behind, and unless African policymakers realize that access to digital technologies is a critical tool for socioeconomic inclusion, progress will be confined to those with electricity and telecom services—further isolating the vast majority without such access. The divide will widen.

The deep disruptions generated by the pandemic have opened up opportunities to remake society that are subtle. These are times that test policymakers' vision and leadership. As McKinsey & Company (2020) noted, the "COVID-19 crisis contains the seeds of a large-scale reimagination of Africa's economic structure, service delivery systems and social contract. The crisis is accelerating trends such as digitalization, market consolidation and regional cooperation, and is creating important new opportunities—for example, the promotion of local industry, the formalization of small businesses and the upgrading of urban infrastructure."

The moment is now. As Africa rebuilds from COVID-19 disruptions it must not return to a pre-pandemic reality; it must build a better reality that recognizes the need for innovation, particularly digital technologies. This is the prerequisite for victory over its myriad development

## As Africa rebuilds from COVID-19 disruptions it must not return to a pre-pandemic reality.

challenges—such as poverty, health, productivity, competitiveness, economic diversification, food security, climate change, and governance.

### Receptive to change

Over the past five years, change has occurred in Africa, suggesting that the continent may be receptive to building better rather than merely rebuilding. Liu (2019) identified three major African initiatives that signal such receptivity to change:

- The African Continental Free Trade Area (AfCFTA), which aims to create a single market with a combined GDP that exceeds \$3.4 trillion and includes more than 1 billion people;
- The South African government's new Centre for the Fourth Industrial Revolution of the World Economic Forum (WEF), for dialog and cooperation on the challenges and opportunities presented by advanced technologies;
- The WEF's Africa Growth Platform, which aims to help companies grow and compete internationally, leveraging Africa's entrepreneurial activity—13 percent higher in its initial stage than the global average.

These ongoing initiatives could become game changers, breathing life into the top-down dimension of going digital.

So far, the change has been almost only from the bottom up. More than 600 technology hubs—places designed to help start-up companies—have emerged across the continent. Three have achieved international recognition: Lagos in Nigeria, Nairobi in Kenya, and Cape Town in South Africa. These tech hubs host thousands of start-ups, incubators, technology parks, and innovation centers driven by the private sector and young people who, despite adversity, are aware of how self-employment is linked to innovation.

### Public policy lacking

Things are less promising from the top down. According to a 2018 WEF report, 22 of 25 countries analyzed had no public policies focused on an ecosystem for innovation.

Investing in broad-based digitalization, from a geographic and sectoral point of view, is crucial not only to address socioeconomic problems but also to deal with peace and security challenges. And it boosts economic growth. A study by the International Telecommunication Union found that 10 percent greater mobile broadband penetration would generate a 2.5 percent rise in Africa's GDP per capita.

But digital solutions cannot be achieved in a vacuum. Policymakers must make implementation of digital technologies an element of an ecosystem of innovation, and there's no time to lose. Well-calibrated regulatory frameworks, investment in infrastructure, digital skills, and financial inclusion must take priority.

Most research shows that digital technologies are essential to addressing socioeconomic challenges. They are often described as the single ingredient Africa needs to leapfrog to sustainable and inclusive economic development. From an economic standpoint, better information and communication technology democratizes information crucial to production and market agents, which makes for more efficient value chains and more affordable products and services. And the most vulnerable people will benefit.

However, the massive adoption of digital technologies also means that policymakers must be aware of and address the complex legal and ethical impact of technology in society, including privacy, data, and tax evasion. This is especially true in Africa, where weak institutions might not be strong enough to uphold the rights and interests of their people against those of the market. **FD**

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# DECOUPLING IN THE DIGITAL ERA

Absent multilateral cooperation, the global digital economy could splinter, and everyone would pay

**Daniel Garcia-Macia and Rishi Goyal**

**T**echnology wars are becoming the new trade wars.

In the race to dominate the technologies of the future, the competition between the United States and China has led to import and export bans of 5G network technologies, semiconductors, social media platforms, and data-based security applications across multiple countries. Countries are also imposing restrictions on financial market access for foreign tech firms deemed to be security risks. Trade liberalization in digital services is giving way to increased restrictions (see chart).

From a classical economic perspective, this escalation makes little sense. In traditional sectors, barriers to trade generally lower economic well-being in all countries involved, as they prevent efficient specialization and limit the variety of goods available.

In the digital era, however, leadership in emerging technologies bestows outsized profits, global market shares, and the ability to set standards. New services built on data, such as artificial intelligence, next generation 5G networks and the internet of

things, and quantum computing have opened the way for new growth engines that promise to transform entire industries and lift productivity. This trend toward an increasingly digitalized and networked world has only been accelerated by the COVID-19 pandemic.

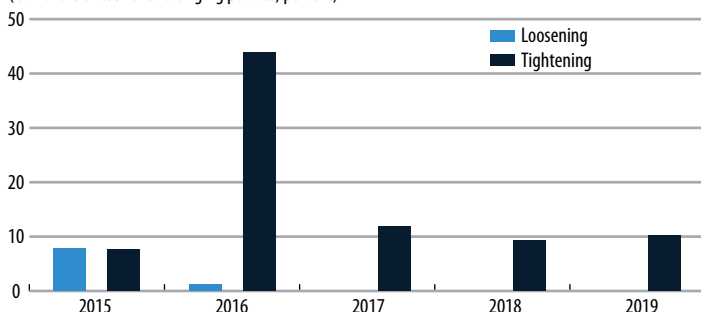
With a winner-takes-most dynamic—rooted in economies of scale and scope—global technological leadership is highly prized. The IMF *World Economic Outlook* has shown that a small fraction of highly productive and innovative firms has gained dominance and enjoyed large profits over the past two decades (IMF 2019). The phenomenon spans sectors and economies but is particularly acute in the digital sector.

However, the race for leadership in digital technologies does not conform to traditional borders and intellectual property protections. The networked economy makes it possible to reach seamlessly across the world to collect information and make decisions, enhancing economic efficiency. But it also can allow thieves, saboteurs, and spies

## A digital trade wall

Trade restrictive measures on digital services have replaced trade liberalization in recent years.

(GDP share of countries changing policies, percent)



**Sources:** Organisation for Economic Co-operation and Development (OECD); and authors' calculations.

**Note:** The sample comprises OECD countries and eight large non-OECD countries.

to reach back to steal, copy, manipulate, or destroy. Digitalization and connectivity have sped up the diffusion of knowledge while simultaneously bringing new security threats.

### Toward a new tech order

Macroeconomists in general have treated security matters as largely distinct from economic matters, except where conflict and crime dominate. For the most part, they have taken the institutional underpinnings for safeguarding property rights and military matters as separate from the analysis of economic policy. But in cyberspace, there are no such distinctions; no effective domestic norms or public institutions for enforcing security, such as “e-police” or an “e-justice system”; and no international mechanisms for de-escalation and maintaining peace.

The interconnections of the digital era blur traditional distinctions between economic and security issues. Simultaneously engines of economic growth and channels of security risks, they link and incentivize the use of economic policy tools, such as trade and industrial policies, for broader security or geopolitical gains.

Thus, we are confronted with a new set of questions. When, if ever, does restricting digital trade make sense for an individual country? How does this affect other countries, and how should they respond? What policies and institutions can deter conflict?

In a recent IMF staff working paper, we show that some of the standard answers no longer apply in the digital era (Garcia-Macia and Goyal 2020). Once the key features of digital sectors are considered—large market power driven by scale economies, technology flows, and security risks—import and export bans can be rationalized from the point of view of an individual country. However, these bans come at a deleterious cost for the rest of the world.

In our analysis, the key motivation for banning technology imports—if a country hosts a potentially viable supplier—is to repatriate monopoly profits that would otherwise accrue to foreign firms. The presence of cybersecurity vulnerabilities only increases the attraction of banning imports of foreign technology. However, banning imports could halt inflows of technological knowledge and may be desirable only for a country with sufficiently advanced technological capacity and know-how. This is not an entirely new result. Trade economists have long pointed out that banning imports may be beneficial in monopolistic sectors.

More striking and novel is the finding that banning *exports* can also be beneficial for an individual country in the digital economy. The explanation lies in the dynamics of technological competition between countries. A challenger country can successfully displace a leader as the global producer and capture monopoly rents, as a result of international technology diffusion and domestic scale economies. To forestall such an outcome and reduce the associated cybersecurity vulnerabilities, the leader in a certain technology may seek to ban its exports.

Imposing trade bans could lead to retaliation. An import ban might help a technological power gain an advantage in global markets, although a competitor might also reciprocate the ban, leading to a worse outcome for both countries. In many cases, the anticipation of such reciprocity can act as a powerful deterrent.

Unlike import bans, export bans cannot be deterred with retaliation via trade policies. A technology leader would impose them irrespective of the challenger’s response. Hence, they could be harder to defuse in a world of decentralized international competition.

### Cooperation as a cure

These findings are sobering. Trade bans may benefit an individual country relative to the free trade outcome. But they cut off other countries from access to digital technologies or lead to inefficient decoupling into separate economic spheres. Costs are amplified when allies follow suit. Leading countries should be urged to set up cooperative frameworks in several areas.

Securing intellectual property rights across borders should be a priority. Minimum enforced



standards would be in everyone's interest. They would reduce concerns about misuse, forced transfers, or theft and thus diminish the incentives for a technological leader to impose export bans, allowing for longer periods of diffusion and higher global welfare. Steps toward defining global standards should start with fostering cooperation in specific areas. An example is the international standard for electronic data interchange among financial institutions that facilitates payments.

Clear, transparent, and uniform rules may also be needed on the interaction between the public and the private sectors. Governments' partnerships with domestic cyber technology firms for purportedly national security purposes, including surveillance, should be clearly ring-fenced.

A related area is cybersecurity. The advent of the internet has facilitated an explosion in cross-border online crime, for which the national and international tools, norms, and organizations have yet to be firmly established. Efforts to cooperate on cybersecurity have been stymied by competing interests among participants, national security considerations, differences in judicial and criminal systems, and concerns over misuse by governments.

Facilitating foreign ownership and control of monopolistic digital goods firms would also broaden the sharing of rents, align incentives for better global outcomes, and discourage trade conflict. Open financial or capital accounts to permit such ownership, governance arrangements to facilitate control, upholding foreign property rights, and narrowly circumscribing areas subject to national security arguments would be prerequisites.

Regarding regulatory policy, if consideration is given to breaking up large domestic technology firms to reduce their monopoly profits or otherwise regulating prices, this ideally should be done in concert across nations. The absence of a concerted effort could reduce the incentives for any country to pursue action in this area. If only one country or region moves toward strong regulation while foreign monopolists are free to compete, that area could risk falling behind in the race for technology and markets.

Coordinated initiatives to introduce digital taxation would similarly be much more effective and perceived to be fairer. Tech giants benefit from selling goods and services online across borders with limited physical presence and facing little income tax liability in the buyer's jurisdiction

under existing international tax arrangements. This favors tax arbitrage and creates an uneven playing field.

### A new Bretton Woods moment

The challenge of international cooperation against a backdrop of mistrust and competition has led to calls for a new Bretton Woods moment for the digital age. Just as Bretton Woods brought nations toward a new monetary order in the wake of two world wars, rampant protectionism, and the Great Depression, international cooperation on digital matters could similarly seek consensus on broad principles and common institutions to resolve problems, such as in the areas outlined above, and help create a predictable and open framework for international trade.

Another concrete proposal would be to establish a digital stability board—in the image of the Financial Stability Board—to develop common standards, regulations, and policies; share best practices; and monitor risks (Medhora 2021). This could help protect financial stability from cyberattacks and bring about progress in areas such as a charter of technological rights, uniform statistics for the digital economy, and international data trusts to collect and guard individuals' data for designated purposes, such as health research.

If, as is expected, the monopoly rents on offer remain large and cyber warfare is seen as the key arena for security conflicts in the future, there will be strong domestic resistance to collaboration. In this case, continued tech conflict, with the risk of a global rupture and its associated adverse spillovers, looms large. Collaboration would weaken the incentives for conflict and lead to potentially better outcomes. But it will require sustained effort and rebuilding trust. **FD**

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# THE GLOBAL CYBER THREAT

Cyber threats to the financial system are growing,  
and the global community must cooperate to protect it

**Tim Maurer and Arthur Nelson**

In February 2016, hackers targeted the central bank of Bangladesh and exploited vulnerabilities in SWIFT, the global financial system's main electronic payment messaging system, trying to steal \$1 billion. While most transactions were blocked, \$101 million still disappeared. The heist was a wake-up call for the finance world that systemic cyber risks in the financial system had been severely underestimated.

Today, the assessment that a major cyberattack poses a threat to financial stability is axiomatic— not a question of *if*, but *when*. Yet the world's governments and companies continue to struggle to contain the threat because it remains unclear who is responsible for protecting the system. Increasingly concerned, key voices are sounding the alarm. In February 2020, Christine Lagarde, president of the European Central Bank and former head of the International Monetary Fund, warned that a cyberattack could trigger a

# The assessment that a major cyberattack poses a threat to financial stability is axiomatic—not a question of *if*, but *when*.

serious financial crisis. In April 2020, the Financial Stability Board (FSB) warned that “a major cyber incident, if not properly contained, could seriously disrupt financial systems, including critical financial infrastructure, leading to broader financial stability implications.” The potential economic costs of such events can be immense and the damage to public trust and confidence significant.

Two ongoing trends exacerbate this risk. First, the global financial system is going through an unprecedented digital transformation, which is being accelerated by the COVID-19 pandemic. Banks compete with technology companies; technology companies compete with banks. Meanwhile, the pandemic has heightened demand for online financial services and made work-from-home arrangements the norm. Central banks around the globe are considering throwing their weight behind digital currencies and modernizing payment systems. In this time of transformation, when an incident could easily undermine trust and derail such innovations, cybersecurity is more essential than ever.

Second, malicious actors are taking advantage of this digital transformation and pose a growing threat to the global financial system, financial stability, and confidence in the integrity of the system. The pandemic has even supplied fresh targets for hackers. The financial sector is experiencing the second-largest share of COVID-19–related cyberattacks, behind only the health sector, according to the Bank for International Settlements.

## Who is behind the threat?

More dangerous attacks and ensuing shocks should be expected in the future. Most worrisome are incidents that corrupt the integrity of financial data, such as records, algorithms, and transactions; few technical solutions are currently available for such attacks, which have the potential to undermine trust and confidence more broadly. The malicious actors behind these attacks include not only increasingly daring criminals—such as the Carbanak group, which targeted financial institutions to steal more than \$1 billion during 2013–18—but also states and state-sponsored attackers (see table). North Korea,

for example, has stolen some \$2 billion from at least 38 countries in the past five years.




This is a global problem. While cyberattacks in high-income countries tend to make headlines, less attention is paid to the growing number of attacks on softer targets in low- and lower-middle-income countries. Yet it is in those countries where the push toward greater financial inclusion has been most pronounced, leading many to leapfrog to digital financial services such as mobile payment systems. Although they do advance financial inclusion, digital financial services also offer a target-rich environment for hackers. The October 2020 hack of Uganda’s largest mobile money networks, MTN and Airtel, for example, resulted in a major four-day disruption of service transactions.

## The responsibility gap

Despite the global financial system’s increasing reliance on digital infrastructure, it is unclear who is

### A closer look at cyberattacks

The actors behind these incidents include not only increasingly daring criminals but also states and state-sponsored groups, with diverse goals and motivations.

THREAT ACTOR	MOTIVATIONS	GOALS	EXAMPLES
 <p><b>Nation-states, state-sponsored groups</b></p>	Geopolitical, ideological	Disruption, destruction, damage, theft, espionage, financial gain	Permanent data corruption, targeted physical damage, power grid disruption, payment system disruption, fraudulent transfers, espionage
 <p><b>Cybercriminals</b></p>	Enrichment	Theft/financial gain	Cash theft, fraudulent transfers, credential theft
 <p><b>Terrorist groups, hacktivists, insider threats</b></p>	Ideological, discontent	Disruption	Leaks, defamation, distributed denial-of-service attacks

**Source:** European Systemic Risk Board. 2020. “Systemic Cyber Risk.” [https://www.esrb.europa.eu/pub/pdf/reports/esrb.report200219\\_systemicyberrisk~101a09685e.en.pdf](https://www.esrb.europa.eu/pub/pdf/reports/esrb.report200219_systemicyberrisk~101a09685e.en.pdf)

## Without dedicated action, the global financial system will only become more vulnerable as innovation, competition, and the pandemic further fuel the digital revolution.

responsible for protecting the system against cyberattacks. In part, this is because the environment is changing so quickly. Without dedicated action, the global financial system will only become more vulnerable as innovation, competition, and the pandemic further fuel the digital revolution. Although many threat actors are focused on making money, the number of purely disruptive and destructive attacks has been increasing; furthermore, those who learn how to steal also learn about the financial system's networks and operations, which allows them to launch more disruptive or destructive attacks in the future (or sell such knowledge and capabilities to others). This rapid evolution of the risk landscape is taxing the responsiveness of an otherwise mature and well-regulated system.

Better protecting the global financial system is primarily an organizational challenge. Efforts to harden defenses and toughen regulation are important but are not enough to outpace the growing risks. Unlike many sectors, most of the financial services community does not lack resources or the ability to implement technical solutions. The main issue is a collective action problem: how best to organize the system's protection across governments, financial authorities, and industry and how to leverage these resources effectively and efficiently.

The current fragmentation among stakeholders and initiatives partly stems from the unique aspects and evolving nature of cyber risk. Different communities operate in silos and tackle the issue through their respective mandates. The financial supervisory community focuses on resilience, diplomats on norms of state behavior, national security agencies on trying to deter malicious activity, and industry executives on firm-specific rather than sector-specific risks. As lines between financial services firms and tech companies become ever more fuzzy, the lines of responsibility for security are likewise increasingly blurred.

The disconnect between the finance, the national security, and the diplomatic communities is particularly pronounced. Financial authorities face

unique risks from cyber threats, yet their relationships with national security agencies, whose involvement is necessary to effectively tackle those threats, remain tenuous. This responsibility gap and continued uncertainty about roles and mandates to protect the global financial system fuel risks. Part of this uncertainty is due to the current geopolitical climate and high levels of mistrust, which hinder collaboration among the international community. Cooperation on cybersecurity has been hampered, fragmented, and often limited to the smallest circles of trust because it touches on sensitive national security equities. International and multi-stakeholder cooperation is not a "nice-to-have" but a "need-to-have."

### An international strategy

To achieve more effective protection of the global financial system against cyber threats, the Carnegie Endowment for International Peace released a report in November 2020 titled "International Strategy to Better Protect the Global Financial System against Cyber Threats." Developed in collaboration with the World Economic Forum, the report recommends specific actions to reduce fragmentation by fostering more collaboration, both internationally and among government agencies, financial firms, and tech companies.

The strategy is based on four principles: first, *greater clarity about roles and responsibilities is required*. Only a handful of countries have built effective domestic relationships among their financial authorities, law enforcement, diplomats, other relevant government actors, and industry. Existing fragmentation hampers international cooperation and weakens the international system's collective resilience, recovery, and response capabilities.

Second, *international collaboration is necessary and urgent*. Given the scale of the threat and the system's globally interdependent nature, individual governments, financial firms, and tech companies cannot effectively protect against cyber threats if they work alone.

Third, *reducing fragmentation will free up capacity to tackle the problem*. Many initiatives are underway to better protect financial institutions, but they remain siloed. Some of these efforts duplicate each other, increasing transaction costs. Several of these initiatives are mature enough to be shared, better coordinated, and further internationalized.

Fourth, *protecting the international financial system can be a model for other sectors*. The financial system is one of the few areas in which countries have a clear shared interest in cooperation, even when geopolitical tensions are high. Focusing on the financial sector provides a starting point and could pave the way to better protection of other sectors in the future.

Among actions for strengthening cyber resilience, the report recommends that the FSB develop a basic framework for supervising cyber risk management at financial institutions. Governments and industry should strengthen security by sharing information on threats and by creating financial computer emergency response teams (CERTs), modeled on Israel's FinCERT.

Financial authorities should also prioritize increasing the financial sector's resilience against attacks targeting data and algorithms. This should include secure, encrypted data vaulting that allows members to securely back up customer account data overnight. Regular exercises to simulate cyberattacks should be employed to identify weaknesses and develop action plans.

To reinforce international norms, the report recommends that governments make clear how they will apply international law to cyberspace and strengthen norms to protect the integrity of the financial system. The governments of Australia, The Netherlands, and the United Kingdom have already taken a first step with statements indicating that cyberattacks from abroad may be regarded as illegal use of force or intervention in the domestic affairs of another state.

Cyber resilience and strengthened international norms can facilitate collective response through law enforcement actions or multilateral reaction with industry. Responses can include sanctions, arrests, and asset seizures.

Governments can support these efforts by establishing entities to assist in assessing threats and coordinating responses. Intelligence gathering should include a focus on threats to the financial system, and governments should share such intelligence with allies and like-minded countries.

## Building capacity

The comprehensive strategy outlined in the Carnegie report depends in turn on building the cybersecurity workforce, expanding the financial sector's cybersecurity capacity, and safeguarding gains in financial inclusion that have resulted from the digital transformation.

Elevated unemployment due to the pandemic provides an important opportunity for training and hiring talented people to strengthen the cybersecurity workforce. Financial services firms should invest in initiatives to build the talent pipeline, including high school, apprenticeship, and university programs.

Building cybersecurity capacity means focusing on providing assistance where it is needed. The IMF and other international organizations received many requests for cybersecurity assistance from member states, particularly following the 2016 Bangladesh incident. G20 governments and central banks could create an international mechanism to build cybersecurity capacity for the financial sector, with an international agency such as the IMF designated to coordinate the effort. The Organisation for Economic Co-operation and Development and international financial institutions should make cybersecurity capacity building an element of development assistance packages and should significantly increase assistance to countries in need.

Finally, maintaining progress in financial inclusion requires strengthening connections between financial inclusion and cybersecurity. This is particularly urgent in Africa, with many countries on the continent experiencing a significant transformation of their financial sectors as they extend financial inclusion and move to digital financial services. A network of experts should be created to focus specifically on cybersecurity in Africa.

The time has come for the international community—including governments, central banks, supervisors, industry, and other relevant stakeholders—to come together to address this urgent and important challenge. A well-thought-out strategy, such as the one above, provides a blueprint for turning words into action. **FD**

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# THE NEW MORALITY OF DEBT

Increased datafication of debt raises ethical questions and calls for a new approach to regulating lending

Nikita Aggarwal

Throughout history, society has debated the morality of debt. In ancient times, debt—borrowing from another on the promise of repayment—was viewed in many cultures as sinful, with lending at interest especially repugnant. The concern that borrowers would become overindebted and enslaved to lenders meant that debts were routinely forgiven. These concerns continue to influence perceptions of lending and the regulation of credit markets today. Consider the prohibition against charging interest in Islamic finance and interest rate caps on payday lenders—companies that offer high-cost, short-term loans. Likewise, proponents of debt forgiveness appeal in part to morality when they advocate relieving hard-up debtors of the burden of unsustainable debt.

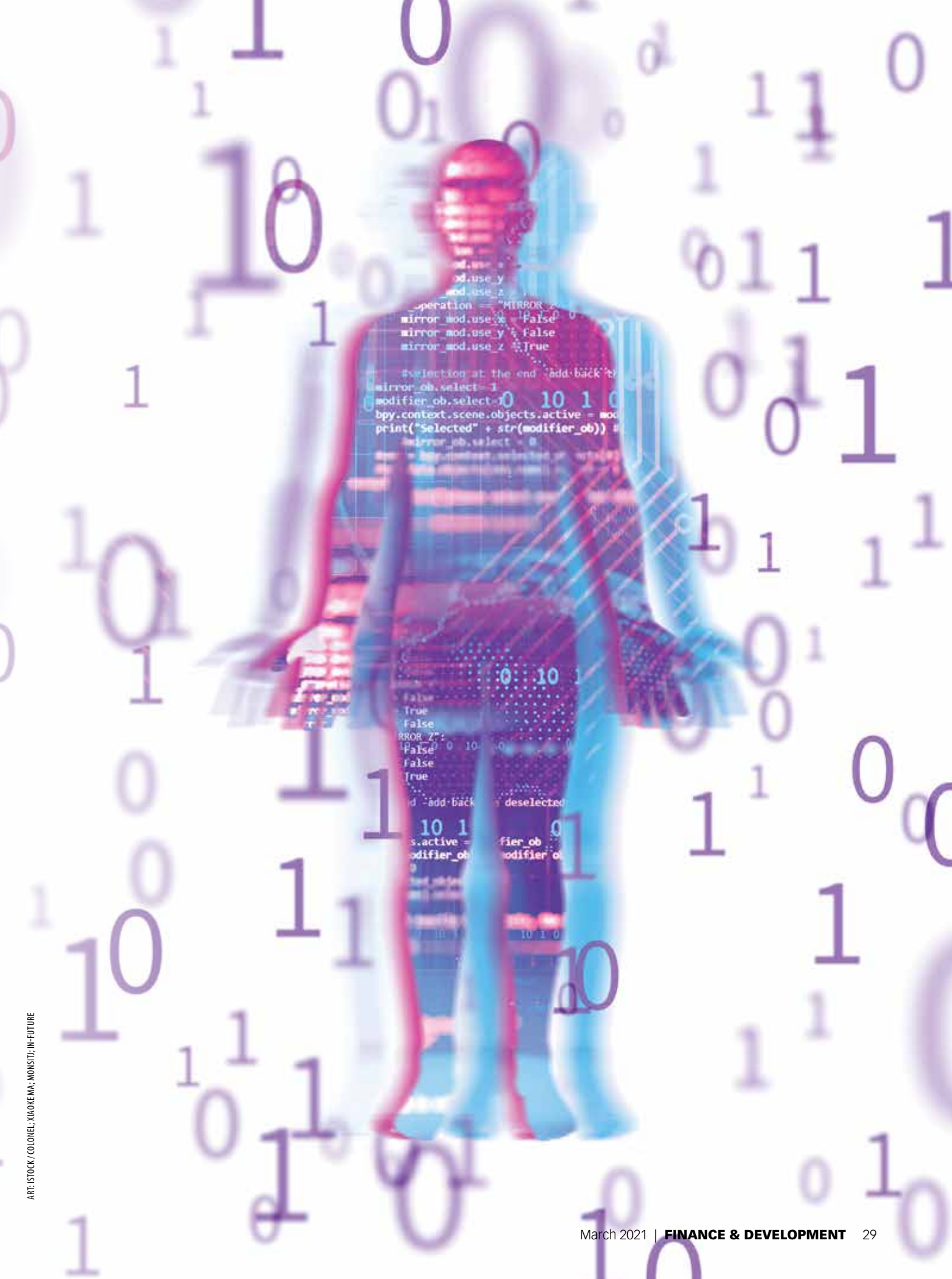
## “Datafied” lending

In much of this debate, the principal moral value at play is fairness; specifically, distributional fairness. Debt is deemed to be unfair and thus immoral because of the inequality of knowledge, wealth, and power between borrowers and lenders, which lenders can and often do exploit. Recent technological advances in lending have added new dimensions to debt’s morality. Notably, the *datafication* of consumer lending has amplified moral concerns about harm to individual privacy, autonomy, identity, and dignity. Datafication in this context describes the rapidly growing use of personal data for consumer credit decision-making—particularly “alternative” social and behavioral data, such as a person’s social media activity and mobile phone data—together with more sophisticated

data-driven machine learning algorithms to analyze those data (Hurley and Adebayo 2017).

These techniques enable lenders to predict the behavior of consumers and shape their financial identities in much more granular ways than in the past. For example, it has been shown that borrowers who use iOS devices, have larger and more stable social networks, or spend more time scrolling through a lender’s terms and conditions are more likely to be creditworthy and repay debt on time (of course, many of these variables proxy for fundamental credit life-cycle variables, such as income). Innovation in datafied lending has been driven largely by fintech start-ups, particularly peer-to-peer lending platforms such as LendingClub and Zopa and Big Tech companies like Alibaba/Ant Group. However, alternative data and machine-learning techniques are increasingly being adopted by traditional bank lenders, as highlighted by recent surveys from the Bank of England and the Cambridge Centre for Alternative Finance.

These practices diminish consumers’ ability to craft their own identity as they become increasingly chained to their “data self,” or algorithmic identity. Moreover, the ubiquitous collection of data and surveillance that fuels datafied lending constrains consumers from acting freely lest their actions negatively affect their creditworthiness. And the commodification of certain types of personal data for lending decisions raises moral concern about harm to individual dignity. Is it moral for lenders to use highly intimate health and relationship data—for example, captured from social media and dating apps—to determine consumer creditworthiness? Consumers may willingly share their



data in specific contexts and for specific purposes, such as to facilitate online dating and social interaction. However, this does not imply that they consent to the use of that information in new contexts and for different purposes, particularly commercial purposes such as credit scoring and marketing.

Datafication also amplifies existing concerns about fairness and inequality in consumer lending. Lenders are prone to abuse data-driven insights, for example, to target the most vulnerable consumers with unfavorable credit offers. Data-driven profiling of borrowers also facilitates more aggressive and intrusive debt-collection practices against the poor. And more accurate screening and price discrimination using alternative data and machine learning increase the cost of borrowing for consumers previously subsidized by hidden information (Fuster and others 2020).

In addition, increasingly data-driven, algorithmic lending could amplify unfairness as a result of racial and gender-based discrimination, as highlighted by the recent Apple Card debacle, when women were offered smaller lines of credit than men. In particular, biases and proxy variables in the data used to train machine-learning models could exacerbate indirect discrimination in lending against minority groups—particularly where the data reflect long-standing structural discrimination. Alternative data, such as social media data, are typically more feature-rich than financial credit data and thus embed more proxy variables for protected characteristics, such as race and gender. The limited interpretability of certain machine-learning methods (such as deep neural networks) could impede efforts to detect discrimination by proxy. Deploying these machine-learning models without rigorously testing their results, and without meaningful human oversight, therefore risks reinforcing social biases and historical patterns of unlawful discrimination, perpetuating the exclusion of less-advantaged and minority groups from consumer lending markets.

Yet the datafication of consumer lending could also *uphold* the morality of debt, by improving other dimensions of distributional fairness in consumer credit markets. Notably, more accurate credit assessment thanks to machine learning and alternative data in algorithmic credit scoring will improve access to credit, particularly for (credit-worthy) “thin-file” and “no-file” consumers previously locked out of mainstream credit markets because of insufficient credit data, such as a credit history (Aggarwal 2019). Estimates from Experian

and the US Consumer Financial Protection Bureau suggest, respectively, that nearly 10 percent of the UK population, and nearly 15 percent of the US population, have thin files or no files (also described as “credit invisibles”) and lack access to affordable credit. In developing economies, this figure is several times greater. According to the World Bank Global Financial Inclusion Index, more than 90 percent of people living in south Asia and sub-Saharan Africa lack access to formal credit.

Given that these consumers are often the least-advantaged members of society, typically from ethnic minority and lower-income groups, improving their access to credit supports financial inclusion and enhances fairness—as well as efficiency—in consumer lending markets. Datafied, algorithmic lending also stands to support fairness by reducing more visceral forms of direct discrimination in lending—for example, stemming from sexist or racist preferences of a (human) loan officer (Bartlett and others 2017). Moreover, better access to credit and the accompanying opportunities can enhance the autonomy and dignity of consumers.

More broadly, the digitalization and automation of lending stand to increase financial inclusion by reducing transaction costs and making it more feasible for lenders to extend small-value loans and reach consumers traditionally excluded from borrowing by their remote physical location (for example, a lack of bank branches in “banking deserts”). Data-driven technology also can support financial inclusion by improving consumer financial literacy and personal debt management. For example, automated saving and debt pay-down features of many fintech credit apps can help overcome some of the more common behavioral biases that undermine sound personal financial management.

## Recasting regulation

The rise of machine learning and datafied lending renders the morality of debt much more nuanced. The Goldilocks challenge for regulators is to find the right balance between the benefits and harms of datafied lending. They must protect consumers from its greatest harms—in terms of privacy, unfair discrimination, and exploitation—while still capturing the key benefits, particularly improved access to credit and financial inclusion. However, existing regulatory frameworks governing consumer credit markets and datafied lending in places such as the United Kingdom, United States, and European



## The Goldilocks challenge for regulators is to find the right balance between the benefits and harms of datafied lending.

Union do not strike the right balance. In particular, they do not sufficiently alleviate the privacy, autonomy, and dignity harms of datafied lending.

The prevailing approach to regulating consumer privacy in these jurisdictions is distinctly individualistic. It relies on consumers to consent to all aspects of data processing and to self-manage their privacy—for example, by exercising their right to access, correct, and erase their own data. However, this approach cannot protect consumers in ever-more-datafied consumer credit markets. These markets display steep asymmetries of information and power between borrowers and lenders, negative externalities related to data processing, and biases that impede consumer decision-making, such that individuals cannot on their own safeguard their privacy and autonomy.

In a new article in the *Cambridge Law Journal*, I recommend ways to address these inadequacies and close the privacy gap in consumer credit markets through substantive and institutional regulatory reforms (Aggarwal 2021). To begin with, a more top-down regulatory approach is needed. Firms should be subject to more rigorous obligations to justify the processing of personal data under the paradigm of datafied lending. This should include stricter *ex ante* restrictions on the types and granularity of (personal) data that can be used for credit decision-making. For example, the use of intimate, feature-rich data, such as social media data, should be explicitly prohibited, and anonymization of personal data should be the default.

Firms should, moreover, bear a higher burden of proof regarding the necessity and proportionality of processing personal data and thus their encroachment on consumer privacy. This should include stricter, ongoing model validation and data quality verification obligations, particularly for nonbank fintech lenders. For example, in the context of algorithmic credit scoring, lenders should be required to demonstrate that the processing of alternative data yields a sufficiently significant improvement in the accuracy of creditworthiness assessment.

These reforms should be accompanied by changes to the regulatory architecture to improve the enforcement of consumer privacy protection in consumer credit markets. In particular, regulatory

agencies responsible for consumer financial protection, such as the UK Financial Conduct Authority, should have expanded authority to enforce privacy and data protection in consumer credit markets. I argue that data protection *is* consumer financial protection. Given their expertise and experience working with consumer credit firms, sectoral agencies are in many ways better positioned than cross-sectoral data protection and consumer protection agencies to enforce data protection in consumer financial markets. However, they should continue to collaborate with cross-sectoral regulators, such as the UK Information Commissioner's Office, that have expertise in data protection regulation.

Of course, these reforms are not needed only for datafied consumer lending and its regulation. To truly safeguard the privacy of (credit) consumers, stricter limits on the processing of personal data are called for in all contexts, not only consumer credit markets, and on all actors in the development life cycle of consumer-facing information systems. Likewise, in an increasingly datafied economy, the optimal institutional arrangement for data protection regulation entails a greater role for sectoral regulators and deeper collaboration between sectoral and cross-sectoral regulators everywhere—not just in consumer credit markets. **FD**

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A. Rajakumari (at right), who harvests the tea by hand, says, "It's because of this work that, even during the Corona problem, I was able to happily run the home and live comfortably with our children."



# Digital Dollars for Online Tea

The Bahamas, Sri Lanka, and Uganda fight the pandemic's disruption with innovation

Steven Dorst

**"N**ever let a serious crisis go to waste." Innovators around the world are taking the saying seriously, responding to the disruption caused by the COVID-19 pandemic with creative digital solutions.

The initiatives we highlight here are markedly diverse: the overnight transformation of Sri Lanka's 125-year-old live tea auction; the world's first central bank digital currency in The Bahamas; and the rapid pivot from a taxi-hailing app in Kampala, Uganda, to a thriving e-commerce platform.

All three share a common characteristic: an innovative, entrepreneurial spirit born of an urgent need. The Bahamas initiative responded to a need to extend financial services to residents of remote islands whose lack of access was exacerbated by extreme weather. In Sri Lanka, the tea industry—fundamental to the economy and employing millions—came to a sudden halt when COVID-19 prohibited the weekly tea auction from convening. And in Uganda, people's ability to get food and medicine and earn an income was severely hampered by the pandemic lockdown.

While the ingredients for success vary in each country, there is one constant: there was an enabling

environment for these initiatives to germinate and quickly become reality. The end result? Innovative, homegrown initiatives that help millions of underserved people be financially included and have a better shot at prosperity.

## The Bahamas: first digital currency

In October 2020, The Bahamas leapfrogged into the digital vanguard with the launch of the world's first central bank digital currency—the sand dollar.

Pegged one-to-one to the Bahamian dollar and using a blockchain-backed digital token, the new currency is available to people and businesses to buy and sell goods and services and send money to each other. Sand dollars are issued and regulated by The Bahamas' central bank.

The Bahamas territory is spread out over 700 islands—making it unprofitable for commercial banks to have ATMs or physical branches on remote, sparsely populated islands. Extreme weather events make the cost of maintaining infrastructure even steeper. As a result, the most vulnerable often lack access to financial services.

The need to serve the unbanked and underbanked population, along with a drive to modernize the payment system, spurred the central bank's introduction of the new digital currency.

"We didn't start with the idea of a central bank digital currency," says John Rolle, governor of the Central Bank of The Bahamas. "We focused on eliminating as many obstacles as possible for persons having access to the equivalent of a deposit account or a mobile wallet account to conduct transactions."

Following successful pilots the central bank began distributing sand dollars to Bahamian commercial banks, payment system providers, and money transfer operators. Funds are placed in clients' digital wallets, which allow access to various amounts of money and transaction thresholds.

Anke Weber, IMF mission chief for The Bahamas, attributes the fast rollout and growing interest to the need created by 2019's devastating Hurricane Dorian and the COVID-19 pandemic.

It is still early days, with only \$130,000 worth of sand dollars in circulation compared with \$500 million Bahamian dollars. Customers' initial reaction has been positive.

Those who are using the sand dollar enjoy the ease, faster turnaround, and lower costs.

"When I first heard about the sand dollar, I was extremely excited," says Brandon Kemp, founder of Tin Ferl, a popular pop-up food park in Nassau. "The amazing thing about the sand dollar is that there are no fees or transaction costs. So, if I need to pay one of my staff, I can do it right there in the moment; they receive it literally within seconds, and everybody is happy with that."

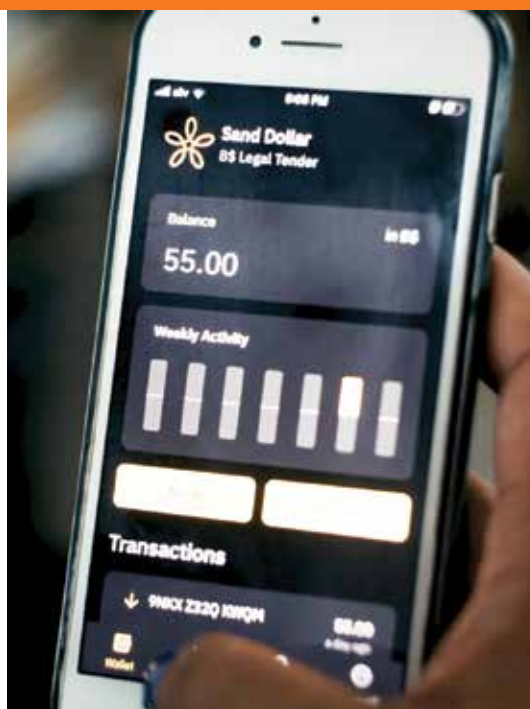
Using the sand dollar doesn't even require a bank account or a mobile phone, although that's how most transactions take place.

And while it wasn't designed with the pandemic in mind, users uniformly cite the safety of a cashless transaction as a key reason for adopting the digital currency. "What convinced me to go with this sand dollar is mainly because of COVID," says Mikia Cooper, an attorney at law firm Twenty Twenty and Associates.

As countries around the world experiment with central bank digital currency, lessons from The Bahamas' experience will no doubt be watched closely.

## Sri Lanka: tea auction transformed

For many, Sri Lanka (formerly known as Ceylon) and Ceylon tea are synonymous. The country's economy and society are deeply intertwined with



An early adopter's app-based mobile wallet shows her sand dollar balance and transactions.

the majestic tea leaf. Today, 10 percent of Sri Lankans derive an income from the tea industry, which generated more than \$1.2 billion in export revenues in 2020.

For more than 125 years, the tea industry has depended on a tradition-steeped auction where hundreds have convened twice a week at the Ceylon Chamber of Commerce to buy and sell Sri Lanka's finest leaves.

When COVID hit, the world's oldest tea auction, which had functioned without fail for more than a century, was suddenly unable to bring together buyers and brokers for the weekly bidding. Plantations and factories had nowhere to sell their product, buyers were left in a lurch, and millions were at risk of losing their income.

Sri Lanka's tea auction faced an urgent need to reinvent itself.

"The whole country said, right—now there's 2 million people whose lives depend on this industry . . . we need to look after them," says Anil Cooke, CEO of Asia Siyaka Commodities, who led the task force charged with digitalizing the auction.

With brokers and buyers unable to meet in person, the challenge was not just to find an alternative to the live auction, but to get it up and running and yielding good prices—immediately.

Sri Lanka's tea industry had been mulling a switch to a digital auction for more than 20 years. But the auction's nuanced dynamics—which drew on an innate knowledge of complex tea blends, frenetic in-person competition to draw top bids,

Hand-harvested tea: Sri Lanka's digital auctions had to reimagine all the human and technical variables of live auctions.



and real-time market feedback—had stymied previous attempts.

With the stakes as high as ever, a team comprising the Sri Lanka Tea Board, technical experts, the government, brokers, auctioneers, and others came together to find a solution.

Local IT company CICRA Holdings led technical development, working with brokers trained to interpret the dynamics of in-person bidding and with deep knowledge of tea categories and grades. To succeed, the e-platform would have to reimagine all the human and technical variables of the live auction.

Within days, some 300 people had taken part in simulated training programs, with sessions running up to the night before the launch.

“I am happy to say that within a very short period of time, about seven days, we managed to build a solution . . . [and] made history on April 4, 2020, by having the first digital auction going live,” says Boshan Dayaratne, CEO of CICRA.

Not only is the new system COVID-safe, it's also faster, more strategic, and cost-effective—and even yields higher prices. The online auction has also improved transparency and efficiency and reduced duplication of work.

Benefits are being felt locally as well. D. Gayan, supervisor of the Dessford Tea Estate, says the continuity of sales has enabled them to continue operations and pay workers.

A. Rajakumari, a “plucker” who harvests tea by hand, says that “even though we had a virus last

year, those of us in the estate got our salaries. It's because of this work that, even during the corona problem, I was able to happily run the home and live comfortably with our children.”

### **Uganda: digital lifeline on wheels**

When COVID-19 hit Kampala, Uganda, small businesses were unable to get their goods and services to customers. People were unable to buy food and medicine. And millions faced the prospect of unemployment.

Enter SafeBoda, an innovative homegrown company that swiftly adapted its business model to serve the urgent needs of this capital city of nearly 2 million people.

Drivers of Kampala's motorcycle taxis (known as “boda boda”) are as ubiquitous as they are dangerous. SafeBoda launched in 2015 as an alternative, placing an intense focus on driver and passenger safety. To make ride hailing easier and cheaper, SafeBoda created a mobile app to connect riders with drivers.

The quality of SafeBoda's service stimulated customer demand for more offerings. At the same time, a prolonged problem faced by its drivers was bubbling to the surface—the lack of proof of income affected their ability to qualify for loans.

“Financial inclusion is a big topic here,” says Ricky Rapa Thompson, SafeBoda cofounder and director of operations. “Because [drivers are] from the informal sector, a lot of banks and financial institutions were not that willing to work with them.”

PHOTO: JEEVANI FERNANDO



*Daniel Ssemu, SafeBoda driver in Kampala: more money with deliveries; Ruth Tindyebwa, a market vendor.*



So in 2017, SafeBoda introduced its wallet, which offers app users and drivers an integrated payment system through mobile service providers. As customers paid through their phones, drivers were able to document their income without a bank account—effectively expanding the universe of financial services available to them.

When COVID-19 hit in March 2020, mobility restrictions were put in place to control the spread of the virus. Vehicles were largely grounded, and commerce came to a near halt. People, many without refrigerators, needed food, and millions of jobs were at risk.

SafeBoda quickly identified and partnered with local restaurants, food vendors, and markets, and—working with the UN Capital Development Fund and digital experts—launched a new digital service, Shop, within two weeks.

Today, the SafeBoda app has more than 1 million downloads, connecting customers to nearly 1,000

food vendors, 350 shops, 16 markets, and 21 United Nations Population Fund (UNFPA) pharmacies through 20,000 moto drivers in Kampala.

By offering a cashless, minimally invasive service, SafeBoda not only helped revitalize the local economy, it also played a role in mitigating exposure to COVID-19.

Ruth Tindyebwa, one of the first market vendors to join the Shop platform, says the sign-up process was fast and that she's earning more than before the pandemic. "I can now pay my rent. I pay school fees for my kids."

SafeBoda driver Daniel Ssemu says that "the shift to e-commerce and delivery of goods, it was quite a good thing. Now we are getting more money . . . because now we are doing both rides and deliveries."

The service has helped mitigate exposure to the pandemic, spur the local economy, and offer inspiration for a new generation of digital innovators in Uganda, and beyond.

"SafeBoda is a good Ugandan story," says CK Japheth, team lead, Innovation Village. "It kick-started the digital economy, and we now see that technology has offered a new competitive landscape of opportunities." **FD**

**STEVEN DORST** is a documentary filmmaker. This article is based on the accompanying videos produced by Dorst MediaWorks (see [www.imf.org/fandd](http://www.imf.org/fandd)).



PHOTO: IMF

## Averting a Great Divergence

*Exiting the pandemic with minimal scarring will require policy action on several fronts*

**Gita Gopinath**

**THE COVID-19 PANDEMIC** and the widespread lockdowns imposed in 2020 led to the worst peacetime global contraction since the Great Depression. The first half of 2020 saw record collapses in output and only a partial rebound in the second half as economies gradually reopened, supported by decisive fiscal and monetary policy measures. While the remarkable success in developing vaccines provides hope of conquering the pandemic, fresh waves of the disease and a mutating virus portend uncertain times and risky prospects for 2021.

In the January 2021 update of the *World Economic Outlook*, the IMF revised global growth upward for 2021—reflecting the start of COVID-19 vaccinations, continued policy support in systemically large economies, and adaptation to social distancing measures by firms and households. But the projection is fraught with uncertainty and highlights the stark divergence in prospects across countries. On the one hand, China returned to its pre-pandemic projected level in the fourth quarter of 2020, and the United States is projected to surpass its pre-COVID

levels this year. On the other hand, more than 150 economies are expected to have per capita incomes below their 2019 levels in 2021. And more than half of the emerging market and developing economies whose per capita incomes had been converging toward those of advanced economies over the past decade are expected to diverge over the next few years. Nearly 90 million people are expected to fall into extreme poverty during 2020 and 2021, reversing the trend of the past two decades.

These divergences partly reflect differences in the sectoral composition of countries. But they also reflect the severity of the health shock and how effectively governments dealt with the crisis. Averting the divergences in growth prospects and exiting the pandemic with minimal scarring will require policy actions on several fronts.

On the medical front, advanced economies and some emerging market and developing economies have secured substantial doses of vaccine and initiated large vaccination drives that hold out hope for faster easing of containment measures and stronger recoveries. However, many developing and low-income countries have had less success accessing vaccines. As a result, they are dependent on the multilateral COVAX facility, which guarantees vaccine coverage for just 20 percent of the population. But the pandemic is not over until it is over everywhere. To vaccinate enough of the world's population to contain the pandemic will require global action on scaling up of vaccine production, additional funding for COVAX, and financing the logistics of getting people vaccinated.

The crisis has had not only health consequences, it has wreaked havoc on many livelihoods. While advanced economies have the fiscal space to extend widespread measures to support economically devastated households, other countries, especially those with scarce fiscal space, will face difficult trade-offs. To avert an even greater divergence in economic prospects, all countries must continue to support livelihoods and keep viable firms afloat until they are certifiably past the crisis.

Many countries can ramp up spending by borrowing and still maintain debt at sustainable levels because of historically low borrowing costs that are expected to stay low for the foreseeable future. But in countries with limited fiscal space, spending should be prioritized for health and transfers to the poor. International organizations and bilateral donors must ensure that these countries have

adequate access to concessional financing and grants to support critical spending. Expanding the IMF's Special Drawing Rights (SDRs), an instrument that was designed precisely for a global crisis like the one we are living through, should also be considered.

For the hardest-hit countries—especially those that entered the crisis with high levels of debt distress—globally coordinated measures to provide debt relief, and in some cases outright debt restructuring under the new Common Framework agreed to by the G20 countries, may be inevitable.

The pandemic has not just inflicted short-term economic damage, it has left potentially long-lasting scars that can further exacerbate divergence. A chief concern is school closures, which threaten the livelihoods of a generation of children. These disruptions have been particularly costly in emerging market and developing economies, where remote learning is practically infeasible. Left unaddressed, this diminution of skills and educational attainment can have life-long implications—exacerbating inequality and precipitating social unrest. Governments must swiftly take action to ensure that all school-age children can benefit from distance learning. They must provide vouchers to enable families to buy computers and other IT equipment, ensure the return to school of the large number of students from poorer households who dropped out, and create programs to allow students to make up for lost learning.

Not only are there divergences across countries, there are worrisome divides within countries too. Millions who lost jobs to lockdowns joined the ranks of the long-term unemployed, and many have given up looking for work. Low-skilled workers, women, and youth—who are vastly overrepresented in jobs where social distancing is difficult or impossible—experienced the largest increases in unemployment in many countries, exacerbating pre-pandemic inequalities.

Many of those same workers are confronting another transformation of the labor market accelerated by the pandemic: the automation of work. Workplaces have hastened to adopt technologies to mitigate health risks to workers and strengthen preparedness against future shocks. Self-checkout machines replace grocery store cashiers. Chatbots fill in for call center operators. Such technological changes can help the overall economy by raising

productivity, increasing output, and improving living standards—though the evidence is somewhat mixed. What is well established is that low-skilled workers are the most easily replaced by machines.

Moreover, as the pandemic transforms the business landscape, the major impact is on small- and medium-sized enterprises (SMEs), which employ up to two-thirds of the labor force in some countries, and which are even more vastly overrepresented in contact-intensive sectors hit hardest by the pandemic—such as leisure, hospitality, accommodation, and the arts.

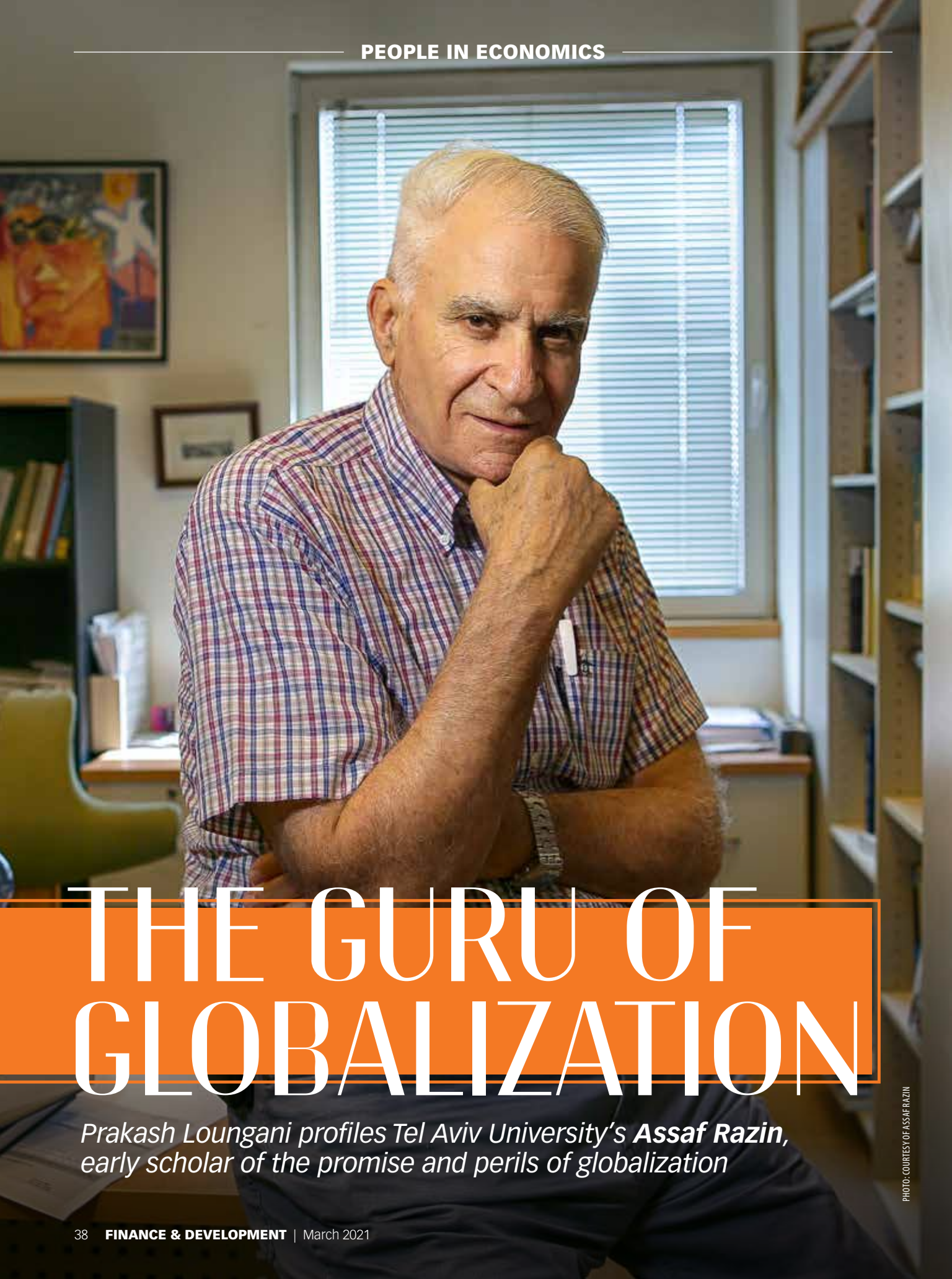
Because of persistently weak demand in these sectors, a prolonged health crisis will spell the end of many SMEs. A premature withdrawal of policy support would hasten this process. With a decline in SMEs, a significant number of jobs could be lost, some permanently. Here again, the fortunes of those employed by SMEs in sectors heavily impacted by social distancing measures will diverge adversely from those in other sectors.

## Low-skilled workers, women, and youth experienced the largest increases in unemployment in many countries, exacerbating pre-pandemic inequalities.

Credit guarantees, equity-like financing, and similar lifelines should be offered to otherwise viable firms that are struggling. Support to displaced workers—more generous unemployment insurance, retraining assistance, and facilitating their shift to thriving sectors—will be critical to fixing labor markets. Relaxing eligibility rules for welfare benefits will help workers who have borne the brunt of the pandemic. These actions will not just alleviate the economic hardship on displaced workers, they will limit the potential for long-lasting earning and productivity scars and the higher mortality associated with job loss.

The world has taken a major step toward ending the worst crisis in a century with multiple vaccines developed in record time to fight COVID-19. It will take an even greater combined push of the scientific and medical community, governments, and multilateral institutions to avert a great divergence in prospects across countries. [FD](#)

**GITA GOPINATH** is chief economist of the IMF.



# THE GURU OF GLOBALIZATION

*Prakash Loungani profiles Tel Aviv University's **Assaf Razin**, early scholar of the promise and perils of globalization*

PHOTO: COURTESY OF ASSAF RAZIN



In 1958, 17-year-old Assaf Razin suffered a near-fatal injury from friendly fire while fulfilling his draft requirement in the Israeli army. He was hospitalized for a year, during which it became evident that an active life toiling in the fields of Kibbutz Shamir, the community on the slopes of the Golan Heights where he was born, was not to be. He turned instead, he has written, toward “the remarkable opportunities the modern global world offers to so many,” in his case graduate school at the University of Chicago and then to a stellar career as a leading exponent of how countries can make the most of globalization. With Tel Aviv University as a secure home base, he has been “a most welcome visitor” at institutions all over the world, says Lars Svensson of the Stockholm School of Economics. In 2017, Razin was awarded the EMET Prize, Israel’s highest award for “excellence in academic and professional achievements that have far-reaching influence and make a significant contribution to society.”

“So the unfortunate event of my injury turned out to be transformational,” Razin says, displaying a trait his friends and family say is “classic Assaf”: never dwell on personal tragedies but move ahead resolutely to fulfill your obligations. Marxist ideals ruled in the kibbutz—his father, one of its founding members, made it a point to visit Karl Marx’s grave when in London—and, after his injury, the kibbutz elders thought he could best serve the community by gaining expertise in agriculture through courses at Hebrew University. Razin however became fascinated with economics and, with a strong recommendation from a mentor, won a fellowship to pursue graduate studies at the University of Chicago, then as now a bastion of free market economics.

“What a remarkable journey from a Marxist commune to capitalist Chicago, then to a career of tremendous achievements, all the while being humble and helpful to everyone,” says Jonathan Ostry, deputy director in the IMF’s Asia and Pacific department, who has known Razin since his own graduate school days at Chicago in the 1980s. Ostry, along with Tom Krueger—also now a deputy director at the IMF—wrote the companion guide for Razin’s noted 1987 book *Fiscal Policies and the World Economy*. “It was a vade mecum [an essential guide] for the international economics community” to navigate a rapidly changing world, says Ostry, with flexible exchange rates and increased capital flows. Relationships among countries’ policy choices were

becoming “incredibly complicated,” he says; “today we would turn to computer simulations to understand the complex channels that in those days were clear in Assaf’s mind and book.”

### Promise and perils

The book, written with Jacob Frenkel (a future chief economist at the IMF), bears the hallmark of Razin’s work: laying out the promise and perils of globalization, a world of countries bound together not just by international trade but by flows of capital and labor across national boundaries. To trace the channels of an integrated world, Razin and his coauthors frequently had to cross boundaries between fields of economics, which raised the work’s practical value, according to Atish Ghosh, the IMF’s historian. “Policy issues don’t fall neatly within one field of economics. And topics that Assaf and his coauthors worked on in one decade seem somehow to have become hot policy issues over subsequent decades,” says Ghosh.

With Elhanan Helpman (then at Tel Aviv University and now at Harvard), Razin studied how capital flows could affect the pattern of international trade. Helpman characterizes their 1978 book, *A Theory of International Trade under Uncertainty*, as an early attempt to break the silos between the study of international trade (considered part of *microeconomics*) and of capital movements (within the realm of *macroeconomics*): “it was silly to think independently of trade and macro,” he says. Through an integrated treatment of the two, the book shows that greater risk sharing among countries because of capital mobility in turn enabled greater specialization in trade, which was good for productivity. But greater interdependence as a result of increased specialization also meant countries were more vulnerable when there were disruptions to the global system—because of financial crises, say, or political turmoil in major countries. Razin developed this theme with other authors in subsequent work that stress-tested economists’ belief that some capital flows, such as foreign direct investment, confer greater benefits than others, such as “hot money” (short-term portfolio flows).

In the 1980s, Razin’s research with Frenkel showed how in an integrated world, the monetary and fiscal policy choices of one country could affect and constrain policy choices of other countries—policy “spillovers” in today’s jargon. National

governments jealously guard their independence to tax and spend, but to gain the benefits of globalization they must give up some of this precious sovereignty. “This demonstration of the need for fiscal policy coordination in a world with capital mobility is a defining contribution,” says Ghosh, noting the echoes of this theme in many policy debates. Indeed, the issue is one that countries of the European Union are grappling with today, as they seek to agree to fiscal rules that will succeed once they fully unify their economies under a single capital market.

### Current and capital accounts

In the 1990s, Razin worked on the interaction between capital and labor mobility, on the one hand, and tax and welfare systems, on the other. Razin did much of this work with Efraim Sadka, another colleague at Tel Aviv. While the mobility of capital can be beneficial to countries, the desire to attract foreign capital by lowering taxes can lead to a “race to the bottom”; lower tax revenues can prevent governments from offering the public services their societies need. The relevance of Razin’s early work on this topic has come to the fore as countries compete for foreign capital through tax breaks that deplete their finances, leading many to question how well foreign capital serves the general good.

Razin’s work on the benefits and costs of capital flows made him a welcome visitor to the IMF in the 1990s. After the 1994 Mexican “tequila crisis,” it was feared that other countries might be at risk. In times past, economists had used simple rules to measure vulnerability, such as a current account deficit (a close cousin of the trade deficit) that exceeded 5–6 percent of a country’s income. But with countries tapping into foreign capital, it seemed that they could run higher current account deficits as long they enjoyed the confidence of foreign investors.

Razin worked with Gian Maria Milesi-Ferretti, who recently retired as deputy director of the IMF’s research department, to understand when a current account deficit might be suddenly reversed. They looked at factors such as low foreign exchange reserves or deteriorating terms of trade—Razin had done pioneering work with Lars Svensson on understanding the microfoundations of the link between terms-of-trade changes and the current account when there is capital mobility. “I had many conversations with Stan Fischer [then the IMF’s first deputy managing

director],” says Razin. “Fischer understood that, despite all the insights from my theoretical work and Gian Maria’s diligence with the data, it was difficult to predict exactly when certain countries would face a sudden reversal and crisis.” Indeed, the timing of current account reversals in some Asian economies in 1997–98 proved difficult to predict, and the quest for a reliable early warning system remains elusive to this day.

Razin’s research also forewarned of the interaction between labor mobility and welfare systems, an issue relevant today in the United States and Europe, where populists often accuse migrants of “welfare shopping”—taking advantage of destination countries’ generous support.

### Tragedy amid triumph

This remarkable research activity and intensive engagement with policy issues played out against the backdrop of another personal tragedy, his son Ofair’s death in 1996 at the young age of 30 after a courageous battle with progressive multiple sclerosis. Displaying his father’s tenacity, Ofair had managed in the days before his death to complete his PhD dissertation in economics at Georgetown University. Razin says he cried during entire long plane journey to Washington, DC, after he got the news, but tried to do so “in a nonvisible way” to avoid bothering others.

Razin has honored Ofair’s memory by establishing a prize for the best research paper by a Georgetown economics graduate student and a lecture series in which he himself has spoken, as has his son Ronny (now a professor at the London School of Economics). Other speakers among the elite of the profession include Stanley Fischer, Cecilia Rouse, Jeff Sachs, Dani Rodrik, and Nobel Laureate Paul Krugman, who has called the annual event a “family reunion” of Razin’s wide circle of admirers.

In 2001, Razin’s 60th birthday celebration attracted the profession’s leading international economists to Tel Aviv—including Krugman and Anne Krueger (former IMF first deputy managing director). Deflecting the praise heaped on him at the celebration, Razin quipped that he wished his parents had been on hand: “my father would have liked to hear all this praise, and my mother would have believed all of it.” He said he had no intention of retiring but was merely taking a “a wonderful break between semesters.” True to his word, he has been very active over the past 20 years, teaching in the graduate program

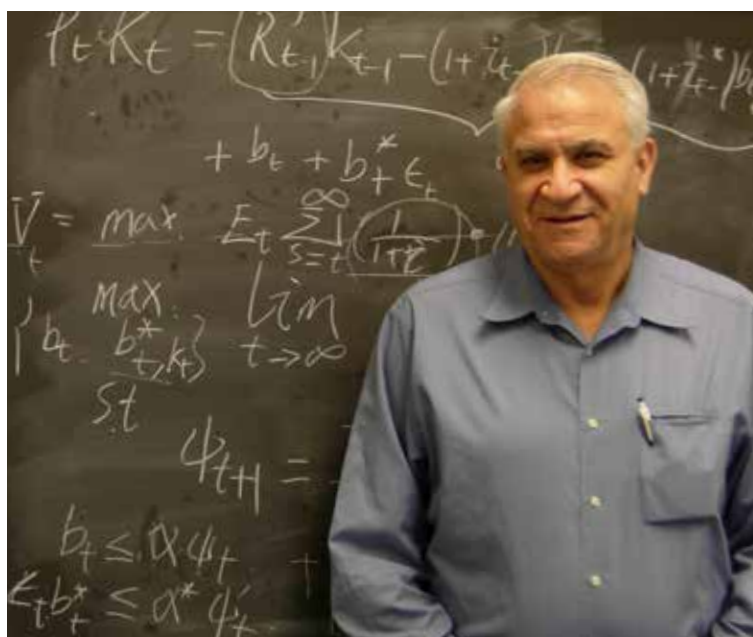
at Cornell University (he retired in 2016), continuing with research, and publishing several books, including a well-received analysis of how Israel has made the most of globalization.

He has been intimately following and writing on economic developments in Israel for decades, and he put his ideas together in a 2018 book, *Israel and the World Economy*. Phillip Swagel, head of the US Congressional Budget Office and a research collaborator of Razin's, praised the book's clear exposition of why other countries had "experienced problems with globalization [but] Israel had found success." Unlike many other countries, Israel was able to guide large foreign capital flows toward its growth industry—start-ups in its high-tech sector. And Israel absorbed a million immigrants—about 20 percent of its population—from the former Soviet Union in the 1990s in a way that helped its high-tech sector and overall growth. But Swagel also notes "Razin's frankness on the potential pitfalls" of globalization, including growing inequality within Israel—the highest in the developed world.

### Secrets of success

Razin turns 80 this year and, true to form, is marking the occasion with a new book on how globalization can get back on track after setbacks from populism and the pandemic. In an interview with F&D, Razin attributed his successful career to the "good fortune to be surrounded by great people ... and to discover and stick to my comparative advantage." At Chicago, his professors included future Nobel laureates such as Milton Friedman and Robert Mundell, and his classmates were a future who's who in the field of international finance, including Rudi Dornbusch and also Frenkel and Michael Mussa, both future IMF chief economists. At the University of Minnesota, his first job after graduation, he "learned 'GE' [general equilibrium]—since Chicago didn't teach it—from the finest minds," Razin says. GE refers to the study of the interactions of the various sectors that comprise an economy, which often yields insight not apparent from the study of the workings of one sector alone ("partial equilibrium"). From Krueger, who was also teaching at Minnesota at the time and has been "a lifelong friend and influence," Razin learned the importance of taking theory to the data.

Stints at other jobs convinced him that he was best suited for academia. From time to



Assaf Razin in the classroom in 2009.

time, he took on administrative jobs at Tel Aviv University, but he says that he "was never in my element" in those jobs. He did not take to government jobs either. In 1979, he was appointed to one of the top positions in Israel's Treasury. The government had been on a spending spree that had fueled inflation and threatened to bring Israel to the verge of hyperinflation. Razin was public in his warnings about the need to reverse the course of policies, which led to his ouster after only six months on the job. "It was akin to Marty [Martin Feldstein] having to leave his job under Reagan because he warned about the dangers of deficits," says Razin. The brief stay in government convinced him that "academic life was my comparative advantage."

While staying out of government, he has remained active in commenting on developments in Israel. His mind is "always preoccupied" with the prospects of peace between Israel and its neighbors. He is reconciled to the likelihood that "peace will come not in my time but in the time of my children and grandchildren." But it is important not to give up the hope of a better world, however utopian that seems, he urges, citing the last line of a poem by his young grandson: "The kingdom of Utopia is hidden hope amongst a heartless world." **FD**

**PRAKASH LOUNGANI** is assistant director of the IMF's Independent Evaluation Office.



PHOTO: GRACE KARGOBAI

## Radical Inclusion

*Sierra Leone's **David Sengeh** is taking an inclusive approach to digitalizing the country's education system and economy*

**DAVID MOININA SENGEH** tries to see the beauty in everyday things—a challenge under the circumstances of the past year. In his dual roles as Sierra Leone's minister of basic and senior secondary education and chief innovation officer, he is motivated by the magic of a simple line of code for a government application and novel ways of reaching students during the COVID-19 pandemic.

The pandemic has driven the government to find innovative ways to use technology to manage the health crisis, provide aid to families, and support remote learning for the country's large public education system.

In this interview with F&D's Adam Behsudi, Sengeh—who holds a PhD in biomedical engineering from the Massachusetts Institute of Technology—discusses how his country has found new ways to meet the challenge of the past year.

**F&D:** Tell us about Sierra Leone's digital innovation strategy launched last year and the progress made.

**DS:** The government is using the National Innovation and Digital Strategy to inform not just how it implements innovation across government but also how it supports the medium-term national development plan—the road map that drives our budget and sets priorities for ministries, departments, and agencies. The objective of the Directorate of Science, Technology, and Innovation (DSTI) is to ensure government delivery of the national development plan and design of an innovation ecosystem. At the core of this effort is total digitalization. Digital identity, a digital economy, and digital governance really drive what we do and how we get involved. With COVID-19, the strategy is going full speed ahead.

**F&D:** How specifically have technology and innovation helped respond to the pandemic?

**DS:** In a couple of ways—information dissemination for one. An app and mobile phone solutions—text messaging—are available to our citizens to access and share information, and for COVID testing and health self-assessment. An online travel portal allows us to track passengers who've been tested. We have a quarantine app to manage monitoring of service delivery to quarantine facilities and homes, and we have been synchronizing the districts' health information systems. Our application programming interfaces use the data we collect to build dashboards for decision makers. During lockdowns, drones monitored and evaluated compliance with stay-at-home orders. Anonymized call data records and surveys help us understand the effects of government policies.

**F&D:** Can you explain how your two roles dovetail?

**DS:** In my role as chief innovation officer I lead the DSTI, whose job is to spur and coordinate innovation in government, and I advise the president on technology and innovation across the board. Education is the government's flagship program. Some 22 percent of our budget is devoted to education. Thirty percent of the population is receiving free public education. We added 9 percent more students to the total in-school population between 2018 and 2020. The country's 11,400 schools employ about 80,000 teachers. A lot of the work we coordinate is school subsidies. We pay tuition for every student in government and government-assisted

school as well as exam fees for all students. Providing effective and efficient education services including learning materials and school meal programs requires data and digitalization. So as the lead on basic education, it helps that I am also chief innovation officer. The two roles are deeply intertwined and very much priorities of the government.

The DSTI leads the national COVID emergency response center's ICT and data effort. I sit on the presidential task force for COVID. On the education side, we set up an emergency education task force. Whether it's education or COVID, the messages are the same, and technology plays a critical role.

**F&D: Has the pandemic accelerated the education divide in Sierra Leone? What steps are you taking to address a growing divide, especially as it relates to girls and women?**

**DS:** In Sierra Leone we closed schools the day we recorded our first COVID-19 case; we then made plans to revamp our radio teaching program, which was initially launched during the 2014 Ebola crisis. The radio teaching program kick-started one week after schools closed. During the COVID-19 pandemic school closures we expanded and extended its reach to nearly all districts by working with community radio stations and procuring new radio transmitters. When schools finally reopened in July 2020 for examination classes, we brought back over 450,000 students for in-class learning and supported them via radio and online instruction. In many parts of the country we provided physical materials and books along with teaching support. Recently, we launched an SMS and USSD accessible dictionary. Many people take dictionaries for granted, but not everyone here has access to one. Some 87 percent of our people, however, do have mobile connectivity.

The pandemic has made us think about how to be more inclusive in our provision of services. We have a policy called radical inclusion, which means that we will ensure that every child—regardless of family origin, location, gender, or disability—is educated. To that point, we overturned a ban on pregnant girls going to school. We saw during Ebola there were a lot of girls who got pregnant and were excluded from school. We didn't want to leave those girls out of school again this time.

**F&D: Every crisis is also an opportunity. How has this crisis spurred positive change in health care, social support, education, or other areas?**

**DS:** As a government we have expanded and revamped our social welfare base. During the pandemic, we've provided lots of direct support—cash—to women in particular, including direct cash transfers in various informal sectors. And the support is ongoing.

People with disabilities and vulnerable groups are getting new consideration and are being taken into account. Within the health care system, we have published information and expanded ways that facilities can make more beds available. A new travel portal system is in place at airports and borders. Under our epidemic control system, we can connect with people entering the country by air and land. These are all investments in a more robust health system.

**F&D: What lessons from this pandemic have been most important for you as a policymaker? As a father?**

**DS:** When we build solutions in normal times, we're not usually leading with inclusion. We're not thinking about everyone. But in an emergency, solutions must include all people, because everyone is vulnerable. The key lesson is that solutions should work for everyone, not just in emergencies. I think that's really important.

We haven't always considered the labor and the loss of time that stay-at-home parents face when juggling childcare and other responsibilities. This period has helped us see that, and as a father, I have newfound appreciation for them.

**F&D: You are a prolific musician with a recently released album. What inspires you, and what do you hope to convey?**

**DS:** The album is called *Love Notes to Salone*. I think it's really about my love for Salone [the Krio word for Sierra Leone] and public service. I listen to a lot of music, which inspires me, and I hope to inspire others as well. It's music written for young people, for people who must have hope. "Dear Salone" is how it opens—the song is a love letter to Sierra Leone that talks about the country's history and its future. It also talks about the love and power of young people. The song helps us think about our power in a really nice way.

I say things in my songs that maybe people consider political, but it's how I feel; it's art. People can interpret it how they want. Once you create a work of art, it's not really yours anymore. **FD**

*This interview has been edited for length and clarity.*



# Dear Mom, Forget the Cash

*An IMF economist explains central bank digital currency to his mother*

**Tommaso Mancini-Griffoli**

**Washington, DC, March 2021**



## **MY DEAR MOTHER,**

I hope this letter finds you well, back in Italy. We are fortunate to have just visited; now we'll go back to seeing each other on screen for a few months. Still, how far we've come since the immigrants of the last century who could only write letters—and hope they would eventually arrive. And yet, as I unpacked, I found remnants of our visit: euro notes, unused from my trip and now souvenirs of my stay. If only I could send them back as easily as I can call you. It might not be long before this is possible.

The cash you spend at the market may one day be replaced by a central bank digital currency. Yes, the stuff I work on at the IMF, which you always ask about and we never find time to discuss.

I know you like the security of cash, the tangible feeling of holding a new banknote. It helps you manage your spending and reminds you of being part of a monetary union with shared values and a commitment to price stability.

But remember that time your wallet was stolen? Cash isn't very safe. Plus, you have to make a detour to withdraw cash from the bank, after the nearby branch closed. Since the start of the pandemic, fewer stores accept cash because of health concerns. Even the baker did us a favor the other day—do you remember? But next time he may not have change for your €50.

You call me “the American” when I pull out my cards. Indeed, here it's all I use; I find it so much easier to pay!

But not everyone will agree. People without bank accounts rely on cash even more than you. If it disappears, what will happen to them?

They may one day use central bank digital currency. Think of it as a digital form of cash that you can hold on your phone, in an app called a digital wallet, a bit like the one we use to send messages to each other. You could transfer money there from your bank account, or simply hold balances you receive from others. Instead of sending you a picture via phone, I could send you those euros I didn't spend.

Well, to the extent I could hold a digital wallet in euros. I would probably have to register for one and provide my passport and other information. Not for the state to snoop on me, but to make sure money doesn't go to the wrong people, like a terrorist group. No, don't worry mother, I don't know any. Besides you, to whom would I send money anyhow?!

In any case, these privacy concerns are very important. Cash offers anonymity. Had we eaten our cakes on the way home from the bakery, no one would have known we had purchased them. To what extent will countries allow spending in digital currency to be anonymous is an open question. Perhaps you'll get away with it when buying cake, but not a new car.

You may smile as you read this and think I have gotten carried away—that this whole thing will



only exist in sci-fi movies. Not at all. The Bahamas already has a central bank digital currency. And many other countries are testing or investigating them. If you ask me, it's a question of when, not if.

The potential advantages are considerable. Some countries want to lower costs of handling cash, especially across vast territories or multiple islands. Some are keen to improve financial inclusion, so those without bank accounts still have access to a means of payment as cash use diminishes. For many, payments are the first step to accessing other financial services like savings accounts and loans.

Some central banks are concerned that their payment systems are increasingly dominated by a few large, and often foreign, companies. So they aim to offer an attractive domestic alternative, that would also serve as a backup and induce the private sector to offer efficient services at low cost.

Think of innovation too—a new digital currency may be like a personal computer or a smartphone, spurring the development of new innovative services and applications.

Despite these advantages, central banks are proceeding cautiously, and rightly so. Payments are systemically important. They can't go wrong, crash, be subject to cyberattacks, or be used by criminals to launder money or finance terrorism.

There are other risks too. Perhaps the most important is related to bank funding. What if you decided to withdraw your savings from the local bank and hold only central bank digital currency? I know, you've grown suspicious of big banks since the last crisis. But banks are important to channel your savings to finance someone else's project. Maybe our baker friend needs a loan to get a new oven. So it's important to find ways to limit vast or sharp shifts away from bank deposits. Some central banks may impose fees if you hold more than a certain amount of digital currency—we'll see.

Similarly, people may choose to hold a digital currency issued by a foreign central bank, if it is

deemed safer, more stable, or perhaps more efficient and easier to use. That would be a problem for the domestic banking system and for central banks trying to steer their economy through interest rates on assets in domestic currency. So central banks may have to find ways to manage cross-border flows in and out of digital currencies. That's a big open issue we're working on.

Finally, the credibility of central banks might be at risk, and the demands on them will be significant. Can you imagine a central bank becoming more like a software company, constantly needing to remain on the cutting edge of technology and serve diverse and rapidly evolving user needs?

Fortunately, central banks don't need to do it alone. The private sector can partner with them to extend the functionality of digital currencies. For instance, a private firm could allow you to send money to a phone number in your address book (yours, Mother, is the first in my book), which is linked behind the scenes to a verified user identity. Private firms may also design the digital wallets to hold official digital currencies, and could even create their own digital currencies, though fully backed and supervised by the central bank (unlike many of those crypto coins out there).

But don't worry too much about those technical details; that's my job. You will just want to know that you're using a safe, stable, and efficient means of payment.

Now you know what I'm up to, and why I'm so excited about my work. Then again, I know you'll insist on paying for cake next time we meet—probably with a crisp paper note! **FD**

**VERY SINCERELY YOURS,**  
**Tommaso**

**TOMMASO MANCINI-GRIFFOLI** is a division chief in the IMF's Monetary and Capital Markets Department.



# RETHINKING ECONOMICS

The pandemic tests a new policymaking benchmark that includes civil society and social norms

**Samuel Bowles and Wendy Carlin**

**M**any workers deemed essential during the pandemic—such as those in eldercare, supermarkets, and distribution warehouses—are unable to make ends meet even in good times. And during the COVID-19 crisis the threat of serious illness has been added to low pay. Employers have required people to report to work—in meat-packing plants and restaurants—at grave risk to themselves and their families; their only recourse is to walk away from their jobs, risking their livelihoods.

These wrenching choices represent the collateral damage of the pandemic. Moral discomfort with the situation has spread even into economics—forcing the profession to confront ethical concerns that in

ordinary times are consigned to religious leaders and philosophers. Along with the climate emergency, the pandemic has made it clear that market failure is now the norm not the exception, rendering the standard economic model anachronistic, much as massive and persistent joblessness in the Great Depression did for the idea that labor markets will equate supply to demand, eliminating unemployment.

The fallout from the pandemic will alter how we think about the economy and public policy—not only in seminars and policy think tanks, but also in the everyday vernacular people use to talk about their livelihoods and futures.

What students today care about hints at what a new economics paradigm might look like. Between 2016





Chart 1



and 2020 we asked 9,032 students in 18 countries, at the very beginning of their introduction to economics course, to name the most pressing problems today’s economists should be addressing (see Chart 1).

Their responses are shown above; the size of the font indicates the frequency of the response. A new benchmark model that is increasingly widely taught is already encouraging young people who care about these issues to stick with economics. The economics students cited inequality, climate change, and unemployment as top issues of concern between 2016 and 2020.

A new economic model alone will not change minds and policies. The successes of both the Keynesian New Deal and neoliberalism have taught us that a new economic model becomes a force for change when it is integrated into a powerful moral framework, illustrated by emblematic policy innovations, and articulated in everyday conversations.

Classical liberalism, for example, rested on commitments to order, equal dignity, anti-paternalistic liberty, and utilitarianism, which were synergistic with its economic model characterized by competitive markets, division of labor, and specialization. Free trade and antitrust policies were its hallmark. Ordinary discourse took up its truths, as when Alice whispered to the Queen (in Alice in Wonderland), “It’s done by everyone minding their own business.”

More recent economic paradigms were also founded on a synergy of complementary values and economic models.

For Keynesian economists, a commitment to reducing economic insecurity and raising the incomes

of the less well-off through government programs and trade union bargaining was combined with a set of propositions about saving behavior, automatic stabilizers, and aggregate demand. Both the coherence and the rhetorical power of the Keynesian paradigm depended on the belief—very plausible under the circumstances—that the pursuit of its advocates’ egalitarian values through economic policy and organization would improve aggregate economic performance by supporting higher and more stable output and employment.

In like manner, what has come to be called neoliberalism advanced two normative pillars. The first was “freedom from” government coercion (rather than a more expansive “freedom to” and the absence of domination in private or public spheres). The second was a procedural view of justice, which deems outcomes—however unequal—as fair so long as the rules of the game are fair. Cementing neoliberalism’s philosophy to its economics was a view that people are individualistic and amoral—along with a representation of how they interact in the economy; namely, through exchange in competitive markets under complete contracts. Complete contracts, which cover all aspects of the exchange of interest and not only those of the exchanging parties, ensured against market failures arising from “spillovers” or “external effects,” such as epidemic spread or greenhouse gas emissions.

Extending the assumption of self-interested agents to the public sphere gave neoliberalism a view of public choice in which governments and other collective actors, such as trade unions, were simply special interest groups using up scarce resources



## The behavioral revolution in economics has taught us that people are neither omniscient nor entirely self-interested, but are moved by “moral sentiments and material interests.”

in order to get a larger slice of a smaller pie. In this model of the economy, the limits on government that were advocated on philosophical grounds were also necessary for a well-functioning economy. The values and the model were brought together in emblematic policies such as school vouchers (allowing school choice) and a negative income tax (replacing antipoverty programs with direct government cash payments) and in memes such as “The government that governs best governs least.”

But integrating economic models and ethical values in a complementary manner does not alone allow a paradigm to succeed: for the advocated policies to work, the economic model must be a reasonable approximation of the empirical economy. Just as a changing economic reality spelled the demise of classical liberalism following the Great Depression, the Keynesian paradigm was challenged by the stagnant growth combined with inflation (so-called stagflation) of the 1970s. Similarly, disenchantment with neoliberalism strengthened after the global financial crisis of 2008, which appeared to many as the price to be paid for the market deregulation advocated by neoliberals. Disenchantment with laissez-faire individualism has since mounted in the face of growing inequality, the climate crisis—and now the pandemic.

To serve as a component of a new paradigm, a new benchmark economic model must take a position on fundamentals, including the economy as a component of the social system and biosphere, how we represent people as economic actors and decision makers, the key institutions that govern our interactions, and the characteristics of the technologies that underpin our livelihoods. Contemporary economics—the economics that researchers use and graduate students routinely are taught—provides a response on each of these dimensions.

The behavioral revolution in economics has taught us that people are neither omniscient nor entirely self-interested but are moved, as Adam Smith put it, by “moral sentiments” as well as material interests. Among those moral sentiments are dignity—the desire not to be taken advantage of by others—as well as ethical convictions and concern for others.

These include not only altruism and reciprocity but also parochial intolerance and tribal hostility.

The way economics represents interactions among people has also undergone a fundamental transformation: we now recognize that most contracts are incomplete. The information economics pioneered by Friedrich Hayek and greatly extended in the past four decades to become a pillar of contemporary economics makes it clear that neither government nor private parties can stipulate in an enforceable contract the full range of what matters.

The effects on others—not covered by contractual provisions—are the rule, not the exception. These include not only the familiar market failures affecting our interaction with the biosphere, such as pollution, but also the central markets in a modern capitalist economy: for labor, credit, and information. In the labor market, for example, of great concern to both employees and employers is how hard and carefully a worker works. But there is no way to enforce or even specify this in a contract. In the credit market the promise to repay a loan can be included in the contract but may not be enforceable.

The incompleteness of contracts has wide-ranging consequences. Where they are incomplete, there will typically be excess supply or demand, even in highly competitive markets. Employers, for example, choose to pay wages higher than a worker’s next best alternative. This confers what economists call a rent on the worker, which means the worker is better off with the job than without. Fearing the loss of this rent is a powerful motive for the worker to implement the employer’s request to work hard instead of self-isolating. If it is costly to lose your job, then there must be potential workers who would prefer to have a job—namely, the unemployed.

In these interactions the exchange is governed in part by some combination of the contract, social norms (such as a work ethic on the part of the employee or truth telling by the borrower), and the exercise of power by the employer—or, in the case of the credit market, by the lender. Eight decades ago, Ronald Coase famously defined the employment contract as a transfer of power from the worker to the employer. An economic model recognizing this



transfer of power—and able therefore to incorporate the abuse of employers’ private powers—gives policymakers a framework for addressing the plight of low-paid essential workers forced to choose between their livelihood and their health. Policy initiatives in this area range from expanding workers’ individual rights on the job to support for those who stay home so as to minimize the epidemic spread.

By extending economics to a new set of motivations—a commitment to justice, the demand for dignity and voice—the new benchmark economic model opens up a broader set of policy options. It offers changes to the rules of the game that can be implemented not only by market and government instruments but also by the exercise of private power and social norms.

Take the policies “carbon tax and dividend” (in which the government sets a price on carbon emissions) and “cap and trade” (in which the government sets limits on emissions and lets the market determine the price). Each uses a different combination of state capacity and market mechanism to deliver lower carbon emissions, as shown by their different positions on the horizontal line in Chart 2. But this is a cramped one-dimensional continuum of policy options. It presumes that both private and government actors have sufficient information to design mechanisms adequate to address issues such as climate change—or a global pandemic. Its narrowness overlooks the opportunities for solutions involving a third dimension that arises from the social character of people and the power of social norms.

Chart 2 illustrates policies that combine motivation and implementation mechanisms of three poles that work in synergy rather than as substitutes: government, markets, and civil society. Such policies fall at various points inside the triangle. A position toward the center would use a mixture of all three mechanisms—for example, research, production, distribution, and population coverage of a vaccine for COVID-19 (see Chart 3).

As a result of the pandemic, ethical considerations are unavoidable, especially those of fairness and solidarity, even among strangers. Debates about who should have priority access to vaccines, and about which workers are essential during a pandemic, make it clear that we cannot rely on the price system or indeed compliance with government fiat to capture the values that matter to us.

Chart 2

### A new space for policymaking

Extending the state power vs. markets debate to recognize the role of social norms creates new opportunities to address problems from pollution to pandemics.

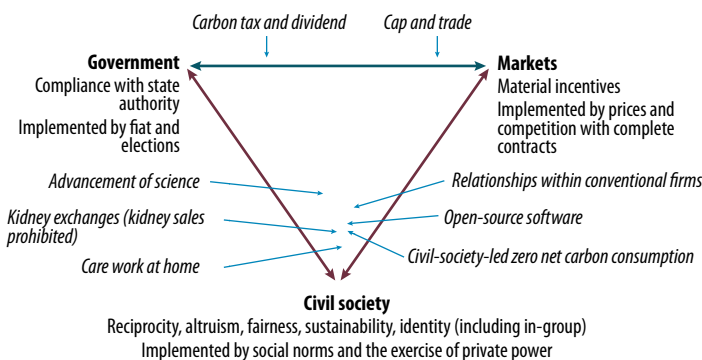
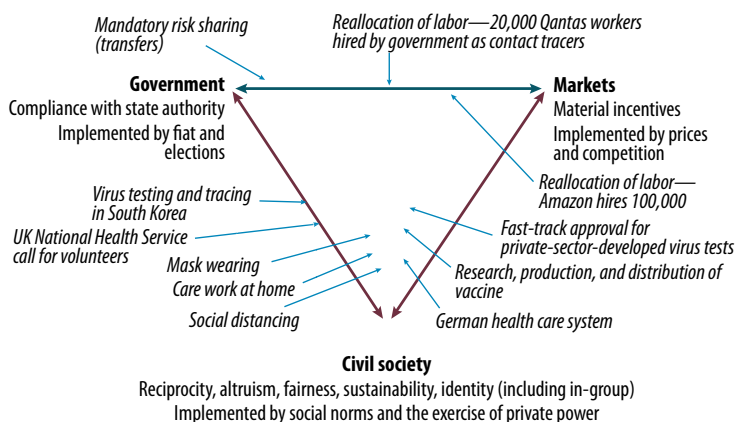


Chart 3

### The COVID test

Responses to COVID-19 show governments, markets, and civil society working synergistically—best exemplified by the development of vaccines.



The expanded space offered by the new economics benchmark provides an analytical framework integrating these ethical concerns with an economic model appropriate to a world in which people are connected not only by markets and contracts but also by the private exercise of power, the spread of infection, effects on the biosphere, ties of in-group membership, and a concern for the common good. **FD**

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$(a+b)^2 = a^2 + 2ab + b^2$   
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   
 $a^2 + b^2 = c^2$   
 $\frac{d}{dx} x^n = nx^{n-1}$

# EMBRACING *the* GIFT *of* GLOBAL TALENT

More equal opportunities can make us all better-off

Ruchir Agarwal, Ina Ganguli, and and Patrick Gaule

**T**alent can be born anywhere, but few places specialize in nurturing it. Accordingly, talented individuals have pursued opportunities abroad for centuries. Aristotle, for instance, moved from northern Greece to Athens to attend Plato's Academy and then to Macedonia to tutor a young Alexander the Great. Since World War II, the United States has emerged as a hub for foreign talent, playing an outsize role in the global knowledge network of scientific activity in recent decades.

Accordingly, immigration policies in the United States may have significant implications for scientific activity both in the United States and the rest of the world. While studies have examined the potential impact of US immigration policies on US competitiveness in science and innovation, there has been less focus on understanding how US immigration barriers may in turn impact scientific activity *globally*.

In this context, our recent paper "Why U.S. Immigration Barriers Matter for the Global Advancement of Science" finds that the global scientific output of future generations could be up to 42 percent higher if talented youth around the world had equal opportunities to nurture their abilities. Our work suggests that achieving this goal would require reducing immigration barriers and making more scholarships available for top foreign students (especially for those born in developing economies).

The quantitative impact of immigration barriers on global science and on worldwide cross-border flows remains an under-studied question, mainly because

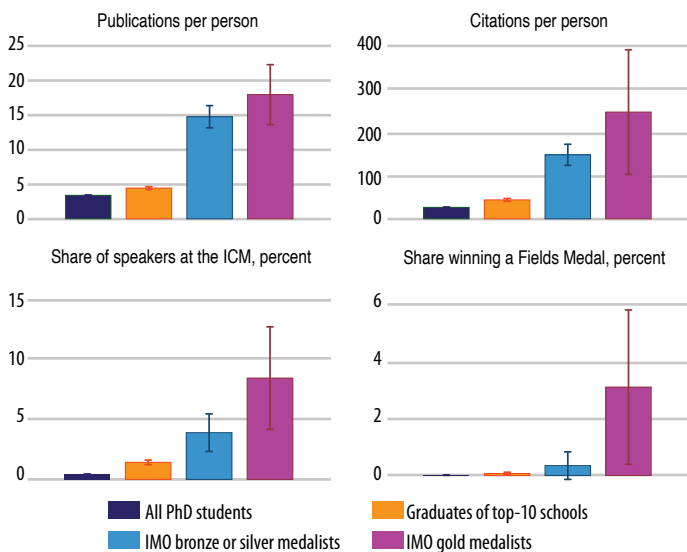
of the difficulty of collecting and linking data on migration and scientific production on a global scale. Yet examining the impact of US immigration barriers on the global advancement of science is both essential and timely—especially given the recent disruption in cross-border flows of people because of both the COVID-19 pandemic and changes in immigration policies. For instance, the number of student (F-1) visas issued by the United States fell 70 percent between fiscal years 2019 and 2020. Further, on September 25, 2020, the Department of Homeland Security proposed a rule to end the "duration of status" on visas for foreign students and exchange visitors (and journalists), which would make it much harder and more expensive for this group to study in the United States. Many of those who can no longer come to the United States to work and study due to recent immigration and travel barriers represent a substantial share of the most talented individuals from around the globe.

In an earlier work, "Invisible Geniuses: Could the Knowledge Frontier Advance Faster?" published in *American Economic Review: Insights* in December 2020, we study the advancement of the knowledge frontier in the field of mathematics. Mathematics provides a natural laboratory to examine where frontier knowledge comes from, thanks to the International Mathematical Olympiad (IMO), a prominent worldwide math competition for talented high school students. This competition for people younger than 20 has taken place annually since

Chart 1

### How IMO medalists do later in life

Those who showed exceptional talent as teenagers significantly outperform other professional mathematicians.

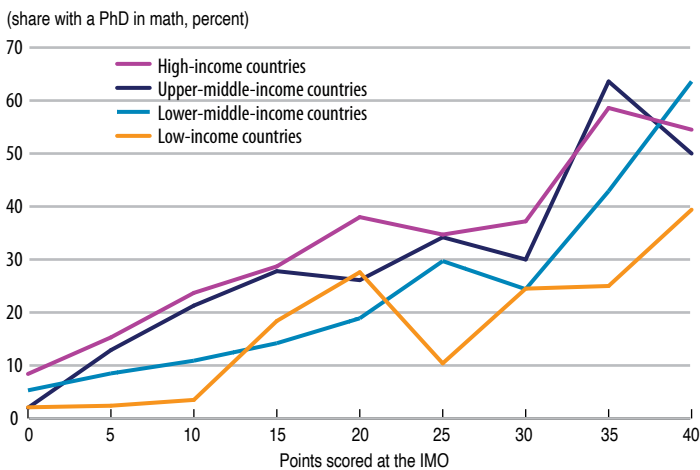


**Source:** Agarwal, Ruchir, and Patrick Gaule. 2020. "Invisible Geniuses: Could the Knowledge Frontier Advance Faster?" *American Economic Review: Insights* 2(4): 409–24.  
**Note:** The chart is based on 89,068 math PhD recipients. On average about 8 percent of IMO participants earn a gold medal, 16 percent earn a silver medal, and 24 percent earn a bronze medal. ICM = International Congress of Mathematicians; IMO = International Mathematical Olympiad.

Chart 2

### IMO scores and math PhDs

Olympiad participants tallying more points earn more mathematics doctorates, but those from lower-income countries do so at lower rates.



**Source:** Agarwal, Ruchir, and Patrick Gaule. "Invisible Geniuses: Could the Knowledge Frontier Advance Faster?" *American Economic Review: Insights* 2(4): 409–24.  
**Note:** The chart is based on 4,710 IMO participants. Income categories are based on the World Bank country classification. IMO = International Mathematical Olympiad.

1959 and includes more than 100 countries. We hand-collected data on careers of all IMO participants competing between 1981 and 2000 (that is, 4,710 participants, of which 2,272 received a medal). Our research found a strong correlation between success in the IMO and many indicators of scientific productivity, including winning the Fields Medal. The Fields Medal is the mathematics equivalent of the Nobel Prize and is awarded every four years to up to four people under the age of 40. Our research shows that the probability of an IMO gold medalist (someone scoring in about the top 10 percent of the competition) winning a Fields Medal is 50 times greater than the probability of a PhD graduate from a top-10 mathematics program doing so.

At the same time, we found a developing economy penalty throughout the talent distribution. Compared with their counterparts from high-income countries who had the same score in the IMO, participants born in low- or middle-income countries contribute considerably less to published research over their lifetimes (see Chart 1). We reached that conclusion by counting individuals' published work, as evidence of original research, and citations of their research by others as evidence of their findings' influence. A participant born in a low-income country produces 34 percent fewer mathematics publications and receives 56 percent fewer mathematics citations than an equally talented participant from a high-income country (see Chart 2). The findings suggested overall that large scientific gains can be achieved by easing barriers to people's migration to places where their talent can be nurtured.

Our recent work (written jointly with Geoff Smith) makes it possible to quantify the effect of immigration barriers on the advancement of science using hand-curated data sets of talented individuals—Nobel laureates, Fields medalists, and IMO participants. We combine our data set of career histories with newly collected survey data of 610 recent IMO participants, which includes information on the universities they applied to, were admitted to, and attended. The survey also asks a series of questions about how respondents would choose between hypothetical university offers in different countries—where offers were either funded or unfunded. These questions allow us to shed light on the role of funding as a constraint to pursuing education abroad.

Our analysis highlights four main results. First, using data on Nobel Prize winners and

Fields medalists, we document the central role migrants to the United States play in the global knowledge network—representing 20–33 percent of these frontier knowledge producers (see Chart 3).

Second, using our novel survey data and hand-curated life histories of IMO medalists, we show that migrants to the United States are significantly more productive than migrants to other countries—even after accounting for their talent during their teenage years. Migrants to the United States are *four to six* times more productive than stayers, while migrants to the United Kingdom are more than *twice* as productive as stayers. The term “stayer” refers to those who remained in their country of birth. Using information on the future occupations of the medalists we show that the US productivity premium is driven by both the extensive margin (that is, migrants are more likely to choose academic careers when they migrate to the United States) and the intensive margin (in other words, among those who choose academic careers in math, migrants to the United States are more productive than those who remain in their home country), in roughly equal measures.

Third, we document that financing costs are a key factor preventing foreign talent from migrating to the United States. In particular, among developing economy IMO participants in our survey, 66 percent dream of studying in the United States, while only 25 percent manage to do so. Financing appears to be a key constraint driving the gap between the dreams and the actual study destinations among talented youth. Forty percent of respondents report that the availability of financial assistance was “very important” or “extremely important” to their decision to attend their particular undergraduate institution rather than a different one—the share rises to 56 percent for developing economy participants.

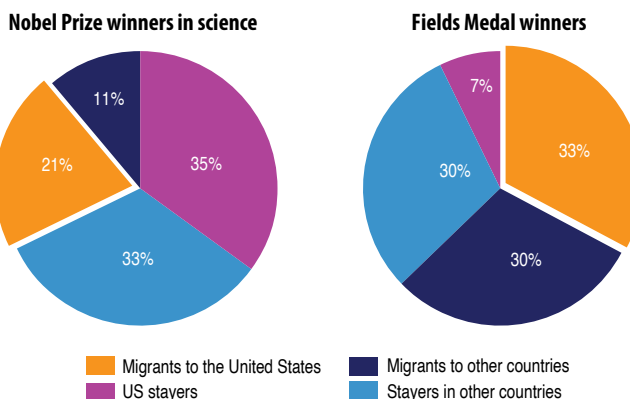
Fourth, our findings suggest that certain policy changes that reduce immigration barriers to the United States—by addressing financing constraints for top foreign talent—could increase the global scientific output of future cohorts of talent by up to 42 percent. This large increase results from the combination of two factors: talented individuals are much more productive in the United States than in their home country (as previously discussed), and many talented individuals aspire to move to the United States but can’t because

Chart 3

### Academic migrants and top achievements

Foreign-born people who relocated to the United States represent 21 percent of the world’s Nobel Prizes in science and 33 percent of the world’s Fields Medals.

(share with a PhD in math, percent)



**Source:** Agarwal, R., I. Ganguli, and P. Gaule. Forthcoming. “Why US Immigration Barriers Matter for the Global Advancement of Science, IMF Working Paper, International Monetary Fund, Washington, DC.

**Note:** Income categories are based on the World Bank country classification.

of financing constraints. Scholarships could thus make a huge difference. Of course, improvements that help young people develop their talent at home are also important, including to nurture those who prefer not to leave their country and those who can’t. Addressing this problem requires investing in better research institutions in more countries to nurture domestic talent, in addition to providing financial opportunities for talented youth who dream of studying abroad.

The pandemic and restrictive immigration policies recently have added new barriers to academic migration. These deprive talented individuals of the opportunity to nurture their abilities and compel many to settle for an inferior educational environment that is not suited to their preferences or strengths. And humanity is deprived of countless potential discoveries. Our findings suggest that timely action by global policymakers and the scientific community is needed to ensure equal opportunities for talented individuals and to accelerate the global advancement of science and knowledge. **FD**

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# TAXING TECH

Digital services taxes take shape in the shadow of the pandemic

Rebecca Christie

**W**hen European Union leaders took aim at the global pandemic last year, they knew they would need a bigger budget. To help pay for it, they will look toward bigger companies: the world's technology giants.

EU leaders agreed in principle to introduce a digital levy, with details to be put forward in mid-2021. While it won't be the largest source of revenue for the pandemic budget, it could be a big step forward in how European countries tax corporations. The plan adds to a long-standing push to reevaluate how the tech titans pay taxes and address how countries around the world can claim their fair share of revenue they help to generate.

If successful, new tax regimes could make it easier for countries to collect revenue generated within their borders and reduce public ire toward the outsize successes of American companies like Amazon, Facebook, Apple, and Google parent Alphabet. If botched, a patchwork of digital-specific taxes could spark trade wars and bog down innovation without generating enough money to matter.

National and regional momentum is building on top of a 137-nation push from the Organisation

for Economic Co-operation and Development (OECD). But the global process, which goes beyond digital to address a wider range of corporate tax concerns, takes time and was set aside when COVID-19 became top priority. As a result, some countries have chosen to enact digital services taxes individually, taking a stand and drawing a backlash. The United States has opened trade investigations against countries from France to Indonesia, claiming such taxes unfairly single out American companies.

French President Emmanuel Macron has said that forcing tech companies to pay more tax is a matter of social justice, and France has been at the forefront of efforts to front-run as well as encourage the broader OECD process. The United States has pushed back, saying such one-off moves undermine the worldwide talks. The two countries stepped back from the brink of a trade war in January—but tensions remain high, even though the amount of money at stake is small.

"With only a few billions of shifting revenue at stake, you could sort out one of the most disputed topics, which would be worth engaging on this," said Pascal Saint-Amans, director of the OECD's Center for Tax Policy and Administration. "Absent





a multilateral solution, there is a serious risk of unilateral measures being taken, and these measures may trigger sanctions or trade tensions.”

## A question of fairness

The precedents that would be set by changing the global tax rules, particularly if there is not a worldwide playbook, have made corporations take notice. They argue that a stable and reliable system should be the priority, rather than piling on compliance costs and the political battles that would inevitably follow. “We accept that may mean we have to pay more tax and pay it in different places under a new framework,” said Facebook CEO Mark Zuckerberg at last year’s Munich Security Conference.

The OECD makes the case that changing how digital services are taxed is a question of fairness, not just revenue. Prior debates about taxing e-commerce have focused on how to apply sales taxes. But such models do not capture the full range of profits earned by companies that offer free services in exchange for information.

There is “a growing frustration” with companies that make profits in countries where they don’t have a physical presence, said Saint-Amans, who *Politico* last year called “the closest thing to a referee” on global tax issues. The challenge now will be to keep searching for global consensus without stalling the effort completely. “We have blueprints; we know where we’re heading. We now need a political impetus, a reset of the negotiation.”

As part of its base erosion and profit shifting work (a set of policies designed to make sure companies pay taxes in the same places where they profit), the OECD has laid out a two-part strategy. One element aims to change the way companies show presence in a country, which makes a particular difference for industries with new business models that are based on data instead of physical factories. The other element tackles the question of minimum taxation, to ensure corporate profits are taxed somewhere and not exempted out of all jurisdictions—similar to the US global intangible low-taxed income (GILTI) regime, enacted in 2017, which sets a floor on what companies have to pay.

The OECD estimates its proposed changes, combined with the US GILTI regime, would bring in new tax revenues totaling about \$100 billion a year, about 4 percent of global corporate income

tax revenues. Most of the increased revenue would come from the minimum taxation element. The proposals for new business models would yield only a “modest amount,” according to the OECD, with revenues shifting from investment-hub countries to other economies.

President Joseph R. Biden, who took office in January, plans to reset America’s approach to trade, technology, and transatlantic ties as part of a broad recommitment to multilateralism. That does not mean the United States will stop pushing back on digital taxes already in place. While details vary, such a tax “frequently discriminates against non-resident businesses and imposes double taxation,” said Treasury Secretary Janet Yellen in comments to the Senate. She said the administration wants to address those concerns while being mindful that retaliatory sanctions can hurt US households.

## Techno-nationalism

Taxes on the digital economy can take a variety of forms. Some are as simple as consumption taxes on internet purchases or service subscriptions. Others that aim to assess profitability and separate out digital companies from other parts of the economy are more complicated. On top of that, there is a question of how digital taxation fits in with other transatlantic tech policy showdowns over privacy, competition, and government subsidies.

“I do believe there is a certain amount of techno-nationalism that is taking place. At the same time, that doesn’t mean intervention is unwarranted,” said Marshall Van Alstyne, professor of information economics at Boston University, whose work on the issue has included unpaid consulting services to the European Commission and to Facebook.

Economies of scale justify singling out the biggest tech firms, which can aggregate data from millions of users in ways that smaller companies can’t match, Van Alstyne said. Whereas traditional companies tie their products together by, for example, selling inexpensive printer hardware to increase sales of paper and ink cartridges, the tech platforms offer free services to one part of the market in order to maximize revenue from other sectors, like trading free email accounts for aggregated advertising data or giving away social network news feeds in order to capture social network information. “Platforms are fundamentally different business models. They are



## After decades of nothing much happening in international tax, everything is now up for grabs.

inverted firms where users outside the organization create much of the value,” he said.

Not everyone agrees. J. Scott Marcus, a former senior technology advisor to the US Federal Communications Commission, said the challenges raised by digital platforms are similar to those in some traditional industries, but on a bigger scale. In his view, tech’s main advantage is how easy it is to move assets around. “For digital companies, the question of where they park the assets, especially where they park the intellectual property, they have more latitude than conventional companies,” said Marcus, now a senior fellow at Bruegel, a Brussels-based think tank that includes Big Tech companies among its members.

To the general public, taxing the digital economy might seem to be a logical extension of seeking contributions from the sectors most able to bear up. Oxfam International, an anti-poverty group that studies taxation as part of its advocacy work, went as far as suggesting governments impose an “excess profit” tax on tech, pharmaceutical, and consumer goods companies that have boomed during the pandemic while other parts of the economy struggled. More broadly, the group holds that the tech sector is undertaxed relative to its economic strength.

“The need to tax the digital companies, and also more in general the digital economy, has received higher attention because of the coronavirus crisis,” said Chiara Putaturo, Oxfam’s EU inequality and tax policy advisor. “We have seen that digital companies have increased their profits during this year, in contrast to those companies that lost lots of their profits because of the crisis.”

### Seeking consensus

The European Union has said it wants to start with a smaller number of big companies rather than thousands of consumer-facing businesses all at once as the OECD has mooted, which puts some US firms in the crosshairs. In a 2018 proposal that may form the basis for this year’s digital levy plan, the European Commission set outside thresholds so

the plan would catch only companies of a certain magnitude, such as having more than 100,000 users in an EU member state or posting national revenues of more than €7 million. However, the European Union has tried to keep its tax proposals separate from other tech regulations. The digital tax proposals apply to all qualifying companies, not just those from across the Atlantic.

“We need to build a text that generates sufficient income, stable income, and we need to build a text that is not likely to fuel trade tensions,” said Benjamin Angel, the European Commission’s director for direct taxation, tax coordination, and economic analysis.

Leaders may have agreed to move ahead with a “digital levy” to become a dedicated revenue stream for the EU budget, but that is no guarantee that member states will want this new “own resource” to look like the prior plans. Furthermore, EU tax proposals need to be unanimously approved by all EU member states. Some tax measures have been able to move ahead, but the European Union’s proposed common corporate consolidated tax base has been stuck behind this hurdle for years.

This means that the European Union will need to strike a balance between countries that want to move ahead and those that resist adding corporate taxes not part of the global consensus. For Ireland, which has made attracting US tech companies a priority, keeping the European Union from outpacing global standards is the priority. “Any outcome at international level must strike an appropriate balance and be acceptable to all countries, small and large, developed and developing,” Irish Finance Minister Paschal Donohoe said in January. Shifting goalposts can make it harder for companies to keep up with requirements and for small countries to set policy in line with global standards.

The European Union’s proposals, like many of the digital services taxes being introduced around the world, have been based on revenues and other assessments of a company’s entire business, rather than on specific sales and corporate income. This poses a challenge because turnover taxes are generally inefficient and should be restricted to very limited circumstances, said Alexander Klemm, deputy chief of the IMF’s tax policy division and coeditor of



the new IMF book *Corporate Income Taxes under Pressure: Why Reform Is Needed and How It Could Be Designed*. Generally speaking, he said, it's best to create a tax system that establishes common concepts like profits and taxes them throughout the economy in roughly the same ways. Singling out individual sectors of the economy often runs counter to these principles, even if sometimes useful as a stopgap measure.

The European Union needs cash from many pots to follow through on the promises in its most recent seven-year budget. That means the bloc needs to introduce a digital tax proposal by mid-2021 to meet its current commitments, even if it wants to structure its rules so that they fall in line with global guidelines if and when an agreement is reached.

"You don't raise a tax because you need cash in a certain place," Klemm said. "You think about it in search of the best way to raise money, by creating the smallest distortion and the lowest cost of collection.

It leads to bad tax policy to say we need to slap on a tax on some sector because we need cash in one special pot."

The global debate over why and how to tax digital companies shows the incredibly rapid shift in attitudes toward corporate levies in recent years, said Michael Keen, deputy director of the IMF's Fiscal Affairs department: "After decades of nothing much happening in international tax, everything is now up for grabs." **FD**

**REBECCA CHRISTIE** is an independent writer and policy researcher based in Brussels. She is also a visiting fellow at Bruegel, a Brussels-based think tank, specializing in financial services issues.

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# TRANSFORMATIVE TECHNOLOGY

The shift to a hyperconnected world presents a formidable opportunity—but also risks and challenges

**Herve Tourpe**

**E**veryone has an opinion on the many ways lockdowns and technology have altered our lives and on how long these changes will last. Technology firms are betting on a permanent trend. They are rapidly adjusting to a post-COVID world where people will do more from home—buying, learning, working, and socializing—and avoid interacting with the physical world whenever possible, with so-called touchless technologies.

The 2021 Consumer Electronics Show, one of the world's most influential tech events, recently offered a glimpse of what's to come. Laptops are now designed for videoconferencing, equipped with multiple cameras, special lights, and software-optimized audio. N95 masks with built-in Bluetooth headsets and microphones, coupled with smart glasses

with ultra-small displays, promise to keep people safely connected while on the go. The spread of germs can also be controlled at our doorsteps, with touchless doorbells that notify homeowners when visitors arrive and maybe even check their temperature!

Technological advancements are not reserved for rich countries and are not limited to high-tech gadgets, however. In lower-income countries, for example, where medical expertise is scarce or even completely absent, Big Tech firms are making open-source artificial intelligence (AI) code available for medical image analysis, which can be a game changer in health care, including for early detection of cancers. The increased need for remote health care and remote education has generated new interest in augmented reality. UNICEF and other organizations expect this technology to be an essential bridge to the digital

world for people with low literacy, many of whom live in developing economies. As technology rapidly changes to enable a smarter and more equitable world, the focus is on foundational elements, including infrastructure, digital identity, and new digital risks, to accompany this transformation.

### **Satellite mega constellations**

Take, for example, internet satellites. Could a new generation of satellite mega constellations be a game changer for the 53 percent of the developing world with no internet connectivity? Theoretically, yes—SpaceX has already launched more than 1,000 of 12,000 planned low-Earth-orbit Starlink satellites. These spacecraft are so close to the ground that they can beam internet down to every remote area in the world with unmatched quality and speed—whether it's to a remote village in Ghana or a base on the deserted North Pole. Other companies, such as OneWeb, plan to launch 650 satellites this year alone, and Amazon's Project Kuiper is expected to send up thousands of high-speed satellites soon. This technology could help countries leapfrog decades of infrastructure investments.

According to IMF research, a 10 percent increase in internet penetration could raise real per capita GDP growth 1 to 4 percentage points in sub-Saharan Africa. The potential is significant, given that three-quarters of the people in the region do not currently have internet access. And in every country, inequality is amplified when access to broadband connectivity is lacking.

Terrestrial internet access currently requires large multiyear infrastructure investments in cross-border networks, national internet-supporting “backbones,” and regional and “last mile” connections—expected to cost about \$100 billion over the next 10 years for Africa alone. Low-Earth-orbit satellite companies promise to do it for a fraction of that cost, in the next two years, and households will need only a small antenna and a box. The satellites can even serve as the backbone for mobile networks, which could further accelerate fast internet adoption, given people's preference for mobile access.

So what's the catch? First, the number of satellites around the globe will grow from fewer than 3,000 today to possibly more than 20,000, which will impact ground-based astronomy. The expected cost for individuals—initially about \$100 a month, plus another \$500 for the hardware—is too steep for people in poorer

countries and would require subsidies. Finally, if widespread connectivity becomes available much sooner than expected, policymakers must understand its impact and their role in making it valuable for their citizens.

Previously underserved people may not, for example, understand the major languages used on the internet. Without basic digital and financial skills training, people may only partially benefit from internet connectivity. Most important, with more connectivity come more digital threats, such as fraud and misuse of data. In the next two years, this new generation of high-speed internet satellites has the potential to transform the lives of billions of people. International organizations, development banks, and governments can seize this new opportunity. But regulation, digital skills programs, and changes in mindset will be necessary.

### **Digital identity**

And then there is digital identity technology. Even before the pandemic accelerated the transition to a more connected world, digital identity was seen as one of the most significant technology trends, especially for the developing world. According to the World Bank Group, 1.1 billion people worldwide lack documentation or verifiable credentials to prove their identity. For years, countries have tried to replicate the success of India's Aadhaar digital ID and the e-Estonia national identity system. The expected benefits include increased government transparency (regarding the budget and elections, for example), easier access to government assistance, and expanded access to basic financial services, especially for displaced or undocumented people.

Over the years, adoption has been slowed by numerous challenges, ranging from ineffective national coordination to limited digital literacy. Cybersecurity issues, data privacy concerns, and mistrust of technologies provided by government have also delayed the deployment of digital ID in many countries. These unresolved challenges have often relegated digital identity programs to the back burner.

But the COVID-19 pandemic has forced governments to rapidly overcome or sidestep these issues to deliver urgently needed financial assistance and other forms of support to the most vulnerable citizens. The time is ripe: the benefits of deploying a national digital ID, including its potential for reliable databases with socioeconomic indicators, now outweigh some of the concerns.

## For countries seeking to embrace the promise of digital transformation, cybercrime is only one of the many digital risks to manage.

The underlying technologies are now quite mature. For example, security and encryption algorithms, such as two-factor authentication and asymmetric encryption, improve the integrity and privacy of data. Artificial intelligence, machine learning, and biometric sensors built into mobile devices can significantly reduce fraud. They can also simplify users' experience by scanning their fingerprints, face, or voice. Moreover, digital ID open-source software, open application-programming-interface (API)-based solutions, and international standards have recently emerged, reducing the implementation costs of national digital ID programs.

Technology providers are already one step ahead, and a new generation of ID solutions is rapidly emerging. Early tests of blockchain-based identities are gaining momentum in several countries, including in Estonia. This potentially groundbreaking technology could shift the control and ownership of data from governments to citizens while preserving governments' authority to issue and validate identity and related services.

But the risks and potential for misuse of digital identity remain real and require the careful, continuous attention of policymakers and regulators. The pandemic certainly has highlighted the benefits of digital ID, but it has also exposed the dangers to privacy when combined with other technologies, such as tracing applications. Regardless of which technology is used, successful digital ID systems must be secure, inclusive, and interoperable to deliver their transformative impact for the billions of people without IDs.

### Managing digital risks

The pandemic has leapfrogged digital adoption worldwide, some say by five years. The flip side, as illustrated above, is that digital risks have accelerated at the same rate. Companies are now more exposed to online threats due to the increased use of personal computers to access corporate systems. Contact tracing applications have raised tensions between data privacy and public health policy goals, challenging regulators and policymakers.

Hackers have exploited fears and anxiety about the virus to lure people into phishing schemes and trick them into downloading malware. Even more disconcerting are threats of ransomware attacks against hospitals and of intellectual property theft against vaccine companies in the midst of the pandemic.

This is not new: awareness of cyber risks was on the rise even before the pandemic. Geopolitical tensions and new cyber-offensive capabilities have inspired both nation-states and nonstate actors, blurring the lines between spies and malicious hackers. The World Economic Forum recognized the threat even in 2019, adding cybersecurity to the top of the global risk landscape, right next to climate change.

But the scale and threat landscape have changed rapidly. For countries seeking to embrace the promise of digital transformation, cybercrime is only one of the many digital risks to manage. The role of technology in amplifying misinformation is clear to everyone—and not only when it comes to the United States. Experts fear that deepfakes—deceptive videos produced by artificial intelligence and made to look like the real thing—may fuel political tension by spreading disinformation that is hard to debunk. Fears about AI are rooted in very real concerns. These include faster-than-expected automation of certain jobs, amplification of gender and racial biases, and the so-called black box problem—when AI reaches conclusions that even its developers can't explain.

The shift to a hyperconnected world is a formidable opportunity for billions of citizens to have better access to education, health, employment, and financial services. This decade will continue to witness faster digitalization, more complex digital questions, and ever changing digital risks. The question is: Can governments become more agile, and can they rapidly adopt a more comprehensive approach to risk regulation and digital strategy to reap the benefits of this acceleration while limiting the risks? **FD**

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**HERVE TOURPE** is chief of the Digital Advisory Unit at the IMF.

## Growing Pains

**IT'S EASY TO SEE** the failures of modern capitalism in the rise of inequality, post-financial-crisis stagnation, and inadequate responses to climate change and now COVID-19. Polarized political parties offer a choice only between different visions of a stronger state. And almost everyone seems to agree that now is a good time to beat up on the tech giants.

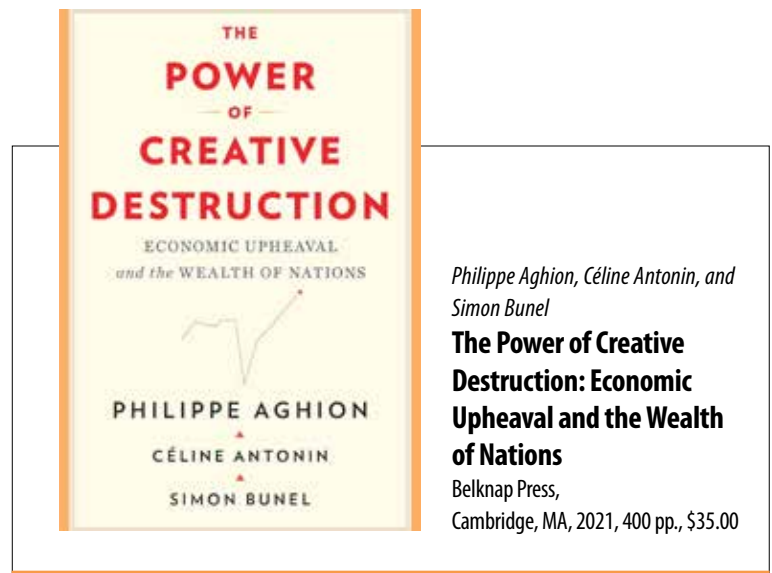
In *The Power of Creative Destruction: Economic Upheaval and the Wealth of Nations* Philippe Aghion, Céline Antonin, and Simon Bunel say that we've been thinking about this wrong. In the influential neoclassical paradigm, a mystery term labeled “total factor productivity” governs how well the economy converts inputs such as capital and labor into output. The secrets of long-term growth are hidden in this unexplained “black box.”

This book is based on a decades-long academic research program in which these authors, along with coauthors and students, open this black box. In the tradition of the early 20th century economist Joseph Schumpeter, they emphasize that growth comes about when entrepreneurs innovate, creating new goods and increasing productivity but in the process destroying existing jobs and firms.

If for Thomas Piketty economic history is the story of “inequality regimes” (*Capital and Ideology*), the focus here is on growth and its benefits. Thanks to sustained productivity growth, the world has enjoyed remarkable increases in well-being since the industrial revolution, and thanks to growth in China, India, and many other developing economies, global inequality has fallen.

For Aghion and his colleagues, more—and better—growth is the solution to our current ills, and the “creative destruction” paradigm explains how this happens. Export markets reward the most innovative, while imports and foreign direct investment bring new ideas and the competition that spurs the best firms to keep improving. Vibrant financial markets provide the capital that successful new firms need to thrive and expand. Fighting climate change calls for a green technological revolution. Much inequality should be accepted or even celebrated as the price of incentivizing innovation.

The creative destruction paradigm also helps guide policy. Governments should protect patents and avoid excessive taxation, insure the losers from the destructive part of creative destruction,



*Philippe Aghion, Céline Antonin, and Simon Bunel*

**The Power of Creative Destruction: Economic Upheaval and the Wealth of Nations**

Belknap Press,  
Cambridge, MA, 2021, 400 pp., \$35.00

accompany flexible labor markets with “active” labor market policies to help people find new jobs, and support basic research. And they need to avoid being co-opted by yesterday’s innovators trying to entrench their position, easier in a democracy.

**For Aghion and his colleagues, more—and better—growth is the solution to our current ills.**

A book this wide-ranging inevitably leaves questions. Are “flexitarian” labor market policies truly adequate to address the losers from creative destruction? Is China facing a “middle-income trap” of failed transition to innovation-led growth, due in part to an imbalance between the state, the market, and civil society, as this book suggests?

The goal of this book, however, is not to answer all the questions but to point us in the right direction. Metaphors shape us. The “invisible hand” seems inadequate for our current challenges. “Creative destruction” is evidently not an entirely encouraging lens, but this book presents a rich and strong case that it can guide us to a better capitalism. **FD**

**ANDREW BERG**, deputy director, IMF Institute for Capacity Development

## Adding It All Up

**IN OUR EVERYDAY** lives we are constantly confronted with a myriad of data—from health news to political opinion polls—presented to us as hard facts based on statistics. In such circumstances, the natural tendency is to deduce that if it is based on statistics, it must be true. But how many times have we encountered divergent statistics on the same issue? How does one know if the facts presented are true?

This is where Tim Harford, in his latest book, *The Data Detective*, makes an important contribution by presenting, in an intuitive way, basic rules that can help evaluate if the facts labeled

help us understand the world in which we live, a bit like the telescope is to astronomy, to borrow his analogy.

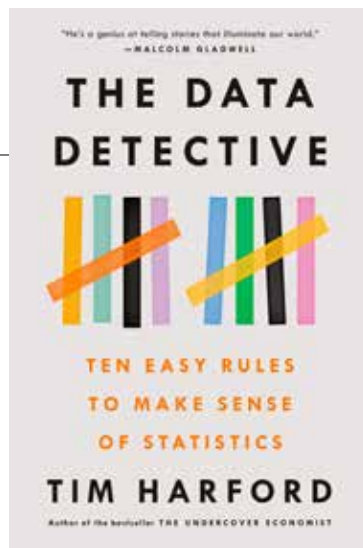
Building on well-researched examples across domains and time, Harford reminds us of key steps to take when analyzing a series of statistics, including maintaining some distance so as not to be influenced by our biases and personal experiences, which may not be representative; pausing and reflecting before coming to a conclusion; and, as a detective would, asking simple questions (What are we trying to measure? What is the sample or universe used?) to get a sense of context and perspective. His examples of the different measures of income and wealth, poverty, health, and murder rates—as well as prediction of election results—are telling, and we can be seriously misled if we don't scrutinize carefully the data we regularly encounter.

Statistics should be seen as a tool that can help us understand the world in which we live.

The book also delves into new areas such as big data and computer algorithms, presenting some of the benefits of these new sources of large administrative data sets but reminding us also of their limitations and potential biases. Harford's book illustrates with convincing examples the importance of data transparency, vigorous analysis, and the protection of the independence of statistical agencies, which he rightly calls "nations' statistical bedrock."

*The Data Detective* comes at the right time: we face an onslaught of statistics on critical issues such as the consequences of climate change, the COVID-19 pandemic, the economic downturn, and Brexit, just for starters. This well-documented book is a must for anyone who is curious about how to make sense of all the information about this complex world in which we live. **FD**

**LOUIS MARC DUCHARME**, chief statistician, data officer, and director, IMF Statistics Department



Tim Harford  
**The Data Detective:  
 Ten Easy Rules to Make  
 Sense of Statistics**  
 Riverhead Books,  
 New York, 2021, 336 pp., \$21.49

as true statistics make sense. The book is nicely designed for a broad audience, presenting a series of captivating and amusing stories that illustrate how statistics can mislead as well as examples of serious statistical studies that have changed our knowledge and behavior—for instance, the effects of smoking on health. While avoiding the specialized jargon and technical aspects of the statistical profession, the author argues convincingly, based on his experience and research, that statistics should be seen as a tool that can



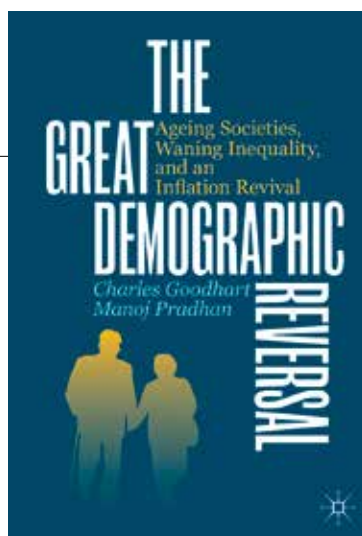
## Where We Are Headed

**THE EMINENT SWEDISH** economist Knut Wicksell (1851–1926) once argued that textbooks on economics should start with a chapter on population. A new book by Charles Goodhart and Manoj Pradhan echoes this approach, placing demographics and the influence of slow-moving and persistent trends on macroeconomic developments front and center in economic discussions.

*The Great Demographic Reversal: Ageing Societies, Waning Inequality, and an Inflation Revival* focuses on demographics and the participation of China in the global economy. It argues that the confluence of these two dynamic forces led—over the past three decades or so—to deflationary forces that explain falling inflation and nominal interest rates. These two phenomena also contributed to weak nominal wages, increased inequality in many countries, and social and political upheaval. Going forward, both forces will operate in reverse, leading to looming inflation pressure. The logic of the argument, in the body of the book, points to this plot playing out in the next three decades or so.

The authors acknowledge that, as of the beginning of 2020, they did not have a tight view of the timing of the coming inflection point. But COVID-19 changed everything, and they advance a very precise prediction: “...what will happen as the lockdown gets lifted and recovery ensues, following a period of massive fiscal and monetary expansion? The answer, as in the aftermaths of many wars, will be a surge in inflation, quite likely more than 5% or even in the order of 10% in 2021.”

Goodhart and Pradhan argue that the demographic reversal and the very expansionary monetary and fiscal policies put in place to combat COVID-19 will lead—sooner rather than later—to less saving and more investment. That will push the natural rate up. Financial markets and policymakers are unprepared for such developments. Accumulated leverage leads to financial fragility and discourages central banks from tightening, so inflation is bound to increase.



Charles Goodhart and  
Manoj Pradhan

**The Great Demographic  
Reversal: Ageing Societies,  
Waning Inequality, and an  
Inflation Revival**

Palgrave Macmillan,  
London, UK, 2020, 280 pp., \$24.40

One year after COVID-19 was declared a pandemic, uncertainty remains elevated. Savings are high, and investment is weak. Workers are understandably concerned about their jobs and job prospects. Inflation has been low for years, and monetary policy has been under the shadow of the effective lower bound.

**One year after COVID-19  
was declared a pandemic,  
uncertainty remains elevated.**

To my mind, Japan (with policy rates at or close to the zero lower bound for 25 years, a declining labor force since 1995 and falling population since 2008, and inflation averaged approximately at zero and expected to stay there for the next 10 years) is a clear counterexample to the inflationist thesis. But Goodhart and Pradhan disagree, and do so in a compelling way.

In fact, the authors include an engaging discussion of several objections to their main theses, which gives the book the feeling of a pleasant conversation with well-read and well-informed friends, prompting reflection and examination of conventional views. [FD](#)

**VITOR GASPAR**, director, IMF Fiscal Affairs Department

## New Old Idea

### Technological innovation is fueling the resurgence of community currencies

**Andreas Adriano**

**ABOUT A CENTURY** before Satoshi Nakamoto created Bitcoin, there was Johann Silvio Gesell. A little-known amateur German economist, Gesell was motivated by a similar libertarian spirit: to create currencies independent of national governments and central banks. He believed communities could grow faster with money that would boost local activity and not be spent elsewhere.

Although there have been hundreds of community currencies (or “scrips”), they have always remained largely an economic curiosity. Now, this concept from yesterday is harnessing technologies of today, like blockchain and mobile payments, potentially creating new development tools for tomorrow.

#### Economic miracle

Born in 1862, Gesell led a somewhat paradoxical life while moving between Germany, Switzerland, and Argentina. He was a merchant and social activist, entrepreneur and anarchist, a self-described “citizen of the world,” and a separatist. In 1891, while suffering through one of Argentina’s frequent economic crises, the self-taught economist began to develop his doctrine of *Freiwirtschaft*, German for free economy. It was based on three pillars: *Freigeld* (free money), *Freihandel* (free trade), and *Freiland* (free land).

Gesell believed that land ownership and centralized monetary systems hampered progress. In his book *The Natural Economic Order* he wrote that money should go out of date like a newspaper, rot like potatoes, and rust like iron. He devised a system to boost local currencies circulation, requiring holders to buy monthly stamps to keep their value, akin to a “hoarding tax.”

In 1931, a year after Gesell’s death, the Austrian village of Wörgl gave his ideas a shot. Local infrastructure investment financed with *Freigeld* created jobs and boosted economic activity without stoking inflation. Despite, or because of, strong interest from other localities, and fearing political fragmentation, Austria’s central bank shut down the so-called miracle of Wörgl after two years.

#### Strange prophecies

In *General Theory of Employment, Interest, and Money*, John Maynard Keynes called Gesell “a strange, unduly neglected prophet” and praised the stamp mechanism. Another leading 1930s economist, Irving Fisher, wrote a book called *Stamp Scrip* and prescribed community currencies as economic stimulus during the Great Depression. Although Fisher had been widely discredited after predicting high stock prices nine days before the 1929 crash, hundreds of scrips were issued across the United States.

One was in Tenino, a village in Washington state, which issued local dollars printed as wooden cards. In 2020, when creating a cash transfer program prompted by the pandemic, instead of distributing debit cards or checks, the city minted new wood chips with the same press used 90 years earlier.

The largest alternative currency is the WIR franc, launched in 1934 in Switzerland and still in circulation. The WIR (an abbreviation of “economic cycle” and the word “we” in German) bank is a credit cooperative in which members lend to each other, and the currency is backed by real assets. Annual turnover is around \$7 billion.



A 5 schilling note issued in the Austrian city of Wörgl in the 1930s, showing the monthly stamps required for preserving its value, which served to stimulate circulation and worked like a “hoarding tax.”



### Mobile boom

Just as community currencies boomed during the Great Depression, their digital versions are expanding amid the COVID-19 recession. As the virus hit, the city of Maricá, Brazil, was able to double its income supplement program to residents, paid in mumbucas (after a local river), two months before any federal support arrived. While cards exist, most transactions go through mobile phones.

More complex experiments are combining mobile payments with blockchain, the technology behind most cryptocurrencies, in which all computers in a given network record all transactions simultaneously, creating an immutable decentralized ledger.

In Turkey, Good4Trust, a virtual bazaar for socially and environmentally conscious producers and consumers, is preparing to launch a community currency using blockchain powered by Celo, a Silicon Valley company.

Brixton, a London neighborhood, launched its pounds in 2008, featuring famous natives and residents, including pop icon David Bowie. In January 2021, it announced the release of a digital version using blockchain from Algorand, a Singapore company.

In Kenya, the sarafu (Kiswahili for “currency”) also leverages blockchain. It was used by 41,000 people across 60 villages, which in 2020 spent the equivalent of \$2.5 million in over 335,000 transactions, all through mobile phones. “This platform allows a group of farmers to come together and create their own currency and a resilient economic system from the bottom up,” its creator, Will Ruddick, told

F&D. “Currency is vital infrastructure,” added the American physicist turned economist and social entrepreneur, who first launched a paper-based community currency in Kenya in 2010.

Recording all transactions in the blockchain allows for real-time data collection and evaluation of social initiatives. The Danish Red Cross, one of the project’s funders, uses it to study the effect of its programs. “For the first time, we can observe a program’s impact in real time,” says Adam Bornstein, head of the innovative finance and systems change team. “We can correct course within days rather than wait for surveys 12 months after the fact.”

The data can also be used to create early warning systems for disasters, giving the institution more flexibility in deploying its resources. “The world is complex and dynamic, whereas humanitarian finance and procurement policies are inherently inflexible,” adds Bornstein.

Strengthening communities and supporting local business have always been at the core of local currencies. But the experimentation they allow can have broader, perhaps national, implications. “There’s a lot of focus on central bank digital currency,” Ezechiel Copic, Celo’s head of official sector engagement, told F&D. “Local currencies can provide a testing ground for these initiatives.” With new technologies and the hard work and vision of social entrepreneurs and economists, alternative currencies might find their way into the mainstream. **FD**

**ANDREAS ADRIANO** is on the staff of *Finance & Development*.

*A villager in Kenya makes a purchase with sarafu. The digital community currency was used across 60 villages for purchases equivalent to \$2.5 million last year, all through mobile phones.*

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