CENTER ON FINANCE, LAW & POLICY
UNIVERSITY OF MICHIGAN

CENTRAL BANK OF THE FUTURE

Central Bank of the Future Summary and Recommendations for Further Inquiry

Paper # 8

Released July 19, 2021

The authors thank the Bill & Melinda Gates Foundation for its support of this research. Thanks are also owed to the research assistants at the Center on Finance, Law & Policy, and especially to Avaskhan Assanaliyev. The authors are also grateful for the editorial assistance of Tracey Van Dusen and Christie Baer.

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FINAL ISSUE BRIEF: Central Bank of the Future Summary and Recommendations for Further Inquiry

Executive Summary

Over the past two years, the University of Michigan's Gerald R. Ford School of Public Policy and its Center on Finance, Law & Policy, with support from the Bill and Melinda Gates Foundation, has embarked on an exploration of the Central Bank of the Future. The project convened current and former central bank governors, policymakers, regulators, researchers, innovators, entrepreneurs, consumer and community organizations, non-profit think tanks, and others for two large, public conferences, three private roundtables, and dozens of small group and one-on-one discussions and interviews. The project also produced an introductory paper, seven working papers, a comprehensive data set cataloging central bank financial inclusion mandates from around the world, and a "What If" blog series. The goal of the project was to explore how central banks could leverage technological advances to foster financial inclusion and to provide recommendations for further work to advance this goal.

This paper summarizes many key takeaways from the project and provides a set of recommendations for further research. The paper is divided into five parts. Part I describes how the COVID-19 pandemic underscored existing deficiencies in payment systems around the world and discusses some of the strategies central banks used to respond to the crisis and the impact of those policies on the poor. Part II describes the multiple definitions of "financial inclusion" used by governing bodies around the world and how these competing definitions make it challenging to enact broader global financial inclusion policies. It also provides examples of central banks' attempts to harmonize definitions, with varying degrees of success. Part III provides an overview of how fintech has changed customers' expectations; created new risks; and created new opportunities to provide affordable, accessible, and appropriate financial services to those whose needs have not been met. Part IV delves into the regulatory challenges raised by new technology, such as artificial intelligence (AI) and Distributed Ledger Technology (DLT), and offers examples of how central banks could modify regulations to address these gaps in regulation. Part V explores some of the key factors involved in creating a global identification system, based upon learning from national identification systems offered by some central banks. This includes a discussion of anti-money laundering (AML) and other risks. Each Part concludes with recommendations for further research. A summary of the recommendations can be found in Appendix A.

I. Financial Inclusion in the Wake of the COVID-19 Pandemic

Although the global pandemic was not identified as a threat at the start of the Central Bank of the Future project in early 2019, COVID-19 has affected financial inclusion policies around the world, leading to unprecedented crisis responses from central banks. This section discusses what measures central banks from some of the largest economies, such as the U.S. Federal Reserve (the "Fed"), the European Central Bank (the "ECB"), and the People's Bank of China (the "PBOC"), have taken to mitigate the disparate impact of COVID-19 on the poor and the widening resource gap. It also outlines fintech solutions that several jurisdictions have used to deliver stimulus payments and other benefits to under- and unbanked individuals.

A. General Activities of Central Banks to Respond to the COVID-19 Crisis

To mitigate the economic impact of the pandemic, governments leveraged both fiscal and monetary policy.[1] Central banks' responses have focused on supporting commercial banks so that those banks may in turn assist businesses and retail customers.[2] In particular, the central banks of five of the world's largest economies – the Fed, the ECB, the PBOC, the Bank of Japan ("BOJ"), and the Bank of England ("BOE") – have taken extraordinary measures to mitigate the negative consequences of the COVID-19 pandemic.[3] As a nod to the enormity of the responses by these jurisdictions to conquer panic and stabilize economies, commentators dubbed the resultant measures economic "bazookas."[4] Illustrations of the central banks' responses bear out this characterization. China, along with a number of other central banks in Emerging Market Economies, enacted changes to required bank liquidity reserves.[5] Using an incentives regime that required banks to meet "inclusive financial objectives," the PBOC allowed for a reduction in reserves of up to 200 basis points.[6] In parallel efforts to preserve liquidity, the ECB

[1] Christopher G. Collins & Joseph E. Gagnon, *A Timeline of Central Bank Responses to the COVID-19 Pandemic*, PETERSON INST. FOR INT'L ECON. (Mar. 30, 2020, 1:45 PM), https://www.piie.com/blogs/realtime-economic-issues-watch/timeline-central-bank-responses-covid-19-pandemic; *see also* Michael S. Barr, Howell E. Jackson, & Margaret Tahyar, *The Financial Response to the COVID-19 Pandemic* (Univ. of Mich. Law & Econ. Research Paper, No. 20-040, 2020).
[2] Wim Bartels, Francisco Uría & Maureen Finglass, *Central Banks Respond to the Pandemic: An Overview of How Central Banks Around the World are Responding to the COVID-19 Pandemic*, KPMG, https://home.kpmg/xx/en/home/insights/2020/05/central-banks-respond-to-pandemic.html (last visited Apr. 14, 2021).
[3] Collins & Gagnon, *supra* note 1.
[4] *See* Matina Stevis-Gridneff & Jack Ewing, *Will 'Helicopter Money' and the 'Big Bazooka' Help Rescue Europe?*, N.Y. TIMES (Mar. 20, 2020), https://www.nytimes.com/2020/03/20/business/EU-European-Central-Bank-economy-covid.html.
[5] Carlos Cantú, Paolo Cavallino, Fiorella De Fiore & James Yetman, *A Global Database on Central Banks' Monetary Responses to Covid-19* 10 (Bank for Int'l Settlements, Working Paper No. 934, 2021).
[6] *Id.*

enacted a repo line.[7] In this arrangement, the ECB "provide[d] euro liquidity to a non-euro area central bank in exchange for adequate euro-denominated collateral."[8] Among other things, the Fed, the BOJ, and the BOE each focused on propping up small- and medium-sized enterprises ("SMEs"). This included providing funds to commercial banks who were willing to grant loan extensions to SME borrowers on favorable terms.[9]

More broadly, central bank response measures generally have fallen into three categories:

1. Quantitative Easing: a type of central bank intervention that includes reducing interest rates and purchasing government bonds to reduce their returns at different maturities.[10]

2. Lending widely to banks, other financial institutions, and non-financial institutions.[11]

3. Encouraging financial institutions to offer loans to businesses adversely affected by the crisis.[12] This includes SMEs, a particularly vulnerable group of businesses for which some of the most popular recovery measures have been direct lending and loan guarantees.[13]

In sum, trillions of dollars, euros, yuan, and other major currencies have been used to bolster the global financial system and provide households and companies with necessary capital.[14] Such measures helped soften the impact of the economic turmoil caused by the global pandemic.[15]

In addition to these programs, central banks and finance authorities around the world sought to provide stimulus payments to their citizens, but with 31 percent

[7] *Id.* at 16.
[8] Isabel Schnabel, Member of the Eur. Cent. Bank Exec. Bd., The ECB's Policy Response to the COVID-19 Pandemic, Guest Lecture at the University of Chicago Booth School of Business 4 n.2 (Feb. 18, 2021) (available at https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210218~d8857e8daf.en.pdf).
[9] Cantú et al., *supra* note 5, at 12.
[10] Collins & Gagnon, *supra* note 1.
[11] *Id.*
[12] *Id.*
[13] KRIS BOSCHMANS ET AL., ONE YEAR OF SME AND ENTREPRENEURSHIP POLICY RESPONSES TO COVID-19: LESSONS LEARNED TO "BUILD BACK BETTER," OECD 3-4, 6 (2021).
[14] *See* Bartels, Uría & Finglass, *supra* note 2; Felicity Duncan, *Combatting COVID-19: How Central Banks Are Responding to the Crisis*, INTUITION (June 19, 2020), https://www.intuition.com/combatting-covid-19-how-central-banks-are-responding-to-the-crisis/.
[15] Duncan, *supra* note 15.

of the world's population unbanked,[16] governments had to determine how best to deliver benefits to these populations.

B. Stimulus Payments and the Use of Fintech to Achieve Greater Financial Inclusion to Curb the Economic Distress Caused by the COVID-19 Pandemic

As the pandemic progressed, numerous countries provided their citizens with supplementary financial support.[17] For example, as of May 2021, the U.S. Government had distributed $391 billion of non-refundable stimulus payments to its citizens.[18] Other jurisdictions responded in a similar fashion through the use of direct assistance initiatives.[19] Spain guaranteed basic income for lower-income families, and countries such as the United Kingdom, the Netherlands, and Germany contributed to funding employee salaries in an effort to avoid layoffs.[20]

Countries have differed in their approaches to the delivery of stimulus payments, with some of the most innovative solutions having been launched by emerging economies. The government of Togo created a cash transfer program entitled *Novissi* in response to the pandemic.[21] This app allowed for the direct distribution of stimulus payments to informal workers whose wages were jeopardized by the pandemic.[22] More than 116,000 people are now registered with the app, and over 13 billion CFA ($23 million USD) in funds have been dispersed.[23]

Pakistan is a second example of an emerging economy using its digital infrastructure to deliver benefits during the pandemic.[24] Citizens of Pakistan may submit applications for benefits using their mobile phones.[25] Such funds are then disbursed at 18,000 locations across the country, using the recipients' biometric

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[16] ASLI DEMIRGÜÇ-KUNT ET AL., THE GLOBAL FINDEX DATABASE 2017, THE WORLD BANK GRP. 39 (2017).
[17] Juliana Kaplan, *14 Countries that are Paying Their Workers During Quarantine—And How They Compare to America's $1,200 Stimulus Checks*, BUS. INSIDER (May 8, 2020, 12:08 PM), https://www.businessinsider.com/countries-offering-direct-payments-or-basic-income-in-corona-crisis-2020-4.
[18] Lorie Konish, *New Round of $1400 Stimulus Checks Brings Total Amount Sent to About $391 Billion*, CNBC, https://www.cnbc.com/2021/05/26/new-round-of-1400-stimulus-checks-brings-total-sent-to-391-billion.html (last updated May 27, 2021, 10:20 AM).
[19] Kaplan, *supra* note 17.
[20] *Id.*; *see also* Annette Weisbach, *Germany is Using a Familiar Weapon to Prevent Massive Layoffs*, CNBC, https://www.cnbc.com/2020/04/03/kurzarbeit-germany-is-using-a-familiar-weapon-to-prevent-layoffs.html (last updated Apr. 3, 2020, 4:30 AM).
[21] FRANCOIS JURD DE GIRANCOURT ET AL., HOW THE COVID-19 CRISIS MAY AFFECT ELECTRONIC PAYMENTS IN AFRICA, MCKINSEY & CO. 4 (2020).
[22] NOVISSI, *Home*, https://novissi.gouv.tg/en/home-new-en/ (last visited June 23, 2021).
[23] *Id.*; *CFA Franc BCEAO to US Dollar,* WISE, https://wise.com/us/currency-converter/xof-to-usd-rate (last visited July 1, 2021) (finding that 13,308,224,040 XOF (CFA) is equal to $23,904,232.02 USD as of July 1, 2021).
[24] ZIYAD CASSIM ET AL., THE $10 TRILLION RESCUE: HOW GOVERNMENTS CAN DELIVER IMPACT, MCKINSEY & CO. 10 (2020).
[25] *Id.*

information to verify their identities.[26] The government of Pakistan successfully reached 12 million households (approximately 80 million people) through the use of such digital avenues; close to 70% of the beneficiaries were women.[27]

Governments' willingness and ability to leverage digital payments technologies is an important step, as consumers around the world are moving towards digital channels for the provision of financial services.[28] This shift towards an increasingly contactless economy has been accelerated by the pandemic.[29] Research suggests that efforts should now be directed towards the dual goals of bolstering security measures for these technologies and increasing user awareness surrounding their potential risks.[30] The potential benefits of such efforts are twofold: First, they may help populations become proficient in the use of digital payment technologies; second, increased protections may lower the risks of fraud and cyberattacks and in turn promote confidence in the use of digital payment channels. Confidence in digital technologies may increase the efficacy of programs, such as the digital provision of stimulus payments, which promote financial inclusion for under- and unbanked populations.

C. Recommendations for Further Work

Due to both the scale of the pandemic and its ongoing impact, many avenues of research are on the table for further study. The following suggestions seem particularly ripe:

- Philanthropy and research institutions could conduct a comprehensive survey of efforts around the world to deliver stimulus payments (and other like benefits) through the use of digital technologies, with a particular focus on the most successful tactics for reaching under- and unbanked populations.

- Relatedly, researchers could examine the conditions under which central banks (or other authorities) act as a utility/service provider versus when they use their regulatory authority to promote private sector competition in the provision of such services. Such an examination could note the optimal circumstances for each role and provide case studies.

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[26] *Id.*
[27] *Id.*
[28] Dennis Gada, *Five Ways Fintech is Disrupting the Financial Services Industry*, FINEXTRA BLOG (Mar. 5, 2018), https://www.finextra.com/blogposting/15105/five-ways-fintech-is-disrupting-the-financial-services-industry.
[29] CASSIM ET AL., *supra* note 24, at 12.
[30] *Id.* at 10.

II. Advancing Financial Inclusion Policies

A. Defining Financial Inclusion

The definition of financial inclusion itself varies across international organizations. The Organisation for Economic Cooperation and Development ("OECD") writes that financial inclusion is reached through "affordable, timely and adequate access to regulated financial products and services and broadening their use by all segments of society."[31] In contrast, the World Bank posits the "first step" to financial inclusion is access to a transaction account which in turn opens the door to consumer access to other financial services.[32] The G20 Financial Indicators follow a similar approach to the World Bank, naming nine factors that point to the satisfaction of financial inclusion.[33] Developing a consistent definition of financial inclusion across such global organizations could pave the way for the harmonization of central bank policies to foster financial inclusion.

B. Measuring Financial Inclusion

The leading effort to measure financial inclusion is through the creation of the World Bank Global Findex database.[34] The World Bank indicators of financial inclusion stretch beyond those typically provided by brick-and-mortar banks: in addition to measuring the number, type, and usage of bank accounts, the Findex also reports the use of digital payments, such as those conducted through mobile money apps independent of traditional banking services.[35] This development underscores that simply having access to a bank account does not necessarily equate to financial inclusion. A case study illustrates this: although eighty percent

[31] OECD, FINANCIAL INCLUSION AND CONSUMER EMPOWERMENT IN SOUTHEAST ASIA 9 (2018) ("Financial inclusion refers to the process of promoting affordable, timely and adequate access to regulated financial products and services and broadening their use by all segments of society through the implementation of tailored existing and innovative approaches, including financial awareness and education, with a view to promote financial wellbeing as well as economic and social inclusion.").
[32] *Financial Inclusion Overview*, THE WORLD BANK GRP., https://www.worldbank.org/en/topic/financialinclusion/overview (last updated Oct. 2, 2018).
[33] *IMF Data: Financial Access Survey (FAS)*, IMF, https://data.imf.org/?sk=e5dcab7e-a5ca-4892-a6ea-598b5463a34c&sId=1412015057755 (last visited June 23, 2021); *see also* Adrienne Harris & Emma Macfarlane, *Redefining Financial Inclusion*, 18 MICH. J. PUB. AFF. 8, 8 (2021) ("Of these nine factors, five focus on the number of accounts or branches of 'commercial banks,' one on the 'number of ATMs,' and one on the number of 'registered mobile money agent outlets' (with each statistic showing the number per 100,000 adults).").
[34] *See* DEMIRGÜÇ-KUNT ET AL., *supra* note 16.
[35] *Id.* at 61, 91.

of Indian citizens hold a bank account,[36] nearly half of these accounts are inactive.[37] By focusing on the *usage* of accounts instead of mere possession—for example, through the Findex survey question of whether individuals use a mobile phone or internet to check their account balance[38]—the Findex results portray a more accurate picture of financial inclusion within the surveyed countries.

Regulatory sandboxes represent a second effort to evaluate the efficacy of financial inclusion projects. A regulatory sandbox is "a framework set up by a regulator that allows FinTech startups and other innovators to conduct live experiments in a controlled environment under a regulator's supervision."[39] Such frameworks are attractive as they allow for a balanced approach to innovation in fostering financial inclusion against the inherent risk that accompanies such efforts.[40] They also can serve as a conduit for collaboration between fintech firms and regulatory institutions such as central banks.[41] Sandboxes can be used to advance consumer protection in a controlled environment.

1. Case Study: Monetary Authority of Singapore

The Monetary Authority of Singapore ("MAS") has spearheaded two initiatives that advance financial inclusion policies through the use of regulatory sandboxes. First, in August 2019, MAS implemented a program called the Sandbox Express.[42] The Sandbox Express is a "pre-defined environment" that allows for market testing within 21 days of applications to MAS;[43] essentially, it is the creation of a sandbox (or version) to expedite the process of applying to the sandbox.[44] Its purpose is to streamline the process for applicants who wished to enter the MAS sandbox and eliminate the time-consuming, bureaucratic processes

[36] Ramesh Iyer, *Financial Inclusion in India is Soaring. Here's What Must Happen Next*, WORLD ECON. FORUM (Jan. 14, 2019), https://www.weforum.org/agenda/2019/01/financial-inclusion-in-india-is-soaring-heres-what-must- happen-next/.
[37] *At 48%, India Tops in Bank Users with Inactive Accounts, Says World Bank*, THE HINDU BUS. LINE, https://www.thehindubusinessline.com/money-and-banking/at-48-india-tops-in-bank- users-with-inactive-accounts-says-world-bank/article23606293.ece (last updated Apr. 19, 2018).
[38] DEMIRGÜÇ-KUNT ET AL., *supra* note 16, at 61.
[39] Ivo Jenik, *Regulatory Sandboxes: Potential for Financial Inclusion?*, CONSULTATIVE GRP. TO ASSIST THE POOR BLOG (Aug. 17, 2017), https://www.cgap.org/blog/regulatory-sandboxes-potential-financial-inclusion.
[40] *Id*.
[41] Sharmista Appaya & Mahjabeen Haji, *Four years and Counting: What We've Learned from Regulatory Sandboxes*, THE WORLD BANK BLOGS (Nov. 18, 2020), https://blogs.worldbank.org/psd/four-years-and-counting-what-weve-learned-regulatory-sandboxes.
[42] THE WORLD BANK GRP., GLOBAL EXPERIENCES FROM REGULATORY SANDBOXES 42 (2020).
[43] *Sandbox Express*, MONETARY AUTH. OF SING., https://www.mas.gov.sg/development/fintech/sandbox-express (last updated May 20, 2021).
[44] THE WORLD BANK GRP., *supra* note 42, at 42 ("Singapore's Sandbox Express is intended to help encourage and speed up processes for experimentation and adoption of innovative technologies in the financial sector, specifically for firms with low and well-understood risks, allowing them to embark on their experiments more quickly within the predefined sandbox.").

that restricted the universe of applicants.[45] This, in turn, will help fast track technological innovation in the financial sector, potentially spurring initiatives that will bolster nationwide financial inclusion.[46]

Second, the MAS has set forth four sets of proposed measurements to assess both the efficacy of regulatory sandboxes writ large and how the contributions of firms within regulatory sandboxes promote financial inclusion. The four sets of proposed measurements are country-level financial sector outcomes, regulatory outcomes, firm level outcomes, and operational and institutional outcomes.[47]

The MAS recommends that these four measurements should be assessed over the course of a firm's participation in the sandbox. At the initial measurement stage, an applicant's feasibility for the sandbox is assessed: How will it enhance the policy goals of the sandbox?[48] During the "ongoing monitoring" stage, assessments measure criteria such as: "(i) continued suitability and relevance of each sandbox firm and cohort against sandbox metrics; (ii) direct and indirect institutional changes that can be attributed to the sandbox; and (iii) operational efficiency of the sandbox process, both for regulators and for firms that move through the sandbox process."[49] Finally, during the concluding evaluation, the impact of the sandbox on the broader financial sector and national goals is assessed, including its contributions to national financial inclusion progress.[50] The MAS framework is desirable for its dual-level measurement scheme. The MAS proposal not only assesses the capabilities of the individual firms themselves towards increasing financial inclusion, but also the efficacy of the sandbox itself in providing a platform for the firm to reach MAS goals.

C. Harmonizing Central Bank Financial Inclusion Policies

Standard Setting Bodies ("SSBs") are a useful tool for identifying central bank policies that promote financial inclusion and coordinating the harmonization of such policies globally.[51] SSBs include organizations such as the Financial Stability Board ("FSB"), the Basel Committee on Banking Supervision ("BCBS"), and the World Bank.[52] Experts recognize that the harmonization of policy frameworks to promote financial inclusion is especially difficult in the face of differing central bank structures, along with the shifting nature (and growing

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[45] *Id*.
[46] *See* Jenik, *supra* note 39.
[47] THE WORLD BANK GRP., *supra* note 42, at 42.
[48] *Id.*
[49] *Id*. at 43.
[50] *Id*.
[51] *See* GLOB. P'SHIP FOR FIN. INCLUSION, GLOBAL STANDARD-SETTING BODIES AND FINANCIAL INCLUSION 13-45, 90-92 (2016).
[52] *Id*. at 13; *Standard-Setting Bodies in the Compendium*, FIN. STABILITY BD., https://www.fsb.org/work-of-the-fsb/about-the-compendium-of-standards/wssb/ (last visited June 24, 2021).

impact) of fintech firms.[53] Collaboration among the SSBs could help provide global guidance and avoid the pitfalls of competing policy objectives introduced by separate initiatives.[54] For example, the definition of financial inclusion provided by the World Bank implies that the highest priority in achieving financial inclusion is an individual's acquisition of and access to a transaction account.[55] In contrast, the "essential criteria" for financial inclusion provided by BCBS emphasize a range of other objectives applicable to central banks, including corporate governance, risk management processes, capital adequacy, and liquidity risks.[56] Increased dialogue may facilitate a deeper, shared understanding of factors that lead to successful financial inclusion efforts across domestic bodies.

1. Case Study: Financial Stability Board

One successful example of efforts to harmonize financial inclusion efforts is that of the FSB, whose membership includes all the G20 countries and European Union, along with ten international organizations such as the World Bank, Organisation for Economic Co-operation and Development ("OECD"), Bank of International Settlements ("BIS"), and International Monetary Fund ("IMF").[57] Among the FSB's most successful initiatives is the Global Partnership for Financial Inclusion ("GPFI"), a mandate to establish financial inclusion as a goal alongside financial stability, financial integrity, and financial consumer protection.[58] The GPFI has itself developed a set of "Key Indicators" of financial inclusion, since endorsed by the G20 leaders.[59] In addition to harmonizing notable characteristics of a financially inclusive society, the Key Indicators may help central banks better develop agendas to produce policies to satisfy these goals.

2. Case Study: Alliance for Financial Inclusion

Offshoots of the Key Indicators have also been developed by central banks themselves. For example, the Alliance for Financial Inclusion ("AFI") has identified a separate set of key indicators to assess the financial inclusion of Small and

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[53] GLOB. P'SHIP FOR FIN. INCLUSION, GLOBAL STANDARD-SETTING BODIES AND FINANCIAL INCLUSION, *supra* note 51, at 91.
[54] *See id*. at 90-91.
[55] *Financial Inclusion Overview*, *supra* note 32 (noting in its definition of financial inclusion that "[b]eing able to have access to a transaction account is a first step toward broader financial inclusion since a transaction account allows people to store money, and send and receive payments").
[56] *See* BASEL COMM. ON BANKING SUPERVISION, GUIDANCE ON THE APPLICATION OF THE CORE PRINCIPLES FOR EFFECTIVE BANKING SUPERVISION TO THE REGULATION AND SUPERVISION OF INSTITUTIONS RELEVANT TO FINANCIAL INCLUSION, BANK FOR INT'L SETTLEMENTS 18-21, 25 (2016).
[57] GLOB. P'SHIP FOR FIN. INCLUSION, GLOBAL STANDARD-SETTING BODIES AND FINANCIAL INCLUSION, *supra* note 51, at 13 & n.29.
[58] *Id*. at 14.
[59] *G20 Financial Inclusion Indicators*, GLOB. P'SHIP FOR FIN. INCLUSION, https://datatopics.worldbank.org/g20fidata/ (last visited June 24, 2021).

Medium Enterprises ("SMEs").[60] The AFI SME Finance Working Group was composed of representatives from 42 countries and included those from central banks, regulatory authorities, treasury departments, and ministries of economy and finance.[61] The goal in developing such indicators was both to "advance a shared understanding of how different dimensions of financial services contribute to the development of sustainable SMEs in developing and emerging countries" and "to identify policy frameworks and interventions that enable and enhance the socio-economic role of SMEs."[62]

In addition to the SME Key Indicators, AFI set forth a "global and measurable set of commitments" to financial inclusion entitled the Maya Declaration in 2011.[63] A commitment to the Maya Declaration "is a means of championing financial inclusion and contributing to a range of Sustainable Development Goals…including…no poverty…gender equality…decent work and economic growth…and climate action."[64] The declaration has since been endorsed by more than 70 developing and emerging-economy nations,[65] with individual central banks committing themselves to quantifiable targets. For example, the National Bank of Cambodia committed to "reduce the financial exclusion rate of women from 27% to 13% by 2025," and the Bank of Zambia undertook to "reduce the gender gap for formal financial services inclusion from 10% to 5% by 2022."[66]

D. Central Bank Initiatives

Central banks across the world have undertaken initiatives to expand and facilitate financial inclusion.[67] Some of the initiatives include the expansion of financial access in rural regions, central bank experimentation with Open Application Interfaces ("APIs"), and the creation of central bank digital currencies.

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[60] *Agreement on Key Indicators to Track Financial Inclusion of Small Businesses*, GLOB. P'SHIP FOR FIN. INCLUSION (Jan. 17, 2016, 3:08 PM), https://www.gpfi.org/news/agreement-key-indicators-track-financial-inclusion-small-businesses.
[61] *Id*.
[62] ALL. FOR FIN. INCLUSION, SME FINANCIAL INCLUSION INDICATORS BASE SET (SME FINANCE BASE SET) 1 (2015).
[63] A QUICK GUIDE TO THE MAYA DECLARATION ON FINANCIAL INCLUSION, ALL. FOR FIN. INCLUSION 1 (2012).
[64] *The Maya Declaration*, ALL. FOR FIN. INCLUSION, https://www.afi-global.org/global-voice/maya-declaration/ (last visited June 25, 2021).
[65] *Id.*; *see also* Adrienne A. Harris & Michael S. Barr, *Central Bank of the Future Working Paper 1* 2 (Univ. of Mich. Ctr. on Fin., Law & Policy, Working Paper No. 1, 2019).
[66] *Maya Declaration Continues to Evolve with Financial Inclusion Commitments from 66 Countries,* ALL. FOR FIN. INCLUSION (Nov. 6, 2017), https://www.afi-global.org/newsroom/news/maya-declaration-continues-to-evolve-with-financial-inclusion-commitments-from-66-countries/.
[67] Harris & Barr, *Central Bank of the Future Working Paper 1*, *supra* note 65, at 4; *see also* Univ. of Mich. Ctr. on Fin., Law & Policy, Financial Inclusion Mandates (Worldwide) (Jan. 24, 2021) (dataset available at https://umich.app.box.com/s/h0z26gr57l27jv35ajw68t00gop8z7zy).

1. Case Study: People's Bank of China

The People's Bank of China ("PBOC") began introducing guidelines and policy strategies in 2011 that aim to promote financial inclusion in rural areas.[68] In 2011, PBOC's *Notice on Promoting Bank-card Withdrawal Services for Rural Residents* expanded pilot projects that facilitated rural access to and engagement with financial services.[69] This focused on creating "cashout points," remittances, billpay, and peer-to-peer ("P2P") transfers for rural users through agent-based service centers and allowed non-bank digital payment providers to create such agent points with a "bank card acquirer" license.[70] Subsequent guidelines have worked to expand rural credit cooperatives, stabilize banking system liquidity, and centralize digital payment systems on one platform for efficiency and transactional security.[71]

2. Case Study: Hong Kong Monetary Authority

In 2018, the Hong Kong Monetary Authority ("HKMA") introduced Open API functions with the publication of its "Open Application Interface Framework for the Banking Sector" and simultaneous launch of Open API on its official website.[72] Open APIs "allow[] . . . software program[s] to 'talk' with one another."[73] They facilitate financial inclusion by "improv[ing] the economics of a range of business models and stimulat[ing] innovation in the digital finance ecosystem."[74] This in turn creates a choice of more financial services for low-income consumers through increased competition.[75] The HKMA's four-phased approach gradually increased the Open API functions over time; its four phases are divided into categories focused on: (i) product information, (ii) customer acquisition, (iii) account information, and (iv) transactions.[76] More specifically, each stage envisions phased modifications which will create increased consumer choice in areas such as deposit rates, credit card

[68] Harris & Bar, *Central Bank of the Future Working Paper 1*, *supra* note 65, at 9.
[69] *Id*.
[70] China's CICO's Agent Revolution: From Cooperatives to Social Commerce, Presentation with the Consultative Group to Assist the Poor 15 (Dec. 2020) (presentation available at https://www.findevgateway.org/sites/default/files/users/user331/2020_12_CGAP_Background_Deck_CICO_China.pdf).
[71] Harris & Barr, *Central Bank of the Future Working Paper 1*, *supra* note 65, at 9-10.
[72] MICHAEL BARR, HOWELL E. JACKSON & MARGARET TAHYAR, FINANCIAL REGULATION: LAW AND POLICY 868 (3d ed., 2021); *see also Open API Framework for the Banking Sector and the Launch of Open API on HKMA's Website*, H.K. MONETARY AUTH. (July 18, 2018), https://www.hkma.gov.hk/eng/news-and-media/press-releases/2018/07/20180718-5/.
[73] *Open APIs for Digital Finance,* CONSULTATIVE GRP. TO ASSIST THE POOR, https://www.cgap.org/topics/collections/open-apis (last visited June 25, 2021).
[74] *Id*.
[75] *Id*.
[76] *Phased Approach*, H.K. MONETARY AUTH., https://www.hkma.gov.hk/eng/key-functions/international-financial-centre/fintech/open-application-programming-interface-api-for-the-banking-sector/phase-approach/ (last updated June 4, 2021).

offerings, loans, transaction records, and payments and transfers.[77] As of January 2021, Open APIs have been regularly used by over 50% of Hong Kong banks.[78]

3. Case Study: Monetary Authority of Singapore

The MAS created a trial form of central bank digital currency ("CBDC") under the name Project Ubin.[79] Project Ubin was described as "a collaborative project with the industry to explore the use of Blockchain and Distributed Ledger Technology (DLT) for clearing and settlement of payments and securities."[80] The success of Project Ubin has underscored the possibility of "how a tokenized Singaporean dollar could function as a means of daily inter-bank settlement" and– as contended by its proponents–showcased the possibility of implementing CBDCs worldwide.[81] Moreover, MAS has since committed to sharing the "policy perspectives and technical guidance" from its Project Ubin development efforts with the Mojaloop Foundation, an entity with the mission of "increas[ing] financial inclusion by empowering organizations creating interoperable payment systems to enable digital financial services for all."[82] Specifically, MAS will use the expertise gained from Project Ubin to collaborate on a research initiative "offering the underserved access to 'affordable' financial services via digital currency based settlement systems and foundational digital infrastructure."[83]

The implementation of CBDC initiatives like Project Ubin may facilitate financial inclusion in a number of ways: CBDCs may expand access to traditional bank accounts by providing low- or no-fee account options; they can increase the speed of transactions by providing real-time payment settlements, benefiting workers who rely on payday lenders or check cashers and otherwise live paycheck to paycheck; they can eliminate excess fees that private payment system operators may levy; and they can reduce cross-border remittance costs as well as increase the reliability of payment deliveries.[84] At the same time, CBDC may pose risks to the

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[77] *Id.*
[78] *Open Banking in Hong Kong: Speaker Overview*, OLIVER WYMAN, INC., https://www.oliverwyman.com/our-expertise/events/2021/jan/open-banking-in-hong-kong.html (last visited June 25, 2021).
[79] *Project Ubin: Central Bank Digital Money using Distributed Ledger Technology*, MONETARY AUTH. OF SING., https://www.mas.gov.sg/schemes-and-initiatives/project-ubin (last updated Dec. 8, 2020).
[80] *Id.*
[81] *Project Ubin: Blockchain Case Study for Banking in Singapore*, CONSENSYS, https://consensys.net/blockchain-use-cases/finance/project-ubin/ (last visited June 25, 2021).
[82] Omar Faridi, *Monetary Authority of Singapore and Mojaloop Foundation to Support the Financially Underserved with Digital Currency Settlement Systems*, CROWDFUND INSIDER (May 26, 2021, 10:05 PM), https://www.crowdfundinsider.com/2021/05/175844-monetary-authority-of-singapore-and-mojaloop-foundation-to-support-the-financially-underserved-with-digital-currency-settlement-systems/.
[83] *Id.*
[84] Michael S. Barr, Adrienne A. Harris, Lev Menand, & Wenqi Xu, *Building the Payment System of the Future: How Central Banks Can Improve Payments to Enhance Financial Inclusion* 2-3 (Univ. of Mich. Ctr. on Fin., Law & Policy, Working Paper No. 3, 2020).

financial system, alter credit intermediation, and may not appreciably increase financial inclusion, as we discussed in an earlier white paper.[85] CBDC initiatives are underway in over 70 countries,[86] including China, Switzerland, Sweden, the Bahamas, France, Japan, the Philippines, and Turkey.[87]

D. Recommendations for Further Work

The importance of good data has perhaps never been more clear. The following recommendation follows from this premise:

- Researchers and policy-makers could catalogue and categorize definitions of financial inclusion by country, region or by existing coalitions and measure improvement based on each definition over a set period of time. Then, compare those metrics to results using a different category of definition. For instance, where a country defines inclusion as access to a traditional bank account, measure improvements based on this definition over, for example, the prior ten years. Then, measure inclusion based on a usage definition, as opposed to an access definition. Document any conclusions that can be drawn by comparing such metrics across countries.

III. Regulatory Evolution

Fintech has spurred technological innovation that has disrupted the financial services system. Many innovations have added value through improved customer experiences, lower costs, and services to low-income households. Many new technologies, however, come with challenges, including predatory practices that harm consumers and concerns about regulatory arbitrage and financial stability risks, that may require central banks and other regulators to reconsider regulatory structures and, potentially, how they execute their core mandates.

A. The Fintech Revolution

A large factor in the development of fintech—smartphones and the mobility they provide—has prompted faster, more accessible banking services.[88] These technological advances have prompted new actors to enter the financial services industry and to build new products and modes of delivery. Some challenger banks, such as Brazil's Nubank, Europe's Monzo, or the U.S.'s Chime, have gained

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[85] *See generally* Michael S. Barr, Adrienne A. Harris, Lev Menand & Karin Thrasher, *Should Central Banks Use Distributed Ledger Technology and Digital Currencies to Advance Financial Inclusion?* (Univ. of Mich. Ctr. on Fin., Law & Policy, Working Paper No. 7, 2021).
[86] *The Rise of Central Bank Digital Currencies,* ATLANTIC COUNCIL (Apr. 20, 2021), https://www.atlanticcouncil.org/blogs/econographics/the-rise-of-central-bank-digital-currencies/.
[87] Becky, *The Rise of Crypto: Countries with Their Own CBDCS*, COIN INSIDER (Mar. 24, 2021), https://www.coininsider.com/the-rise-of-crypto-countries-with-their-own-cbdcs/.
[88] Gada, *supra* note 28.

significant market share.[89] Additionally, "big techs," or firms such as Google, Alibaba, and Amazon that have incorporated financial services into a larger business model, are quickly becoming major players through the use of the "data-network-activities loop."[90] More specifically, big techs typically have large data stores and networks, which allow them to iterate, tailoring their services, drawing in more users, and using data to further tailor and add new services.[91] Moreover, fintech startups have more than doubled in number in the last three years.[92] Growth in fintech has been made possible by increased investment. From 2010 to 2019, global investment in the fintech industry jumped markedly from $9 billion to $168 billion.[93] Even during the COVID-19 pandemic, global fintech investment in 2020 was relatively robust, reaching $105 billion overall and increasing from $40 billion in 2019 to $42 billion in VC investments.[94]

With the addition of new players in the financial services space, incumbent institutions, and banks in particular, have been forced to adjust to the greater competition.[95] Many fintech and big tech firms seek to reach customers that banks traditionally have not.[96] For example, new technologies provide the ability to use alternative data for lending decisions which reduces costs and provides greater access to financial services, including to those without bank accounts.[97] Further,

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[89] *Does the Future of Banking Lie in the Hands of Neobanks?,* INT'L BANKER (Sept. 15, 2020), https://internationalbanker.com/banking/does-the-future-of-banking-lie-in-the-hands-of-neobanks/; *DEEP DIVE with Chime Bank: Top Neobank in the U.S.,* FINTECHTRIS (Jan. 5, 2020), https://www.fintechtris.com/blog/chime-bank-top-neobank-in-us; *see also* OECD DIRECTORATE FOR FIN. & ENTER. AFFAIRS COMPETITION COMM., EXECUTIVE SUMMARY OF THE ROUNDTABLE ON DIGITAL DISRUPTION IN FINANCIAL MARKETS 2 (2020).

[90] BANK FOR INT'L SETTLEMENTS, BIS ANNUAL ECONOMIC REPORT 2019 - BIG TECH IN FINANCE: OPPORTUNITIES AND RISKS 55 (2019).

[91] *Id*. at 55, 62.

[92] *Number of Fintech Startups Worldwide from 2018 to February 2021, by Region*, STATISTA RESEARCH DEP'T (Mar. 17, 2021), https://www.statista.com/statistics/893954/number-fintech-startups-by-region/ (finding that there were over 25,000 fintech startups worldwide as of February 2021).

[93] *Total Value of Investments into Fintech Companies Worldwide from 2010 to 2020*, STATISTA RESEARCH DEP'T (Mar. 30, 2021), https://www.statista.com/statistics/719385/investments-into-fintech-companies-globally/.

[94] *Investment in Fintech More Than Doubles Despite Pandemic: KPMG Report*, THE FINTECH TIMES (Mar. 1, 2021), https://thefintechtimes.com/investment-in-fintech-more-than-doubles-kpmg-report-reveals/.

[95] OECD DIRECTORATE FOR FIN. & ENTER. AFFAIRS COMPETITION COMM., *supra* note 89, at 2.

[96] *Id*. at 2-3; BANK FOR INT'L SETTLEMENTS, BIS ANNUAL ECONOMIC REPORT 2019 - BIG TECH IN FINANCE: OPPORTUNITIES AND RISKS, *supra* note 90, at 62.

[97] BANK FOR INT'L SETTLEMENTS, BIS ANNUAL ECONOMIC REPORT 2019 - BIG TECH IN FINANCE: OPPORTUNITIES AND RISKS, *supra* note 90, at 64-65; Dariusz Wójcik, *Financial Geography II: The Impacts of FinTech – Financial Sector and Centres, Regulation and Stability, Inclusion and Governance*, SAGE J.: PROGRESS HUM. GEOGRAPHY, Oct. 2020, at 5.

fintech services may give consumers increased flexibility and control by speeding up access to and movement of funds.[98]

Banks have responded to fintechs' and big techs' rising market share in several ways. Some banks have partnered with new firms, allowing both parties to benefit—banks from processes unhampered by legacy systems and fintechs from the established networks of trust.[99] Others are attempting to preempt the competition by deploying technological advances to provide better banking services of their own.[100]

The explosion of fintech has provided many new opportunities. Financial innovations have proven useful in unbundling (and in some cases rebundling) services, creating more efficient business models and answering the needs of a growingly tech-oriented customer base with cheaper, more robust financial solutions.[101] The rise of fintech, however, has created questions for financial regulation; financial stability; consumer protection; financial inclusion; and consequently, for central banks.

B. Financial Regulation, Financial Inclusion, and the Evolving Role of the Central Bank and Other Financial Regulators

The rise of fintech presents myriad regulatory challenges for regulators and policymakers. Distorting the lines between banks and other types of financial firms, many fintechs fall outside of the traditional regulatory perimeter, entering the market relatively unregulated.[102] This presents the potential for new market players to skirt traditional consumer protections or engage in activity that has the potential to damage financial stability and market integrity.[103] Fintech also creates cybersecurity concerns; as consumers increasingly look to online and mobile applications to access financial services, they often unknowingly share personal

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[98] *See generally* Barr, Harris, Menand & Xu, *supra* note 84 (discussing cryptocurrencies, tokenization, e-money, and other fintech developments that have been and may be used to foster financial inclusion through greater and faster access to funds).
[99] OECD DIRECTORATE FOR FIN. & ENTER. AFFAIRS COMPETITION COMM., *supra* note 89, at 3.
[100] *Id*. at 3.
[101] *See* FIN. STABILITY BD., FINANCIAL STABILITY IMPLICATIONS FROM FINTECH: SUPERVISORY AND REGULATORY ISSUES THAT MERIT AUTHORITIES' ATTENTION 13 (2017); OECD DIRECTORATE FOR FIN. & ENTER. AFFAIRS COMPETITION COMM., *supra* note 89, at 2; Wójcik, *supra* note 97, at 2.
[102] Wójcik, *supra* note 97, at 3-4. "The unbundling of financial services potentially enabled by technology may mean that new entrants, or incumbents, are better able to separate the provision of many financial services from more traditional bank activities . . . . This could lead to a change in the composition of service providers and result in a greater share of activity falling outside of the regulatory perimeter . . . . " FIN. STABILITY BD., *supra* note 101, at 12.
[103] *See* Wójcik, *supra* note 97, at 3-4; *see generally* Douglas W. Arner et al., *Fintech and Regtech: Enabling Innovation While Preserving Financial Stability*, 18 GEO. J. INT'L AFF. 47 (2017) (discussing the challenges new fintechs bring to consumer protection and financial stability as well as current regulatory approaches and opportunities).

data[104] and thereby create more access points to a highly interconnected and complex system.[105] Where financial inclusion is concerned, moving to fintech solutions too quickly risks potential abuse of individual data, predatory practices, or the exclusion of those who may not be as financially literate, lack access to smart phones and broadband internet, or who still rely predominantly on cash.[106]

The growth of fintech comes at a time of relative regulatory expansion motivated by the Global Financial Crisis of 2008.[107] Weighing the potential risks and benefits of fintech is a challenge for regulators, as they seek to address risks while not hampering the benefits of innovation.[108] To help strike this balance, several central banks and other financial regulators have, for example, begun experimenting with regulatory sandboxes.[109] For instance, the Monetary Authority of Singapore ("MAS") states that its regulatory sandbox "can help to encourage more FinTech experimentation within a well-defined space and duration where MAS will provide the requisite regulatory support . . . . "[110] Firms must meet certain criteria like proposing services which include "new or emerging technology," use "existing technology in an innovative way," are scalable, and which incorporate an "acceptable exit and transition strategy."[111] The Financial Conduct Authority ("FCA") in the U.K. also launched a regulatory sandbox which has hosted 108 fintechs,[112] with the businesses in the sixth cohort announced in July of last year.[113] This cohort will focus on financial inclusion and greener finance.[114]

Similarly, the Bank of Sierra Leone launched a sandbox initiative in 2018 with the goal of advancing financial inclusion in addition to financial stability and consumer protection.[115] The sandbox admitted four fintechs including Icommit,

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[104] *See generally* Michael S. Barr, Abigail DeHart & Andrew Kang, *Consumer Autonomy and Pathways to Portability in Banking and Financial Services* (Univ. of Mich. Ctr. on Fin, Law, & Policy, Working Paper No. 1, 2019) (discussing consumer financial data legal frameworks, risks, and methods of collection).
[105] Wójcik, *supra* note 97, at 5.
[106] *See id*. at 5-6.
[107] Arner et al., *supra* note 103, at 47-48.
[108] *Id*. at 48; *see also* Michael S. Barr, *Innovation & Regulation: Some Preliminary Observations*, *in* ACHIEVING FINANCIAL STABILITY: CHALLENGES TO PRUDENTIAL REGULATION 239-248 (Douglas D. Evanhoff et al., eds., 2017).
[109] *Id*.
[110] MONETARY AUTH. OF SING., FINTECH REGULATORY SANDBOX GUIDELINES 4 (2016).
[111] *Id.* at 5-6.
[112] Victor Chatenay, *Why UK Regulatory Sandboxes are still Beneficial Despite 22% Shutdown Rate Among Fintechs*, BUS. INSIDER (Apr. 27, 2021, 9:00 AM), https://www.businessinsider.com/fintechs-should-still-participate-in-regulatory-sandboxes-2021-4. While the FCA's sandbox has been found to have a 22% shutdown rate among participants, this rate is significantly better than the 60% rate at which startups typically fail in their first three years in the UK. *Id*.
[113] FIN. CONDUCT AUTH., *Regulatory Sandbox – Cohort 6*, https://www.fca.org.uk/firms/regulatory-sandbox/regulatory-sandbox-cohort-6 (last updated Oct. 14, 2020).
[114] *Id*.
[115] Leah Ngari, *Regulatory Sandboxes in Africa*, EMPOWER AFRICA, https://www.empowerafrica.com/regulatory-sandboxes-in-africa/ (last visited May 24, 2021); *Sierra*

which provides mobile savings services for farmers during off seasons, and InvestED, a financial literacy and business education app that connects entrepreneurs to better lending opportunities.[116] The Bank of Jamaica issued regulatory sandbox guidelines in June of 2020 also with a financial inclusion requirement.[117] The creation of the sandbox was prompted by the lack of financial solutions for the unbanked, an issue accentuated by the inability to provide funds to some during the COVID-19 pandemic and which has prompted a partnership with eCurrency Mint to pilot a CBDC.[118]

The way in which regulation evolves varies by jurisdiction,[119] depending on policy and regulatory goals. The OECD summarizes likely regulatory considerations including: "whether to regulate the action (e.g. lending), as opposed to the agent (the bank)"[120]; "how to handle new entrants (new regulation *versus* old framework);" "determine at what level should one regulate (regulate the firm *versus* regulate the network);" and "what should be the main focus of the regulator's mandate (consumer protection *versus* financial stability *versus* prudential regulation *versus* competition)."[121] While each jurisdiction makes its own determinations, greater connectivity and a digital financial system also requires greater international cooperation,[122] often increasing the complexity of the regulatory challenge.

Jurisdictions will also have to consider how fintech has affected the role of central banks. In particular, fintech has led to more and different types of financial entities falling under central bank authority.[123] For example, the Federal Reserve recently proposed guidelines for allowing fintech firms to access its payments system, balancing the incorporation of "novel institutions" with ensuring "the safety

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Leone Becomes the Second Country in Africa to Launch the Sandbox Framework to Test FinTech Innovations, UNITED NATIONS CAPITAL DEV. FUND (Apr. 10, 2018), https://www.uncdf.org/article/3486/sierra-leone-becomes-the-second-country-in-africa-to-launch-the-sandbox-framework-to-test-fintech-innovations.

[116] *Four FinTechs Approved to Enter the Sierra Leone Sandbox Programme*, UNITED NATIONS CAPITAL DEV. FUND (May 15, 2018), https://www.uncdf.org/article/3635/four-fintechs-approved-to-enter-the-sierra-leone-sandbox-programme.

[117] BANK OF JAM., FINTECH REGULATORY SANDBOX GUIDELINES 9-10 (2020).

[118] *BOJ Sandbox is No Plaything*, JAM. OBSERVER (Aug. 26, 2020), https://www.jamaicaobserver.com/digital-life/boj-sandbox_201042; Tanzeel Akhtar, *Jamaica's Central Bank to Pilot CBDC Beginning in May*, COINDESK, https://www.coindesk.com/jamaica-central-bank-pilot-cbdc-may (last updated Mar. 24, 2021, 11:57 AM).

[119] *See* FIN. STABILITY BD., *supra* note 101, at 24-25.

[120] OECD DIRECTORATE FOR FIN. & ENTER. AFFAIRS COMPETITION COMM., *supra* note 89, at 5 ("This would contribute to establishing a level playing field, while still regulating new and old, entrants and incumbents, in a manner that does not skew the market towards the one or the other, and with a similar regulatory burden.").

[121] *Id*. at 5 (emphasis in original).

[122] *See* FIN. STABILITY BD., *supra* note 101, at 1.

[123] Adrienne A. Harris & Michael S. Barr, *Central Bank of the Future Working Paper 2* 2 (Univ. of Mich. Ctr. on Fin., Law & Policy, Working Paper No. 2, 2020).

and soundness of the banking system."[124] Additionally, fintech provides central banks the opportunity to take on new functions, such as promoting equality and greener finance.[125] A recent conference hosted by the Alliance for Innovative Regulation illustrates how fintech can allow regulators and banks to better reach and aid disadvantaged groups.[126] This conference addressed the challenges faced by women, who have been disproportionately affected by the COVID-19 pandemic.[127] The conference brought together banks, regulators, and fintech experts to discuss these challenges, current solutions and possible new solutions.[128] Overall, central banks will have to consider how they will innovate and in what ways they will be willing to expand their core mandates to include technological innovation and financial inclusion.[129]

C. Recommendations for Further Work

Several sandboxes have focused on financial inclusion. Such work is an indication that at least some central banks see a connection between their regulatory mandate, fintech, and financial inclusion.

Therefore, key, discrete areas for further research and exploration include:

- Researchers could catalogue and study central bank (and other financial regulatory authority) sandboxes, with special attention paid to those focused on financial inclusion, and highlight particular success stories where sandboxes resulted in mission-oriented companies reaching market successfully as a result of the companies' participation in the sandbox. Based on the catalogue and success stories, philanthropies and researchers could create a set of best practices that other regulatory authorities could implement.

- Similarly, researchers could examine central banks' regulation of non-bank financial services providers—including, but not limited to, payment providers—to assess how different central banks around the world have defined their regulatory perimeter. Such an examination

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[124] *Press Release: Federal Reserve Board Invites Public Comment on Proposed Guidelines to Evaluate Requests for Accounts and Payment Services at Federal Reserve Banks*, BD. OF GOVERNORS OF THE FED. RESERVE SYS., https://www.federalreserve.gov/newsevents/pressreleases/bcreg20210505a.htm (last updated May 5, 2021).
[125] Harris & Barr, *Central Bank of the Future Working Paper 2*, *supra* note 123, at 1; *see* ALL. FOR INNOVATIVE REGULATION, *Home*, https://regulationinnovation.org/ (last visited June 11, 2021).
[126] ALL. FOR INNOVATIVE REGULATION, *Women's Economic Empowerment TechSprint & Conference*, https://regulationinnovation.org/womens_empowerment_sprint/ (last visited June 11, 2021).
[127] *Id.*
[128] *Id.*; Francesca Hobson, *Women's Economic Empowerment TechSprint*, WOMEN IN IDENTITY (Feb. 17, 2021), https://womeninidentity.org/event/womens-economic-empowerment-techsprint/.
[129] *See generally* Harris & Barr, *Central Bank of the Future Working Paper 2*, *supra* note 123.

should include assessment of the language or tools used to expand or contract the perimeter and the rationale for doing so.

IV. Disruptive Technology: Potential Benefits and Regulatory Concerns

As fintech evolves, central banks will have to adapt their regulations to meet the consequent challenges and opportunities. Throughout the course of this project, two areas emerged as areas that central banks should especially consider for regulatory attention: artificial intelligence ("AI"), as well as digital currency and distributed ledger technology ("DLT"). As central banks adapt regulations, they should consider how such adaptations could foster financial inclusion.

A. Artificial Intelligence

The Bank for International Settlements ("BIS") identifies four main sources of big data used by central banks and other financial institutions including internet-based indicators, commercial datasets, administrative records, and financial market indicators.[130] Making productive use of data is where AI plays a role. Machine learning algorithms, a subset of AI frequently used in financial services, are provided practice datasets, use these datasets to develop pattern recognition and improve accuracy, and make predictions on the basis of new financial data.[131]

Central banks can interface with AI in three different ways. First, central banks can regulate the use of AI. Central banks also can use AI to monitor and regulate financial systems. Lastly, central banks can use AI to execute their other mandates. In other words, not only is it imperative that central banks regulate the use of AI, but it is also important that central banks begin to understand how they might use AI themselves.

Though AI presents many opportunities for financial services, this evolving technology presents several inherent risks as well, which could be mitigated by central bank oversight. Most often discussed are biases that seep into algorithmic models in different ways, including through the historical datasets from which algorithms learn and through the humans who create the models.[132] A common example is the use of AI in credit and lending decisions.[133] Algorithmic models can

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[130] OKIRIZA WIBISONO ET AL., IRVING FISHER COMM. BULLETIN NO. 50: THE USE OF BIG DATA ANALYTICS AND ARTIFICIAL INTELLIGENCE IN CENTRAL BANKING, BANK FOR INT'L SETTLEMENTS 2, 4 (2019).

[131] *Id*. at 6; *see also* IBM CLOUD EDUC., *Machine Learning* (July 15, 2020), https://www.ibm.com/cloud/learn/machine-learning. There are many types of algorithms, all of which learn in different ways. *See id*.; IBM CLOUD EDUC., *supra.*

[132] Luke Scanlon, *AI in Financial Services: Addressing the Risk of Bias*, PISENT MASONS LLP (July 8, 2020, 3:24 PM), https://www.pinsentmasons.com/out-law/analysis/ai-financial-services-risk-of-bias.

[133] *See, e.g.,* Carly Coleman, *AI in Credit Decision-Making is Promising, but Beware of Hidden Biases, Fed Warns*, LOWENSTEIN SANDLER LLP BLOG (Jan. 19, 2021), http://www.lowenstein.com/news-insights/publications/blogs/capital-markets-litigation/ai-in-credit-decision-making-is-promising-but-beware-of-hidden-biases-fed-warns; Ruairi O'Donnellan, *Racist*

enable greater lending services to the unbanked and underbanked by mining nontraditional sources of data such as address history, education, behavioral information, rent payment history, and internet browser history.[134] However, such data may also contain hidden proxies for race, gender, and class[135] (as well as raising privacy concerns).[136] This presents the opportunity for an algorithm to perpetuate existing patterns of discrimination.[137] Further, many models suffer from being "so complex that even their developers lack visibility into how the models actually classify and process what could amount to thousands of nonlinear data elements."[138] This "black box" problem makes the source of issues within algorithms difficult to discern and, consequently, proactively identify and ameliorate.[139] Data sets which are inaccurate, defective, or biased will likely hinder an algorithm's utility in many areas, including fostering financial inclusion.[140]

Already, central banks and financial institutions are considering ways in which regulations might evolve to address the risks posed by AI. Balancing the desire for innovation with the uncertainty, risks, and the need for governance, many banking authorities have so far issued guidelines rather than rules.[141] These guidelines often emphasize several core concepts including transparency, accountability, non-discrimination, and human oversight.[142] For example, the OECD published the "Recommendation of the Council on Artificial Intelligence" guidelines which have since been adopted by many G20 members.[143] These

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Robots? How AI Bias May Put Financial Firms at Risk, INTUITION (Feb. 24, 2020), https://www.intuition.com/disruption-in-financial-services-racist-robots-how-ai-bias-may-put-financial-firms-at-risk/; Jon Truby et al., *Banking on AI: Mandating a Proactive Approach to AI Regulation in the Financial Sector*, 14 L. & FIN. MKTS REV. 110, 112, 115 (2020).

[134] Coleman, *supra* note 133; *see also* Truby et al., *supra* note 133, at 112.

[135] Coleman, *supra* note 133.

[136] Truby et al., *supra* note 133, at 116.

[137] Coleman, *supra* note 133; *see also* Truby et al., *supra* note 133, at 115; O'Donnellan, *supra* note 133 (providing a hypothetical where a U.S. bank uses historical mortgage approval data to teach a machine learning algorithm how to evaluate mortgage applications and noting that "those historical mortgages were approved by humans and may display a pattern of bias against people of color, single female applicants, blue-collar workers, or the young. By using this data to train the algorithm, the bank would teach it to avoid such applicants in the future").

[138] Coleman, *supra* note 133.

[139] *Id.*; Truby et al., *supra* note 133, at 115.

[140] Kristin Johnson et al., *Artificial Intelligence, Machine Learning, and Bias in Finance: Toward Responsible Innovation*, 88 FORDHAM L. REV. 499, 505 (2019) ("[L]earning algorithms may help regulators and lenders fulfill an altruistic promise of inclusion, compensating for decades of discrimination and exclusion in financial markets. However, should learning algorithms fail to fulfill this promise, fintech firms may hardwire predatory inclusion, existing inequities, and unconscious biases into financial markets for the next several generations . . . . ").

[141] Inés Muñoz Vidal, *Will Banks Have to Regulate the Speed at Which AI Spreads Through Their Systems?*, TEMENOS BLOG (Oct. 21, 2020), https://www.temenos.com/news/2020/10/21/will-banks-have-to-regulate-the-ai-in-their-systems/#Download.

[142] Truby et al., *supra* note 133, at 113.

[143] *Id.*; OECD, Recommendation of the Council on Artificial Intelligence OECD/Legal/0449 (May 21, 2019), https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449.

guidelines recommend investing in datasets which are free from bias, using small-scale testing environments before scaling up, and fostering an ethical digital ecosystem.[144] However, several authorities also are investigating the development of firmer regulations. The EU's General Data Protection Regulation ("GDPR") has incorporated the right not to "be subject[ed] to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her" with some exceptions.[145] Likewise, several scholars made suggestions for new AI standards at a recent U.S. House Financial Services Committee hearing, including creating a legal definition of "fairness," and requiring financial agencies' use of an initial project phase and a continuous improvement plan for new AI systems.[146]

In addition to creating new guidelines or rules, existing statutory and regulatory regimes may need to evolve to aid central banks and other authorities in combating bias and the "black box" problem. One such regime includes disparate impact antidiscrimination laws present in many countries.[147] As they currently exist, antidiscrimination laws present challenges, as allegations of bias are often hard to prove or can be too readily rebutted.[148] Further, algorithms may discriminate in ways not currently covered by antidiscrimination laws' protected classes.[149] Relatedly, algorithm discrimination and privacy issues might be governed by expanding existing data protection and transparency laws, such as the U.S.'s Fair Credit Reporting Act or the European Union's GDPR.[150] These laws contain transparency requirements when organizations use personal data, potentially spurring investigations by regulatory authorities and enhancing consumer awareness of data uses.[151] Like antidiscrimination laws, however, data

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[144] OECD, Recommendation of the Council on Artificial Intelligence OECD/Legal/0449, *supra* note 144.

[145] Truby et al., *supra* note 133, at 114. For other examples of such promulgated guidelines and strategies, see *id*.; BANK OF ENG., *Fintech AI Public-Private Forum*, https://www.bankofengland.co.uk/events/2020/october/fintech-ai-public-private-forum (last updated Nov. 26, 2020) (detailing the Bank of England's Public Private Forum launched October of 2020 "to facilitate dialogue . . . to better understand the use and impact of AI in financial services").

[146] Steven Lofchie, *House Committee Considers Measures to Reduce AI Bias in Financial Services*, CADWALADER CABINET (Feb. 12, 2020), https://www.findknowdo.com/news/02/12/2020/house-committee-considers-measures-reduce-ai-bias-financial-services?utm_medium=Email&utm_campaign=Cabinet+Newsletter&utm_source=Newsletter?utm_source=Mondaq&utm_medium=syndication&utm_campaign=LinkedIn-integration.

[147] Truby et al., *supra* note 133, at 115; PROF. FREDERIK ZUIDERVEEN BORGESIUS, DISCRIMINATION, ARTIFICIAL INTELLIGENCE, AND ALGORITHMIC DECISION-MAKING, COUNCIL OF EUR. 33-34 (2018).

[148] ZUIDERVEEN BORGESIUS, *supra* note 147, at 34-35. Showing discrimination often requires statistical proof, but it may be difficult for customers to realize discrimination when theirs is the only transaction they observe. *Id*. at 34-36. Further, such laws often allow rebuttal where there is an "objective and reasonable justification," *see id*., an exceedingly low bar.

[149] *Id*. at 36.

[150] Truby et al., *supra* note 133, at 116; ZUIDERVEEN BORGESIUS, *supra* note 147, at 36-39.

[151] *Id*.

protection and transparency laws are limited in their ability to govern AI due to continuing regulatory gaps.[152] Regulators also are confronted with questions regarding liability for algorithms that develop in unforeseeable ways[153] and whether regulation that requires transparency may hinder technological innovation.[154] In implementing regulations, authorities should consider how to apply standards to ensure lasting effectiveness and credibility.[155]

Beyond regulation, central banks can use AI to augment current processes and more efficiently execute their core mandates. First, AI can be used to enhance anti-money laundering- and countering-the-financing-of-terrorism-related ("AML/CFT") controls.[156] Specifically, banks can use machine learning to conduct Know Your Customer ("KYC") checks, flag irregularities, and prevent fraud.[157] Regulators also can use regulatory technology (regtech) and supervisory technology (suptech) to proactively monitor compliance within the financial system.[158] As of 2017, for example, the Mexican Comisión Nacional Bancaria y de Valores ("CNBV") partnered with Regtech for Regulators Accelerator ("R²A") to test regtech and suptech solutions.[159] Goals of this initiative include making compliance more efficient by allowing financial institutions to digitally submit AML information, to increase data volume and granularity, and to define risk profiles and develop AML alerts.[160] Likewise, the National Bank of Rwanda ("BNR") uses a "data pull" method for its suptech application.[161] One of the first central banks to do this, the BNR is able to pull data automatically every 24 hours from over 600 supervised institutions

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[152] ZUIDERVEEN BORGESIUS, *supra* note 147, at 44-46.
[153] Truby et al., *supra* note 133, at 115-16; Yavar Bathaee, *The Artificial Intelligence Black Box and the Failure of Intent and Causation*, 31 HARV. J. L. & TECH. 889, 924-28 (2018) (finding legal causation to be ineffective for determining liability as related to algorithms).
[154] Warwick Ashford, *GDPR a Challenge to AI Black Boxes*, COMPUTERWEEKLY.COM (Nov. 8, 2018, 1:35 PM), https://www.computerweekly.com/news/252452183/GDPR-a-challenge-to-AI-black-boxes.
[155] *See* Truby et al., *supra* note 133, at 117.
[156] *See* Jennifer Chasseur, Adrienne Harris & Bryan Ricketts, *The Potential for RegTech and SupTech to Help Central Banks Combat Financial Crimes and Promote Financial Inclusion* (Univ. of Mich. Ctr. on Fin., Law & Policy, Working Paper No. 2021-01, forthcoming 2021). For more on this, see also MICHAEL BARR, KAREN GIFFORD & AARON KLEIN, ENHANCING ANTI-MONEY LAUNDERING AND FINANCIAL ACCESS: CAN NEW TECHNOLOGY ACHIEVE BOTH?, THE CTR. ON REGULATION & MKTS AT BROOKINGS (2018).
[157] *Id*.
[158] *See id.*
[159] Craig Dempsey, *Regtech is Ready for a Breakthrough in Latin America*, NASDAQ, INC. (Jan. 14, 2020, 2:51 PM), https://www.nasdaq.com/articles/regtech-is-ready-for-a-breakthrough-in-latin-america-2020-01-14; Bernardo Gonzalez, President, Comisión Nacional Bancaria y de Valores & Secretaría de Hacienda y Crédito Público, Regtech and Suptech: Where Do We See the Frontier, Presentation at the World Bank 18th Annual International Conference on Policy Challenges for the Financial Sector 8 (June 2018) (presentation available at https://www.worldbank.org/en/events/2018/06/06/18th-annual-icpcfs#2).
[160] Gonzalez, *supra* note 159, at 8.
[161] DIRK BROEDERS & JERMY PRENIO, FINANCIAL STABILITY INSTITUTE NO. 9: INNOVATIVE TECHNOLOGY IN FINANCIAL SUPERVISION (SUPTECH) - THE EXPERIENCE OF EARLY USERS, BANK FOR INT'L SETTLEMENTS 6-7 (2018).

to be stored until it is needed.[162] This system reduces errors while improving the consistency and timeliness of data delivery.[163]

Lastly, machine learning is also useful for nowcasting. Nowcasting allows central banks and other authorities to view current macroeconomic outcomes and more accurately make policy decisions based on data that is released with greater frequency than official data.[164] For example, the Asian Development Bank published a working paper on India using a dynamic factor nowcasting model ("DFM").[165] DFMs work well for emerging economies because they can account for missing or inconsistently-released data, allowing authorities to utilize less complete data sources.[166] The Asian Development Bank used quarterly released GDP data as well as asynchronous monthly data indicators to confirm—more accurately than previous models—that rainfall is highly predictive of India's GDP growth.[167] These results reinforced policy recommendations previously made by the Asian Development Bank, including the expansion of India's irrigation systems.[168]

B. Central Bank Digital Currencies and Distributed Ledger Technology

Digital currency and distributed ledger technology ("DLT") are distinct yet related areas that have expanded in recent years and have enormous potential for fostering financial inclusion. DLT creates a shared record of transactions without necessitating that there be a central authority to update and share the ledger, a process that has already been used extensively in relation to private cryptocurrencies such as Bitcoin.[169] Central bank digital currencies ("CBDCs") can come in the form of account-based currency or a tokenized currency.[170] More than 70 central banks around the world, including those of China, Cambodia, Canada, the EU, Singapore, Sweden, Uruguay, and the United States have begun researching or piloting CBDC.[171]

There are opportunities for digital currencies and DLT to benefit the unbanked and other low-income populations, but without an intentional and focused effort, such approaches are likely to bypass the poor and marginalized.[172]

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[162] *Id.*
[163] *Id.* at 7.
[164] WIBISONO ET AL., *supra* note 130, at 11-12; Marta Bańbura et al., *Now-Casting and the Real-Time Data Flow* 2 (Eur. Cent. Bank, Working Paper No. 1564, 2013).
[165] Tara Iyer & Abhijit Sen Gupta, *Nowcasting Economic Growth in India: The Role of Rainfall* (Asian Dev. Bank, Working Paper No. 593, 2019).
[166] *Id.* at 1.
[167] *Id.* at 8, 11, 14.
[168] *Id.* at 18.
[169] Morten Bech & Rodney Garratt, *Central Bank Cryptocurrencies*, *in International Banking and Financial Market Developments*, BANK FOR INT'L SETTLEMENTS Q. REV., Sept. 2017, at 58; *see* Barr, Harris, Menand & Thrasher, *supra* note 85, at 2.
[170] Barr, Harris, Menand & Thrasher, *supra* note 85, at 7.
[171] *Id.* at 8-10; ATLANTIC COUNCIL, *supra* note 86.
[172] *See generally* Barr, Harris, Menand & Thrasher, *supra* note 85.

Both technologies have the potential to accelerate payments, better facilitate cross-border payments, and prevent account holders from suffering overdraft fees due to payment settlement time lags.[173] DLT also may assist in enhancing identity verification through digitally created and privacy-protected profiles that consumers control and to formalize collateral otherwise without legal title for accessing loans.[174] The lack of verifiable identity and formal collateral are two key barriers to financial inclusion and health. Similarly, CBDCs may help financially excluded and vulnerable populations keep their money more secure and pose less risk to their physical safety than cash and could suit specific public policy goals like instant delivery of stimulus funds.[175] Together, these technologies have a number of benefits that could help foster financial inclusion, making it easier for more consumers to effectively use the financial system.[176]

Many central banks recognize this potential and have begun researching or piloting CBDC projects. For example, the Central Bank of the Bahamas launched its CBDC, the Sand Dollar, last year with a main goal of increased financial inclusion.[177] In a recent update, the Bank noted that it is working on accessibility by tailoring KYC requirements to the relevant risks, as well as making the CBDC available on a prepaid card and enabling its interoperability with mobile wallets and, eventually, bank accounts.[178] Similarly, in May 2019, the Bank of Canada and the Monetary Authority of Singapore combined their DLT and CBDC efforts (Projects Jasper and Ubin, respectively) to investigate the ability of DLT to provide faster, cheaper international payments when the two banks completed a cross-border, cross-currency payment using their respective DLT platforms.[179]

Both digital currencies and DLT present challenges that need to be addressed before central banks deploy these technologies.[180] First, some central bank mandates may not extend to the issuance of digital currencies and use of DLT.[181] The International Monetary Fund notes that, depending on the form of the CBDC, some mandates limit central banks to issuing solely coins and banknotes; opening accounts for banks or a closed list of institutions rather than the broader public; or

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[173] *Id*. at 4, 7-8.
[174] *Id*. at 4.
[175] *See generally id*.
[176] *Id*. at 4-5, 7-8.
[177] *Central Bank of Bahamas Makes Progress with Sand dollar CBDC,* LEDGER INSIGHTS (Apr. 6, 2021), https://www.ledgerinsights.com/central-bank-of-bahamas-makes-progress-with-sand-dollar-cbdc/.
[178] *Id.*
[179] Barr, Harris, Menand & Thrasher, *supra* note 85, at 5, 9.
[180] *See generally id.* (noting that the UK, Switzerland, and Brazil are hesitant to develop and use DLT and CBDCs).
[181] Jess Cheng et al., *Preconditions for a General-Purpose Central Bank Digital Currency*, FEDS NOTES, https://www.federalreserve.gov/econres/notes/feds-notes/preconditions-for-a-general-purpose-central-bank-digital-currency-20210224.htm (last updated Feb. 24, 2021); *see generally* Wouter Bossu et al., *Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations* (Int'l Monetary Fund, Working Paper No. 20/254, 2020).

managing narrow payments systems, such as an interbank payment system.[182] These limitations might need to be modified in some cases were central banks to pursue CBDC issuance. China, which has piloted a CBDC, has begun revising its central bank's mandate accordingly.[183] Included in these revisions is the modified language of Article 19, which now includes both physical and digital Renminbi and establishes China's CBDC as legal tender.[184]

In addition to these legislative issues, there are also potential consumer data privacy concerns inherent in digital currency and DLT technology, one of the reasons some consumers continue to use cash despite electronic alternatives today.[185] Digital currencies use a ledger, whether centralized or decentralized, that records some level of detail on individual transactions, including the parties involved.[186] Consumers and governments may object to this type of data collection; however, monitoring such data may help mitigate concerns about security, AML, and KYC.[187] While a BIS report stated that "[f]ull anonymity is not plausible,"[188] it may be possible to further privacy through a regulation-by-design approach, which requires embedding regulatory compliance into CBDC design.[189] Such compliance could be achieved through the use of "privacy enhancing techniques" (PETs), which allow various levels of privacy, including identity privacy and transaction privacy.[190] It is also possible that existing regulatory regimes may at least provide a

[182] Bossu et al., *supra* note 181, at 16-26.
[183] Vipin Bharathan, *People's Bank of China Draft Law Provides a Legal Basis for Digital Currency Electronic Payments (DC/EP) and Bans All Stablecoins Backed by Renminbi Reserves,* FORBES MAG. (Oct. 24, 2020, 12:00 AM), https://www.forbes.com/sites/vipinbharathan/2020/10/24/peoples-bank-of-china-draft-law-provides-a-legal-basis-for-digital-currency-electronic-payments-dcep-and-bans-all-stablecoins-backed-by-renminbi-reserves/.
[184] *Id*.
[185] Barr, Harris, Menand, & Xu, *supra* note 84, at 5-6; *What Are the Implications of CBDCs for Privacy and Cash?*, CRYPTOPEDIA, https://www.gemini.com/cryptopedia/central-bank-digital-currency-regulations-cbdc (last updated Mar. 15, 2021).
[186] *See What Are the Implications of CBDCs for Privacy and Cash?*, *supra* note 185; Cheng et al., *supra* note 181.
[187] *See* Gene Deyev, *How DLT will Change the Compliance Landscape in Financial Markets*, THE TOKENIST, https://tokenist.com/how-dlt-will-change-the-compliance-landscape-in-financial-markets/ (last updated Nov. 24, 2020).
[188] BANK OF CAN. ET AL., CENTRAL BANK DIGITAL CURRENCIES: FOUNDATIONAL PRINCIPLES AND CORE FEATURES: REPORT NO. 1 IN A SERIES OF COLLABORATIONS FROM A GROUP OF CENTRAL BANKS, BANK FOR INT'L SETTLEMENTS 6 (2020).
[189] Nadia Pocher & Andreas Veneris, *Privacy and Transparency in CBDCs: A Regulation-by-Design AML/CFT Scheme*, SSRN 5 (Jan. 3, 2021).
[190] *Id*. at 5-6. Identity privacy "concerns the ability (or lack thereof) to link an activity to the relevant senders or recipients" while transaction privacy "concerns transaction details (e.g., amount) and the ability (or lack thereof) to learn its nature." *Id*. at 5. In February of last year, the Bank of Japan and the European Central Bank published a report on *Project Stella*, a collaboration between the two banks in which they tested the ability of various PETs to balance auditability and confidentiality. *Id*. at 6. The project found that several types of PETs as well as the combination of multiple PETs could be used to balance these two variables. *Id*.

baseline for the balance between confidentiality and AML/KYC considerations.[191] In the U.S., statutory restrictions exist on the ability of both financial institutions and law enforcement to obtain customer information while, in Europe, the GDPR governs consumer data protection.[192] Privacy protections also could be enhanced by additional measures. For example, the central bank could only be able to observe individual identities for transactions above a certain level with the ability to discover identities for smaller transactions.[193] Recently, China's Director General of the Digital Currency Institute also presented a set of potential CBDC rules to the BIS that would govern "how the CBDCs would be used, how they would be monitored and how data would be collected in connection with their usage."[194] Such rules provide for controllable anonymity, providing one approach to balancing privacy and security concerns,[195] although many are concerned about the Chinese government's access to personal data and how it might be used by the authorities.[196]

C. Recommendations for Further Work

The introduction of new technologies like AI, digital currency and DLT present numerous opportunities and risks for central banks. Areas for further research and exploration include the following:

- Philanthropy and researchers could study the use of AI by central banks for fostering financial inclusion, not only as relates to AML/KYC, but also other ways central banks have or are planning to leverage the technology to include historically excluded populations.

- Researchers could conduct a survey of central banks to discover whether and how they are leveraging digital currencies—including CBDC—to promote financial inclusion, like the Bahamas and the Sand Dollar. In particular, this inquiry could explore (1) the role financial inclusion policy goals played in the decision for countries (especially developing countries) to move forward with CBDC and (2) how these jurisdictions viewed and assessed any risk-reward calculus.

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[191] *See* Sarah Allen et al., *Design Choices for Central Bank Digital Currency: Policy and Technical Considerations* 71-72 (Glob. Econ. & Dev. at Brookings, Working Paper No. 140, 2020).
[192] *Id*. at 71-73. The relevant acts in the U.S. are the Electronic Fund Transfer Act, the Right to Financial Privacy Act, the Gramm-Leach-Bliley Act, and the Fair and Accurate Credit Transactions Act. *Id*.
[193] Bejoy Das Gupta, *Policy Principles for Safeguarding Privacy and Financial Integrity*, eCURRENCY MINT LTD. (Oct. 7, 2020), https://www.ecurrency.net/post/policy-principles-for-safeguarding-privacy-and-financial-integrity.
[194] *China Pushes Toward Global Rules For CBDCs*, PYMNTS.COM (Mar. 29, 2021), https://www.pymnts.com/cryptocurrency/2021/china-pushes-toward-global-rules-for-cbdcs/.
[195] *Id*.
[196] Jamie P. Horsley, *How Will China's Privacy Law Apply to the Chinese State?*, THE BROOKINGS INST. (Jan. 29, 2021), https://www.brookings.edu/articles/how-will-chinas-privacy-law-apply-to-the-chinese-state/.

V. Towards a Global ID System

The growth of digital and cross-border payments has increased the risks of illegal financial activity.[197] Domestic and international authorities have attempted to improve anti-money laundering ("AML") practices by implementing processes for customer due diligence ("CDD") and standards for identification, called Know Your Customer ("KYC"). These practices, however, have increased barriers to financial inclusion, particularly in the developing world.[198]

One strategy to combat money laundering while advancing financial inclusion is the development of digital identity systems, which would help overcome the hesitancy of financial institutions to extend payments and credit to businesses and consumers in countries where KYC/CDD standards are perceived to be lax.[199] The central banks of India and Mexico serve as case studies for steps in this direction. Additionally, the use of distributed ledger technology may lessen the cybersecurity risks associated with digital ID by removing the need for a centralized data repository. Digital ID systems increase both efficiency and inclusion, pointing the way toward universal access to the financial system; however, this approach comes with important risks to privacy that must be carefully managed.

A. Barriers to Inclusion under the Current AML Regime

Strong KYC/CDD regimes developed by the Financial Action Task Force ("FATF") have been adopted by 190 countries.[200] These measures include "identifying the customer and verifying the customer's identify using reliable, independent source documents"; "identifying the beneficial owner, and taking reasonable measures to verify the identity of the beneficial owner"; "understanding and . . . obtaining information on the purpose and intended nature of the business relationship"; and "conducting ongoing due diligence . . . and scrutiny of transactions undertaken throughout the course of that [business] relationship."[201]

These requirements, however, have had a disparate impact on financially vulnerable individuals. In order to comply with AML regulations and standards, financial institutions in developed nations have "de-risked" their operations by denying services to customers who are more likely to be unable to meet the KYC/CDD criteria.[202] In practice, this has meant that individuals, firms, and financial institutions in many developing countries are deemed high-risk and

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[197] *See generally* Brett King & Jo Ann Barefoot, *The Regulator's Dilemma*, *in* BANK 4.0: BANKING EVERYWHERE, NEVER AT A BANK (John Wiley & Sons Ltd. 2019) (2018).
[198] *See* SUSAN STARNES ET AL., DE-RISKING AND OTHER CHALLENGES IN THE EMERGING MARKET FINANCIAL SECTOR, WORLD BANK GRP. INT'L FIN. CORP. 12, 19-20 (2017).
[199] BARR, GIFFORD & KLEIN, *supra* note 156, at 6; *see* Chasseur, Harris & Ricketts, *supra* note 156.
[200] FIN. ACTION TASK FORCE, THE FATF: 25 YEARS AND BEYOND 4 (2014).
[201] FIN. ACTION TASK FORCE, INTERNATIONAL STANDARDS ON COMBATTING MONEY LAUNDERING AND THE FINANCING OF TERRORISM & PROFLIFERATION: THE FATF RECOMMENDATIONS 14 (2020).
[202] STARNES ET AL., *supra* note 198, at 12, 19-20

excluded from financial markets.[203] Since the introduction of KYC standards, the number of correspondent banking relationships in Sub-Saharan Africa, Latin America, the Caribbean, Europe, and Central Asia has decreased.[204] In addition, the standards have disparately affected small- and medium-sized enterprises, which are more likely to be de-risked than larger counterparts in the same sector.[205]

The individuals and firms chosen for de-risking face two main barriers. Individuals in developing countries often do not have access to a legal form of identity, such as a passport, leaving financial institutions unable to comply with the KYC identification requirement.[206] Firms then face significant costs in identity determination and data protection, limiting their ability to serve such clients.[207]

B. Global Digital Identity as an Inclusive Strategy to AML

1. Financial Inclusion for the Poor

Digital identity systems could provide secure methods of identification to satisfy KYC/CDD requirements, thus facilitating access to the financial system. Such a system could draw on the four main forms of identity (physical, legal, electronic, and behavioral) to provide a secure credential for consumers.[208] Improving the identification process could result in both reduced costs and improved trust for financial institutions, helping to remove the barriers that currently lead to de-risking.[209] Improving digital identity also could be used to improve AML by facilitating ongoing due diligence and tracking of suspicious activity,[210] further increasing trust in the system.

2. Case Study: India

Since 2009, the Aadhaar initiative has provided an identification number to every Indian citizen.[211] It has helped India overcome a massive documentation gap,

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[203] *Id*. at 19-20.
[204] *Id*. at 26.
[205] *Id*. at 52.
[206] *See* FIN. ACTION TASK FORCE, GUIDANCE ON DIGITAL IDENTITY 38 (2020).
[207] WORLD ECON. FORUM, DIGITAL IDENTITY: ON THE THRESHOLD OF A DIGITAL IDENTITY REVOLUTION 9 (2018).
[208] Chasseur, Harris & Ricketts, *supra* note 156. Physical identity includes biometrics, fingerprints, IRIS, or DNA; legal identity includes passports, national identity cards, or drivers licenses; electronic identity includes social media accounts and phone numbers; and behavioral identity includes data points that capture how an individual walks, talks, or uses a mobile device. Douglas W. Arner et al., *The Identity Challenge in Finance: From Analogue Identity to Digitized Identification to Digital KYC Utilities*, SSRN 7 (Jan. 2018).
[209] FIN. ACTION TASK FORCE, GUIDANCE ON DIGITAL IDENTITY, *supra* note 206, at 14, 89-90.
[210] *Id*. at 13-14.
[211] Billy Perrigo, *India has been Collecting Eye Scans and Fingerprint Records from Every Citizen. Here's What to Know*, TIME (Sept. 28, 2018, 9:36 AM), https://time.com/5409604/india-aadhaar-supreme-court/.

in which as much as 15% of births and 26% of deaths went unrecorded with the Indian government.[212] Legal documentation is combined with biometric data, creating a high-quality credential that covers 99% of the population.[213]

India's Aadhaar identity verification technology was designed to meet the needs of the poor.[214] More than 1.2 people have provided fingerprints, photos, and iris scans to the government to access benefits and collect food rations.[215] In 2016, the Reserve Bank of India ("RBI") issued guidance that documentation from the Unique Identification Authority of India (the group responsible for administering Aadhaar) was valid for KYC purposes.[216] However, the use of the Aadhaar system has grown substantially beyond its initial use case, posing significant privacy risks from both government and state actors.[217] This issue is further explored in the privacy section below.

3. Case Study: Mexico

The Mexican government issues an ID number called the Unique Population Registry Number ("CURP").[218] Since 2001, the national elections authority has collected biometric information and paired it with voter ID numbers (a derivative of the foundational CURP identifier).[219] This voter ID card can then be used to satisfy KYC requirements.[220] Additionally, the Banco de México has launched an initiative to facilitate bank connection to the CURP database.[221]

Mexico also aims to improve financial inclusion by providing a tiered KYC structure.[222] Anyone is able to obtain a "simplified account" without providing identifying information, but customers can increase their account's allowable

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[212] HUMAN RIGHTS LAW NETWORK, BIRTH AND DEATH REGISTRATION FACT FINDING REPORT 5 (2016).
[213] Perrigo, *supra* note 211.
[214] *Id.* For more on Aadhaar, privacy, identity, and financial inclusion, please see Mandira Sarma, A Note on India's Biometric Identification (Aadhaar) Project (Feb. 21, 2021) (unpublished note) (on file with author).
[215] Lauren Frayer & Furkhan Latif Khan, *India's Biometric ID System Has Led to Starvation for Some Poor, Advocates Say*, NPR (Oct. 1, 2018, 2:06 PM), https://www.npr.org/2018/10/01/652513097/indias-biometric-id-system-has-led-to-starvation-for-some-poor-advocates-say.
[216] RESERVE BANK OF INDIA, Master Direction DBR.AML.BC.No.81/14.01.001/2015-16: Master Direction - Know Your Customer (KYC) Direction, 2016, ch. 1 § 3(4)(f)(vi), ch. 4 § 17 (last updated July 8, 2016).
[217] Frayer & Latif Khan, *supra* note 215.
[218] WORLD BANK GRP., ID4D COUNTRY DIAGNOSTIC: MEXICO 22 (2017).
[219] *Id*. at 10-12.
[220] *Id*. at 24.
[221] Antonio Hernández, *Preparan CURP con Información Biométrica para Evitar Robo de Identidad*, EL UNIVERSAL (Aug. 15, 2019), https://www.eluniversal.com.mx/cartera/preparan-curp-con-informacion-biometrica-para-evitar-robo-de-identidad.
[222] Xavier Faz, *Mexico's Tiered KYC: An Update on Market Response*, CONSULTATIVE GRP. TO ASSIST THE POOR BLOG (June 25, 2013), https://www.cgap.org/blog/mexicos-tiered-kyc-update-market-response.

transaction volume by furnishing more and higher-quality identity documentation.[223] In the long term, a digital identification system may make the tiered system unnecessary. In the meantime, however, it serves as an on-ramp to financial inclusion.

C. Distributed Ledger Technology and Digital ID

A digital ID could be implemented using DLT. A permissioned distributed ledger could allow financial services firms to verify the validity of identity documents, while giving consumers control over what data is released to whom.[224] A DLT system may improve privacy, transparency, and trust by removing the risk associated with a central repository.[225] Instead, DLT separates the verification of identity (via the distributed ledger) and the provision of identity data, locking personally identifiable information behind service endpoints at many different data repositories.[226] Further research is needed to determine whether a DLT system can provide these benefits at the scale and security level required for a country.

D. The Benefits and Risks of the Central Bank Provision of Digital Identity

1. Benefits

The current KYC system uses the resources and knowledge of commercial banks to identify risky clients, thereby reducing the number of illicit transactions. Put differently, the system requires that a public good (public safety/national security) be produced in cooperation with private market participants. Current processes, both digital and analog, ultimately rest in part on the use of legal identity as the key to the CDD process—a legal identity that is produced by the central government. As identification continues to digitize, central banks in some countries might be well placed to improve efficiency and inclusion by providing digital identification services themselves. The following is a non-exhaustive list of considerations that central banks might consider were they to undertake the provision of digital identification services.

- *Data Security* – While central banks are often the target of cyberattacks,[227] they also are well positioned with the resources for high-quality data protection regimes. While housing data in a central bank repository might create "honey pot" risk, having ID information held within the central bank also mitigates the risk of multiple actors—including fintechs whose security

[223] Chasseur, Harris & Ricketts, *supra* note 156.
[224] *See* IBM, IBM TRUSTED IDENTITY FINANCE USE CASE 1 (2018).
[225] ACCENTURE, *ID2020: Digital Identity with Blockchain and Biometrics*, https://www.accenture.com/us-en/insight-blockchain-id2020 (last visited Apr. 29, 2021).
[226] DRUMMOND REED ET AL., DECENTRALIZED IDENTIFIERS (DIDS) V1.0 WORKING DRAFT, W3C § 10.1 (last updated July 11, 2021).
[227] *See* AQUIELES A. ALMANSI, CYBER-SECURITY SURVEY: SELF-ASSESSMENTS, WORLD BANK GRP. FIN. SECTOR ADVISORY CTR. (2018).

processes might not yet be fully mature—collecting and holding personally identifiable information ("PII").

- *Universality* – A recognized digital ID standardizes the identification process, improving interoperability for firms and consumers. If a central bank were to provide the digital ID, the central bank would serve as both a utility and regulator—gathering and storing the information and setting the regulatory standards—rather than as the regulator alone.

- *Privacy* – For-profit financial institutions are incentivized to grow revenue, and one way they do so is by monetizing data, which may be harmful to consumer privacy. Moving the digital identity into public hands changes the incentive structure, as the central bank could focus on the policy objectives rather than profit. There is a risk that a central bank or other governmental entities could abuse the data as well, however. This risk is discussed in the next subsection.

- *Success Metrics* – The success of a central bank's digital identity program could be measured, in part, on its ability to reach every citizen with a need to conduct legitimate transactions, thereby incentivizing financial inclusion.

2. Risks

a. Privacy

The consolidation of vast amounts of PII within any single entity, whether public or private, carries significant risks. Significant risks include "honey pot" risks and risks to individuals' privacy.[228] Where central banks are truly independent, the probability of such data being misused for political purposes is lessened, but the risk of abuse increases when a central bank is not truly independent.

One example is the Indian government's creation of Aadhaar. Its inception was met with skepticism by critics who claimed it lessened privacy.[229] Until a 2015 ruling by the Supreme Court of India, private firms were allowed to require Aadhaar numbers to access services, allowing them access to private information beyond what was necessary for the KYC check.[230] Though banks are now banned from requiring the number, many still push customers to submit their number

[228] For more on data honey pots and individual access to and control of data, see Daniel Goroff, Jules Polonetsky & Omer Tene, *Privacy Protective Research: Facilitating Ethically Responsible Access to Data*, 675 ANNALS AM. ACAD. POL. & SOC. SCI. 46, 46-66 (2018); Daniel L. Goroff, *Balancing Privacy versus Accuracy in Research Protocols*, 347 SCI. 479, 479-80 (2015).
[229] Sarma, *supra* note 214, at 4.
[230] *Id*. at 7-9; *see also* Bindu Ananth & Beni Chugh, *Last-Mile Issues can Make or Break the Promise of Aadhaar*, HINDUSTAN TIMES, https://www.hindustantimes.com/analysis/last-mile-issues-can-make-or-break-the-promise-of-aadhaar/story-EzrkO20cGYNRvrjD3sHIbL.html (last updated Jan. 27, 2018, 4:11 PM) (containing the work of Bindu Ananth and Beni Chugh of Dvara Research).

voluntarily instead of going through the traditional KYC process.[231] The widespread usage of the Aadhaar number makes it easier to collate information on an individual's activities across many firms, revealing private behaviors and choices, particularly when that data is leaked or sold, as is frequently the case.[232] The curbs on the use of the Aadhaar number may have lessened risk, but strict and consistent enforcement of the ban is necessary to further reduce it.

Additionally, concerns have been raised that the existence of a universal ID number can facilitate state tracking and repression.[233] The Aadhaar Act of 2016 allows the government to access the collected data for "national security" reasons.[234] In fact, some Indian lawmakers have raised concerns that India's current ruling party intends to use the Aadhaar number for surveillance purposes.[235] Furthermore, malicious intent is not necessary to create problems; lack of internet penetration and strong public infrastructure can lead to the Aadhaar's acting as a friction to services, rather than as a gateway.[236] Given the political sensitivity of privacy issues, some may argue that the creation and maintenance of a national identity may be better left to an administrative agency so as not to threaten central bank independence.

b. Mandate

In addition to the cybersecurity and privacy risks, there is a potential legal challenge facing central banks that desire to implement a digital identification system: Few central banks may have the legal leeway to do so. As an alternative, a central bank could partner with other government agencies for the creation of a digital ID. Strong support from the central bank may enhance an effort's credibility, or it might hinder the independence of the central bank itself. These are important considerations to weigh.

E. Recommendations for Further Work

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[231] Ananya Bhattacharya & Nupur Anand, *Aadhaar Is Voluntary—But Millions of Indians Are Already Trapped*, QUARTZ INDIA (Sept. 26, 2018), https://qz.com/india/1351263/supreme-court-verdict-how-indias-aadhaar-id-became-mandatory/.
[232] Frayer & Latif Khan, *supra* note 215; Mardav Jain, *The Aadhaar Card: Cybersecurity Issues with India's Biometric Experiment*, THE UNIV. OF WASH. HENRY M. JACKSON SCH. OF INT'L STUDIES BLOG (May 9, 2019), https://jsis.washington.edu/news/the-aadhaar-card-cybersecurity-issues-with-indias-biometric-experiment/.
[233] Jain, *supra* note 232.
[234] The Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, No. 18 of 2016, INDIA CODE (2016), ch. VI § 33.
[235] Shashi Tharoor, *This Proposed Internet Law Sets a Terrifying Precedent*, WASH. POST, (Jan. 18, 2019), https://www.washingtonpost.com/news/theworldpost/wp/2019/01/18/modi/.
[236] *See* Frayer & Latif Khan, *supra* note 215.

Many questions remain about the role of the central bank in identity provision, and this is especially true as DLT has become more available. There are many open questions to be explored, including the following:

- Distributed ledger technology makes zero knowledge proofs possible, allowing an identity to be verified without collecting and transmitting private information. However, it remains an open question whether digital ID maintained on a distributed ledger could perform at scale and, more importantly, gain widespread public trust. Philanthropy could conduct a pilot on both the technological and sociological implications of scaling a distributed ledger for zero knowledge proof digital identification verification.

- The practice of de-risking persists among financial institutions that do not have the necessary resources to perform identity verification in accordance with FATF standards. Fintech firms, however, have technological resources to help incumbent financial institutions—especially those in emerging markets—meet this challenge. With support from philanthropy, research partnerships between fintechs and incumbents could help emerging markets comply with AML/KYC requirements and document impacts on inclusion.

Conclusion

This paper has summarized key takeaways from the Central Bank of the Future project and proposed recommendations for future avenues of research. The global pandemic has brought to light deficiencies and opportunities for central banks. In particular, many countries facilitated direct payments to their citizens through improved payment systems, practices, and policies to facilitate financial inclusion. From novel benefits delivery mechanisms, to advancements in central bank digital currencies, to developments in KYC and AML regimes, the time is ripe for innovations that will advance financial inclusion.

Along with these advances have come new entrants into the field of financial services. Fintech firms, big tech, NGOs, and banks are now engaged in financial inclusion efforts. It is crucial that a culture of collaboration is fostered worldwide that encourages central bank innovation alongside private actor input and encourages feedback from consumers themselves.

Looking forward, research initiatives should encourage a multidisciplinary approach to financial inclusion and innovation. In particular, leveraging new technologies such as AI and DLT, along with more traditional areas of central banking expertise, will provide the best chance of innovative strategies to advance financial inclusion globally.

There are additional questions that were outside the scope of this project. Most notable of these is the role of the central bank in combating climate change. Whether through their regulatory and supervisory authorities, through the use of

tools like green bonds, or through some other mechanism, central banks' role in combating climate change is a relatively new topic for research, but is nonetheless pressing and important.

The role of the central bank is undoubtedly evolving. This project was the beginning of a discussion about this evolution, in particular about the use of technology for fostering financial inclusion. There is more work to be done, on this and other topics, but we hope this contributes to a solid foundation.

Appendix A

Recommendations for Future Research

Each Part of this paper contains recommendations for further research. Those recommendations are listed together below.

1. Based on global experiences with COVID-19, philanthropy and research institutions could conduct a comprehensive survey of efforts around the world to deliver stimulus payments (and other like benefits) through the use of digital technologies, with a particular focus on the most successful tactics for reaching under- and unbanked populations.

2. Researchers could examine the conditions under which central banks (or other authorities) act as a utility/service provider versus when they use their regulatory authority to promote private sector competition in the provision of such services. Such an examination could note the optimal circumstances for each role and provide case studies.

3. Given the importance of good data, researchers and policy-makers could catalogue and categorize definitions of financial inclusion by country, region, or by existing coalitions and measure improvement based on each definition over a set period of time. Then, compare those metrics to results using a different category of definition. For instance, where a country defines inclusion as access to a traditional bank account, measure improvements based on this definition over, for example, the prior ten years. Then, measure inclusion based on a usage definition, as opposed to an access definition. Document any conclusions that can be drawn by comparing such metrics across countries.

4. Researchers could catalogue and study central bank (and other financial regulatory authority) sandboxes, with special attention paid to those focused on financial inclusion, and highlight particular success stories where sandboxes resulted in mission-oriented companies reaching market successfully as a result of the companies' participation in the sandbox. Based on the catalogue and success stories, philanthropies and researchers could create a set of best practices that other regulatory authorities could implement.

5. Similar to #4, researchers could examine central banks' regulation of non-bank financial services providers—including, but not limited to, payment providers—to assess how different central banks around the world have defined their regulatory perimeter. Such an examination should include assessment of the language or tools used to expand or contract the perimeter and the rationale for doing so.

6. Philanthropy and researchers could study the use of artificial intelligence (AI) by central banks for fostering financial inclusion, not only as relates to Anti-Money Laundering/Know Your Customer (AML/KYC), but also other ways central banks have or are planning to leverage the technology to include historically excluded populations.

7. Researchers could conduct a survey of central banks to discover whether and how they are leveraging digital currencies—including central bank digital currencies (CBDCs)—to promote financial inclusion, like the Bahamas and the Sand Dollar. In particular, this inquiry could explore (1) the role financial inclusion policy goals played in the decision for countries (especially developing countries) to move forward with CBDC and (2) how these jurisdictions viewed and assessed any risk-reward calculus.

8. In light of the many open questions about the role of central banks in identity provision and the identity verification capabilities offered by distributed ledger technology (DLT), researchers might examine whether digital ID maintained on a distributed ledger could perform at scale and, more importantly, gain widespread public trust. Philanthropy could conduct a pilot on both the technological and sociological implications of scaling a distributed ledger for zero knowledge proof digital identification verification.

9. The practice of de-risking persists among financial institutions that do not have the necessary resources to perform identity verification in accordance with FATF standards. Fintech firms, however, have technological resources to help incumbent financial institutions—especially those in emerging markets—meet this challenge. With support from philanthropy, research partnerships between fintechs and incumbents could help emerging markets to comply with AML/KYC requirements and document impacts on inclusion.