



# CENTRAL BANK OF THE FUTURE



## Building the Payment System of the Future: How Central Banks Can Improve Payments to Enhance Financial Inclusion

Paper # 3

Released July 31, 2020

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, especially Megan Kelly and Avaskhan Assanaliyev.

### Authors

**Michael S. Barr**  
msbarr@umich.edu

**Adrienne A. Harris**  
adrienah@umich.edu

**Lev Menand**  
lmenand@law.columbia.edu

**Wenqi (Michael) Xu**  
mikeyxu@umich.edu

---

University of Michigan Center on Finance, Law & Policy  
Weill Hall Suite 5211  
735 S. State St.  
Ann Arbor, MI 48109

<http://financelawpolicy.umich.edu/central-bank-research>

© Regents of the University of Michigan, Center on Finance, Law & Policy 2020. All rights reserved.

# ISSUE BRIEF 3 – BUILDING THE PAYMENT SYSTEM OF THE FUTURE: HOW CENTRAL BANKS CAN IMPROVE PAYMENTS TO ENHANCE FINANCIAL INCLUSION

## I. Introduction

This brief is part of the Central Bank of the Future Project (“CBOTF” or the “Project”), which is designed to identify ways that central banks can improve access to financial products and services for underserved communities. The Project engages with central bankers, regulators, futurists, financial institutions, FinTechs, consumer and community organizations, and other stakeholders to develop technologies, processes, and tools that enhance inclusion. The Project also works to find ways that businesses and nonprofits can support official sector efforts. One output is a series of working papers and policy briefs focused on specific topics.

This working paper, our third, explores how central banks can design more inclusive payment systems. Payment systems are critical infrastructure that generate positive network externalities.<sup>1</sup> The more people who use them, the better off everyone using them is.<sup>2</sup> They allow households, businesses, governments, and nonprofits to clear and settle transactions.<sup>3</sup> Consumers use payment systems when they swipe their credit or debit cards; homeowners use them when they write checks; and businesses use them when they wire money.<sup>4</sup>

Many have noted the link between payment systems, digital innovation, and access to financial services.<sup>5</sup> New technologies have the power to be a remarkable equalizer,

---

<sup>1</sup> See generally JOHN A. WEINBERG, FED. RESERVE BANK OF RICHMOND, NETWORKING EXTERNALITIES AND PUBLIC GOODS IN PAYMENT SYSTEMS 5 (1996), [https://www.minneapolisfed.org/research/conferences/research-events---conferences-and-programs/~media/files/research/events/1996\\_12-03/Weinberg\\_PaymentSystems.pdf](https://www.minneapolisfed.org/research/conferences/research-events---conferences-and-programs/~media/files/research/events/1996_12-03/Weinberg_PaymentSystems.pdf); THE PAYPERS, PAYMENT METHODS REPORT 2019 3-4 (2019), <https://www.europeanpaymentscouncil.eu/sites/default/files/inline-files/Payment%20Methods%20Report%202019%20-%20Innovations%20in%20the%20Way%20We%20Pay.pdf>

<sup>2</sup> *Id.*

<sup>3</sup> NAT’L BANK OF SERB., *Central Bank Oversight of Payment Systems* (last updated 2020), [https://www.nbs.rs/internet/english/35/nadgledanje/funkcija\\_nadgledanja.html](https://www.nbs.rs/internet/english/35/nadgledanje/funkcija_nadgledanja.html).

<sup>4</sup> See CHARLES KAHN, STEPHEN QUINN, & WILL ROBERDS, CENTRAL BANKS AND PAYMENT SYSTEMS: THE EVOLVING TRADE-OFF BETWEEN COST AND RISK 3-4 (2014), [http://www.norges-bank.no/contentassets/3fba8b3a3432407d929ae9218db1ffc4/10\\_kahn\\_quinn\\_roberds2014.pdf](http://www.norges-bank.no/contentassets/3fba8b3a3432407d929ae9218db1ffc4/10_kahn_quinn_roberds2014.pdf).

<sup>5</sup> See PYMNTS, *Payments at the Edge: Day 1* (Mar. 17, 2016), <https://www.pymnts.com/innovation/2016/payments-at-the-edge-day-1/>; CURRENCYCLOUD BLOG, *Payments for the Unbanked: How Technology is Driving Financial Inclusion* (Mar. 26, 2019),

allowing marginalized groups to enter the mainstream payment system and access lower-cost services.<sup>6</sup> But they can also be a catalyst for further inequality – excluding lower income people through excessive fees and nonpecuniary barriers.<sup>7</sup>

In most countries, central banks operate at least part of the payment system directly.<sup>8</sup> They also often serve in a regulatory capacity, overseeing private sector payment providers such as banks, card processors, and money services businesses.<sup>9</sup> This paper highlights four ways that central banks may wish to consider using their operational and regulatory positions within payment systems to better serve low-income households, small retailers, and marginalized groups.

- (1) Expanding Access. Central banks could impose universal access mandates for low-fee or no-fee bank accounts. One approach would be to work with private providers to set up low-fee or no-fee systems like Kenya’s M-Pesa network<sup>10</sup> and China’s WeChat Pay.<sup>11</sup> A strong enabling environment is critical to developing private networks that advance financial inclusion. Central banks could also directly provide digital money in the form of a bank account at the central bank or a central bank digital currency (“CBDC”) like China’s new digital yuan.<sup>12</sup> The choices to offer CBDC accounts or digital wallets involve difficult tradeoffs that we explore later in the CBOTF project.
- (2) Increasing Speed. Central banks could build – or encourage the private sector to build – back-end systems that allow for real-time gross settlement

<https://www.currencycloud.com/company/blog/payments-for-the-unbanked-how-technology-is-driving-financial-inclusion/>.

<sup>6</sup> See *id.*

<sup>7</sup> See Raúl Morales Resendiz, *The Role of Payment Systems and Services in Financial Inclusion – Latin American and Caribbean Perspective*, at 7; Noelia Cámara & David Tuesta, *Measuring Financial Inclusion: A Multidimensional Index*, at 6-7, in IRVING FISHER COMM. ON CENT. BANKING STATISTICS., BANK FOR INT’L SETTLEMENTS, IFC BULLETIN NO. 47: THE ROLE OF DATA IN SUPPORTING FINANCIAL INCLUSION POLICY (2018), <https://www.bis.org/ifc/publ/ifcb47.pdf>.

<sup>8</sup> See BIS COMM. ON PAYMENT & SETTLEMENT SYS., CENTRAL BANK OVERSIGHT OF PAYMENT AND SETTLEMENT SYSTEMS 18, 20 (2005), <https://www.bis.org/cpmi/publ/d68.pdf>; TÜRKİYE CUMHURİYET MERKEZ BANKASI, *The Role of Central Banks in the Payment Systems*, <https://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Core+Functions/Payment+Systems/Key+Issues/The+Role+of+Central+Banks+in+the+Payment+Systems/> (last visited Jul. 7, 2020); NAT’L BANK OF SERB., *supra* note 3.

<sup>9</sup> *Id.*

<sup>10</sup> See generally ALL. FOR FIN. INCLUSION, ENABLING MOBILE MONEY TRANSFER: THE CENTRAL BANK OF KENYA’S TREATMENT OF M-PESA (2010), [https://www.afi-global.org/sites/default/files/publications/afi\\_casestudy\\_mpesa\\_en.pdf](https://www.afi-global.org/sites/default/files/publications/afi_casestudy_mpesa_en.pdf).

<sup>11</sup> See AARON KLEIN, THE BROOKINGS INST., IS CHINA’S NEW PAYMENT SYSTEM THE FUTURE? 12-14 (2019), <https://www.brookings.edu/research/is-chinas-new-payment-system-the-future/>.

<sup>12</sup> See Marie Huillet, *China’s Digital Yuan Reportedly to Test in Four Cities*, COINTELEGRAPH (Apr. 15, 2020), <https://cointelegraph.com/news/chinas-digital-yuan-reportedly-to-test-in-four-cities>; Naomi Xu Elegant, *Why China’s Digital Currency is a ‘Wake-Up Call for the U.S.’*, FORTUNE (Nov. 1, 2019, 4:14 AM), <https://fortune.com/2019/11/01/china-digital-currency-libra-wakeup-call-us/>.

of retail payments. Central banks could also change “good funds”<sup>13</sup> rules to require instant availability. Instant payments could greatly benefit workers who otherwise rely on payday lenders or other short-term credit to bridge the gap between when they get a paycheck and when that paycheck clears.<sup>14</sup> Instant payments could also reduce the incidence of overdraft and late fees, which disproportionately harm low-income groups and drive them out of the mainstream financial services sector.<sup>15</sup> More immediately, instant access to one’s own funds could reduce incidences of harm among the poor.<sup>16</sup>

- (3) Eliminating Predatory Practices. Central banks could prohibit excessive fees and other predatory practices by privately owned payment system operators. The high costs and uncertain fees sometimes associated with transaction services are harmful to the poor.<sup>17</sup>
- (4) Reducing Cross-Border Costs. Central banks could ease remittance costs, increase the speed of payments, and improve reliability of delivery, by reducing the number of intermediaries required to make payments internationally. Central banks could also facilitate innovation by requiring interoperability so that payment apps and other digital payment services can seamlessly connect with each other. Central banks could also continue to work together to reduce the burdens of Know Your Customer rules on legitimate, low-risk transactions.

This paper proceeds as follows. Part II traces the evolution of payment systems. Part III highlights critical issues in payments today, including areas that the Project will consider from a financial inclusion perspective in future policy briefs. Part IV examines three case studies – (a) Kenya’s M-Pesa; (b) China’s Alipay, WeChat Pay, and e-Yuan; and (c) eGov Pay and related initiatives in the Philippines. Part V concludes.

---

<sup>13</sup> “*Good funds*’ is a colloquial term for withdrawable, spendable money.” Peter Conti-Brown & David Wishnick, *Private Markets, Public Options, and the Payment System*, 37 YALE J. REG. 380, 382n.8 (2020) (citing Hal Scott, *Corporate Wire Transfers and the Uniform New Payments Code*, 83 COLUM. L. REV. 1664, 1670 (1983)).

<sup>14</sup> See Aaron Klein, *Real-Time Payments Can Help Combat Inequality*, SPOTLIGHT EXCLUSIVES (Mar. 5, 2019), <https://spotlightonpoverty.org/spotlight-exclusives/real-time-payments-can-help-combat-inequality/>.

<sup>15</sup> See *id.*

<sup>16</sup> See *id.*

<sup>17</sup> See generally Susan Athey, Econ. & Tech. Professor, Stanford Graduate Sch. of Bus., Remarks as part of the AFA Panel: Fintech, Financial Stability and Regulation at the AFA Annual Meeting, San Diego, CA (Jan. 3, 2020) (video available at Bank of International Settlements website), <http://www.bis.org/press/videos.htm>; Morales Resendiz, *supra* note 7, at 22;

## II. The Evolution of Payments from Cash to Cryptocurrencies

Payment systems sit at the heart of modern economies.<sup>18</sup> They consist of “instruments, procedures, and rules for the transfer of funds between or among participants” as well as a set of operational entities that facilitate these transfers.<sup>19</sup>

Central banks are one such entity which facilitate the use of payment systems by serving in three major roles: as operators, regulators, and catalysts.<sup>20</sup> As operators, central banks provide payment system infrastructure directly.<sup>21</sup> Given that central banks are banks for banks, they usually form the backbone of a country’s payment system by clearing and aiding payments between banks.<sup>22</sup> As regulators, central banks promulgate rules for banks and other financial institutions that facilitate payments between households, businesses, and nonprofits and foster consumer safety and efficiency.<sup>23</sup> This role has become increasingly important in recent decades as payment volumes and methods have grown rapidly.<sup>24</sup> Central banks also act as catalysts for private sector innovation;<sup>25</sup> as new payment technologies arise, central

---

<sup>18</sup> See WEINBERG, *supra* note 1, at 1. For the public good characteristics of the payment system, see Frank A.G. den Butter & Piet M. Mallekoote, *The Payment System as a Public Good? Lessons Learned in the Netherlands*, 12 J. PAYMENTS STRATEGY & SYSTEMS 304, 305-06 (2018).

<sup>19</sup> BIS COMM. ON PAYMENTS & MKT. INFRASTRUCTURES & THE INT’L ORG. OF SEC. COMM’NS [IOSCO], PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES 8 (2012), <http://www.bis.org/cpmi/publ/d101a.pdf>.

<sup>20</sup> See, e.g., TÜRKIYE CUMHURİYET MERKEZ BANKASI, *supra* note 8; NAT’L BANK OF SERB., *supra* note 3; RICHARD OLIVER & STUART E. WEINER, THE FED. RESERVE BANK OF KANSAS CITY, THE ROLE OF CENTRAL BANKS IN RETAIL PAYMENTS: THE CENTRAL BANK AS OPERATOR 200 (2009), <https://www.kansascityfed.org/publicat/pscp/2009/PDF/session-6.pdf>. Central banks also serve as lenders, smoothing payments by offering short-term credit to banks and other financial institutions. See TÜRKIYE CUMHURİYET MERKEZ BANKASI, *supra*.

<sup>21</sup> See OLIVER & WEINER, *supra* note 20, at 200; NAT’L BANK OF SERB., *supra* note 3.

<sup>22</sup> See OLIVER & WEINER, *supra* note 20, at 208; Hans J. Blommestein & Bruce J. Summers, *Banking and the Payment System*, in THE PAYMENT SYSTEM: DESIGN, MANAGEMENT, AND SUPERVISION 15-16 (Bruce J. Summers ed., Int’l Monetary Fund, 1994); KAHN, QUINN, & ROBERDS, *supra* note 4, at 1.

<sup>23</sup> See THE FED. RESERVE BD., *About the Fed* (last updated Jan. 30, 2020), <https://www.federalreserve.gov/aboutthefed.htm>. See also THE WORLD BANK GRP., PAYMENT SYSTEMS WORLDWIDE: A SNAPSHOT 1 (2018), <http://pubdocs.worldbank.org/en/591241545960780368/GPSS-4-Report-Final.pdf> (observing that central bank law provides “the most relevant legal support for payment systems.”).

<sup>24</sup> CAPGEMINI RESEARCH INST., WORLD PAYMENTS REPORT 2019 4 (2019), <https://www.europeanpaymentscouncil.eu/sites/default/files/inline-files/World-Payments-Report-2019.pdf> (showing that global non-cash payment volumes reached the highest they had in the last two decades: 539 billion). See generally, MARIA CHIARA MALAGUTI, PAYMENT SYSTEM REGULATION FOR IMPROVING FINANCIAL INCLUSION, CTR. FOR GLOB. DEV. (2015), <https://www.cgdev.org/sites/default/files/CGD-Policy-Paper-70-Malaguti-Payment-Systems-Financial-Inclusion-1.pdf>.

<sup>25</sup> For example, in 2014, the Bank for International Settlement (“BIS”) Committee on Payments and Market Infrastructures (“CPMI”) and the World Bank Group formed a task force on Payment Aspects on Financial Inclusion (“The PAFI Taskforce”) to examine “how payment systems and services affect financial inclusion efforts.” THE WORLD BANK GRP., *Payment Aspects of Financial Inclusion (PAFI)* (Sept. 11, 2017), <https://www.worldbank.org/en/topic/financialinclusion/brief/pafi>.

banks typically evolve along with them, sometimes spurring widespread adoption of the new technologies.<sup>26</sup>

The following subparts provide a high-level overview of how payment technologies have evolved from cash, checks, and cards to cryptocurrencies and CBDCs and consider the role that central banks have played in that process.

## A. CASH, CHECKS, AND CARDS

Bank notes and coins (“cash”) continue to be a popular means of payment in retail transactions in many countries,<sup>27</sup> with Africa particularly dependent on cash and Oceania having the lowest cash dependency.<sup>28</sup> This continued demand for cash can be attributed to a desire for privacy and convenience,<sup>29</sup> distrust in financial

---

[task-force-and-report](#). The PAFI Taskforce released its final report in 2016. BIS COMM. ON PAYMENTS & MKT. INFRASTRUCTURES & THE WORLD BANK GRP., PAYMENT ASPECTS OF FINANCIAL INCLUSION (2016), <http://documents.worldbank.org/curated/en/806481470154477031/pdf/107382-WP-REPLACEMENT-PUBLIC-PAFI-Report-final-in-A4.pdf>. The report concluded that “payment services are, in their own right, an important part of the overall package of financial services” and may “not only facilitate access to financial services, but, in many cases, be critical to those services’ efficient provision.” *Id.* at 4; Asli Demirgüç-Kunt & Leora Klapper, *Measuring Financial Inclusion: Explaining Variation in Use of Financial Services Across and Within Countries*, BROOKINGS PAPERS ON ECON. ACTIVITY 279, 283 (Spring 2013), [https://www.brookings.edu/wp-content/uploads/2016/07/2013a\\_klapper.pdf](https://www.brookings.edu/wp-content/uploads/2016/07/2013a_klapper.pdf) (noting that “access to” and the use of financial products and services are key indicators of financial inclusion). *See also* Blommestein & Summers, *supra* note 22, at 16. For the Arab Region, see Habib Attia & Carol Coye Benson, *Digital Financial Services: Payment Aspects for Financial Inclusion in the Arab Region* (Arab Monetary Fund, Working Paper, 2018), [https://www.amf.org.ae/sites/default/files/research\\_and\\_publications/%5Bvocabulary%5D/%5Bterm%5D/%5Blanguage%5D/DFS%20Payment%20Aspects%20for%20Financial%20Inclusion%20in%20the%20Arab%20Region.pdf](https://www.amf.org.ae/sites/default/files/research_and_publications/%5Bvocabulary%5D/%5Bterm%5D/%5Blanguage%5D/DFS%20Payment%20Aspects%20for%20Financial%20Inclusion%20in%20the%20Arab%20Region.pdf). For Latin America and the Caribbean, see Morales Resendiz, *supra* note 7. *See also* Tommaso Padoa-Schioppa, Member of the Exec. Bd., Shaping The Payment System: A Central Bank’s Role, Speech Delivered at the Bank of Korea’s Conference on Payment Systems (May 13, 2004) (transcript available at European Central Bank website), [https://www.ecb.europa.eu/press/key/date/2004/html/sp040513\\_1.en.html](https://www.ecb.europa.eu/press/key/date/2004/html/sp040513_1.en.html).

<sup>26</sup> *See generally* KAHN, QUINN, & ROBERDS, *supra* note 4.

<sup>27</sup> *See* FED. FIN. INST. EXAMINATION COUNCIL [FFIEC], FFIEC, RETAIL PAYMENT SYSTEMS: IT EXAMINATION HANDBOOK 3 (2016), [https://ithandbook.ffiec.gov/media/274860/ffiec\\_itbooklet\\_retailpaymentsystems.pdf](https://ithandbook.ffiec.gov/media/274860/ffiec_itbooklet_retailpaymentsystems.pdf). “Retail payments usually involve transactions between consumers, between consumers and businesses, or between two businesses. Wholesale payments are typically made between businesses. Although there is no definitive division between retail and wholesale payments, retail payment systems generally have higher transaction volumes and lower average dollar values than wholesale payment systems.” *Id.* at 2.

<sup>28</sup> G4S CASH SOL., WORLD CASH REPORT 2018 14 (2018), <https://cashesentials.org/app/uploads/2018/07/2018-world-cash-report.pdf>.

<sup>29</sup> *See* Gillian Millar, *Why the Swiss Still Love Cash*, BBC WORKLIFE (Apr. 16, 2019), <https://www.bbc.com/worklife/article/20190416-why-the-swiss-still-love-cash> (“For now, many Swiss still value the anonymity and freedom that cash affords them.”); Morales Resendiz, *supra* note 7, at 6. *See also* Catherine M. Downey, *The High Price of a Cashless Society: Exchanging Privacy Rights for Digital Cash*, 14 J. MARSHALL J. COMPUTER & INFO. L. 303, 318-21 (1996) (concluding that the

intermediaries,<sup>30</sup> lack of access to digital payment services,<sup>31</sup> or to facilitate tax evasion.<sup>32</sup> Cash remains a necessity for many low-income individuals,<sup>33</sup> and many jurisdictions have cited the need to protect the financially excluded as a reason for continuing to issue cash. For example, both the New York City Council and an independent review in the UK call for continued use and acceptance of cash.<sup>34</sup>

Checks are a cash substitute that rose to prominence in the United States in the second half of the nineteenth century.<sup>35</sup> Checks allow households, nonprofits, and businesses with positive bank account balances to transfer large sums to other individuals without withdrawing cash.<sup>36</sup> Governments also sometimes use checks to pay benefits.<sup>37</sup> Clearing checks generally involves a system of multiple banks working

---

current regulatory framework surrounding cashless payments fails to effectively protect privacy rights).

<sup>30</sup> See Helmut Stix, *Why do People Save in Cash? Distrust, Memories of Banking Crises, Weak Institutions and Dollarization*, 37 J. BANKING & FIN. 4087 (2013) (providing an empirical analysis of how distrusting banks has led those in poorer economies to “hold sizeable shares of their assets in cash at home.”).

<sup>31</sup> Morales Resendiz, *supra* note 7, at 6-7.

<sup>32</sup> See Luisa R. Blanco et al., *A Qualitative Analysis of the Use of Financial Services and Saving Behavior Among Older African Americans and Latinos in the Los Angeles Area*, SAGE OPEN, Jan. 2015, at 2, <https://journals.sagepub.com/doi/full/10.1177/2158244014562388> (“[A]n individual might lack the motivation to participate in the formal financial sector if he or she is part of the cash economy and wants to avoid declaring income for taxes or lacks a legal status to do so.”).

<sup>33</sup> See generally ACCESS TO CASH REV. PANEL, ACCESS TO CASH REVIEW: FINAL REPORT (2019), <https://www.accesstocash.org.uk/media/1087/final-report-final-web.pdf>; Mehrsa Baradaran, William Greenlee, & Jay Zagorsky, *Show Me the Money: Does Going Cashless Hurt Financial Inclusion?*, KNOWLEDGE@WHARTON (Mar. 12, 2019), <https://knowledge.wharton.upenn.edu/article/cashless-stores-philadelphia/>; Benjamin Anderson, *Cashless Economy Puts Financial Inclusion at Risk*, GLOB. TREASURER (Mar. 22, 2018), <https://www.theglobaltreasurer.com/2018/03/22/cashless-economy-puts-financial-inclusion-at-risk/>.

<sup>34</sup> ACCESS TO CASH REV. PANEL, *supra* note 34, at 73; Adam Gabbatt, *New York City Votes to Ban Cashless Businesses in Step Against Discrimination*, THE GUARDIAN (Jan. 24, 2020, 8:31 AM), <https://www.theguardian.com/us-news/2020/jan/24/new-york-city-ban-cashless-businesses-discrimination> (citing a 2019 report by the Department of Consumer and Worker Protection of New York City which defines the “unbanked” as people without bank accounts and the “underbanked” as those who have a “bank account but use alternative financial products for some banking needs.” N.Y.C. DEP’T OF CONSUMER & WORKER PROT., WHERE ARE THE UNBANKED AND UNDERBANKED IN NYC? UPDATED FINDINGS 1 (2017 DATA) (2019), <https://www1.nyc.gov/assets/dca/downloads/pdf/partners/Research-UnAndUnderbankedNewYorkers.pdf>).

<sup>35</sup> John A. James & David F. Weiman, *Political Economic Limits to the Fed’s Goal of a Common National Bank Money: The Par Clearing Controversy Revisited*, in RES. ECON. HIST. 91 (Christopher Hanes, Susan Wolcott eds., 2014) [https://www.emerald.com/insight/content/doi/10.1108/S0363-3268\(2014\)0000030002/full/html](https://www.emerald.com/insight/content/doi/10.1108/S0363-3268(2014)0000030002/full/html).

<sup>36</sup> See DEPOSITACCOUNTS, *Banking 101: How to Transfer Money From One Bank to Another* (last updated on Nov. 18, 2019), <https://www.depositaccounts.com/blog/bank-transfer.html>.

<sup>37</sup> See, e.g., Carl Franzen, *US government ending paper benefits checks, switching to direct deposit March 1st*, THE VERGE (Feb. 24, 2013), <https://www.theverge.com/2013/2/24/4024058/us-treasury-ending-paper-benefits-checks-for-direct-deposit>.

together, and for many decades, check clearing was plagued by high fees.<sup>38</sup> In the United States, the Federal Reserve spent decades fighting to eliminate “non-par” clearing of checks – a critical accomplishment for financial inclusion.<sup>39</sup>

Although cash and checks can now often be transferred fee-free, they are increasingly suboptimal payment methods.<sup>40</sup> Low-income and under- and unbanked households disproportionately bear costs incurred by the use of cash and checks.<sup>41</sup> For example, converting these physical payment media into digital account money or vice versa can require spending substantial time at check cashers and paying fees.<sup>42</sup> Further, cash payments are also more difficult to track, and cash can be easily lost or stolen.<sup>43</sup> In light of these and other limitations, wholly electronic payment methods have gradually gained market share.<sup>44</sup> According to the World Bank’s 2015 Global Payment Systems Survey, payment cards, including both credit and debit cards, are the most used cashless payment instruments in the countries surveyed.<sup>45</sup>

Credit cards, introduced in the 1950s, use a set of electronic systems and processes to link merchant transactional accounts with customer accounts through their respective banks<sup>46</sup>. Debit cards, widely introduced in the 1980s, enable people to make payments at points of sale and to withdraw cash from automated teller

<sup>38</sup> See James & Weiman, *supra* note 36, at 93-105.

<sup>39</sup> See *id.* at 109-14.

<sup>40</sup> See Bhaskar Chakravorti, *The Hidden Costs of Cash*, HARV. BUS. REV. (Jun. 26, 2014), <https://hbr.org/2014/06/the-hidden-costs-of-cash>.

<sup>41</sup> Such costs can take the form of cash-access fees charged for check-cashing, loan procurement, or transportation costs required to physically obtain cash due to poor cash infrastructure. *Id.* See also Seema Malhotra, Labor Co-Op, U.K. Parliament, Speaking Contributions at the Financial Exclusion: Access to Cash Debate, Westminster Hall (May 21, 2019) (transcript available at House of Commons Hansard website), <https://hansard.parliament.uk/Commons/2019-05-21/debates/9B58E28C-BBC2-4C07-91BB-2CA28BFAB898/FinancialExclusionAccessToCash>.

<sup>42</sup> See *id.* See also Geoff Williams & Simon Zhen, *How to Cash a Check Without a Bank Account*, U.S. NEWS (Mar. 8, 2019), <https://money.usnews.com/banking/articles/how-to-cash-a-check-without-a-bank-account>.

<sup>43</sup> See ACCESS TO CASH REV. PANEL, *supra* note 34, at 28.

<sup>44</sup> See BIS COMM. ON PAYMENTS & MKT. INFRASTRUCTURES & THE WORLD BANK GRP., PAYMENT ASPECTS OF FINANCIAL INCLUSION, *supra* note 25, at 12-13. Electronic payment methods broadly include credit transfer, direct debit, debit and credit cards, and electronic money (“e-money”) and its derivatives. *Id.* at 13.

<sup>45</sup> See THE WORLD BANK GRP., UNIVERSAL FINANCIAL ACCESS: GLOBAL PAYMENT SYSTEMS SURVEY 2015 – ACCOUNT & ACCESS 13 (2016), <http://pubdocs.worldbank.org/en/504871475847684346/GPSS-UFA-Note-October2016.pdf>. For an analysis of card use in the U.S., see THE FED. RESERVE BD., THE 2019 FEDERAL RESERVE PAYMENTS STUDY (2019), <https://www.federalreserve.gov/newsevents/pressreleases/files/2019-payments-study-20191219.pdf>.

<sup>46</sup> See FUMIKO HAYASHI, RICHARD SULLIVAN, & STUART E. WEINER, A GUIDE TO THE ATM AND DEBIT CARD INDUSTRY, FED. RESERVE BANK OF KANSAS CITY 7, 11, 43 (2003), <https://www.kansascityfed.org/PUBLICAT/PSR/BksJournArticles/ATMpaper.pdf>; Jason Steele, *The History of Credit Cards*, EXPERIAN (Mar. 15, 2018), <https://www.experian.com/blogs/ask-experian/the-history-of-credit-cards/#:~:text=Most%20historians%20trace%20the%20modern.brief%20explanation%20of%20credit%20cards.>

machines (“ATMs”).<sup>47</sup> While payment cards may advance financial inclusion in some contexts,<sup>48</sup> they may also further entrench economic disadvantages. For example, credit card companies often offer less-sophisticated customers cards with shrouded contingent features such as high late fees, overdraft fees, and penalty interest rates.<sup>49</sup> Wire transfers have also begun to replace checks, but banks tend to charge high flat fee rates to customers.<sup>50</sup> This is non-par clearing for the electronic age.

Although the use of cash and checks in the United States is declining, with cards replacing cash as the dominant form of payment by volume,<sup>51</sup> the demand for cash remains steady and, in many places has been increasing.<sup>52</sup> Often cards are used merely to facilitate cash transactions. For example, in Latin America and the Caribbean, cards are most commonly used to withdraw cash from an ATM rather than to transact directly.<sup>53</sup> In these scenarios, the limited use of cards is often attributable in part to the barriers to access caused by underdeveloped acceptance infrastructure at merchant locations.<sup>54</sup>

---

<sup>47</sup> See HAYASHI, SULLIVAN, & WEINER, *supra* note 47, at 5-7, 13 (noting that the Bank of Delaware launched the first debit card pilot program in 1966).

<sup>48</sup> For the financial inclusion effects of debit cards, see, for example, Pierre Bachas et al., *How Debit Cards Enable the Poor to Save More* (Nat’l Bureau Econ. Research, Working Paper No. 23252, last updated Aug. 2019), <https://www.nber.org/papers/w23252.pdf> (finding that debit cards bolster savings by the poor because “they reduce transaction costs of accessing money; second, they reduce monitoring costs, leading beneficiaries to check their account balances frequently and build trust in the bank.”). Challenges of using payment cards to promote financial inclusion in developing economies include a greater vulnerability to the influence of volatile capital flows, insufficient resources to build a physical banking infrastructure that is geographically accessible to all or to invest in technology platforms with updated payment systems, inadequate national personal identification systems, few consumer protection regulations, poverty, informal labor structures, poor financial literacy and capability, and etc. See, e.g., INT’L FIN. CORP. EM COMPASS, WORLD BANK GRP., DIGITAL FINANCIAL SERVICES: CHALLENGES AND OPPORTUNITIES FOR EMERGING MARKET BANKS 3 (2017), <https://www.ifc.org/wps/wcm/connect/067d6a0c-f1b5-4457-97aa-2982a7dfda69/EMCompass+Note+42+DFS+Challenges+updated.pdf?MOD=AJPERES&CVID=ITM-26u>.

<sup>49</sup> Antoinette Schoar & Hong Ru, *Do Credit Card Companies Screen for Behavioral Biases?* 2 (Bank for Int’l Settlements Working Papers, Working Paper No. 842, 2020), <https://www.bis.org/publ/work842.pdf>.

<sup>50</sup> See, e.g., VEEM, *Checks or wire transfers: which is better?* (Sep. 23, 2019), <https://www.veem.com/library/checks-or-wire-transfers-which-is-better/>.

<sup>51</sup> See THE FED. RESERVE BD., THE FEDERAL RESERVE PAYMENTS STUDY: 2018 ANNUAL SUPPLEMENT 1, 2 (2018), <https://www.federalreserve.gov/newsevents/pressreleases/files/2018-payment-systems-study-annual-supplement-20181220.pdf> (“As discussed in a previous report, both debit (including prepaid and non-prepaid) and credit cards held the largest shares of total payments by number in 2015.”).

<sup>52</sup> See generally, Morten Linnemann Bech et al., *Payments are A-Changin’ but Cash Still Rules*, BIS Q. REV., Mar. 2018, [https://www.bis.org/publ/qtrpdf/r\\_qt1803g.pdf](https://www.bis.org/publ/qtrpdf/r_qt1803g.pdf).

<sup>53</sup> Morales Resendiz, *supra* note 7, at 12.

<sup>54</sup> See MALTE KRUEGER ET AL., DEUTSCHE BUNDESBANK, COSTS AND BENEFITS OF CASH AND CASHLESS PAYMENT INSTRUMENTS, MODULE 1: OVERVIEW AND INITIAL ESTIMATES 49 (2014), <https://www.bundesbank.de/resource/blob/710096/4f27e9114ce3a08b74b6c6effee04f65/mL/costs-and-benefits-of-cash-2014-data.pdf>.

## B. NFC AND TOKENIZED PAYMENTS

In the last decade, Near-Field Communication (“NFC”) has spawned a revolution in card-based payments. NFC allows mobile devices and payment cards to remotely communicate with Point-of-Sale (“POS”) terminals in order to perform payment functions.<sup>55</sup> In general, NFC technology leverages banks or other financial institutions, mobile network operators (“MNOs”), phone manufacturers, and end users to effectuate POS retail payments.<sup>56</sup> To date, NFC has enabled both card and mobile payment solutions.<sup>57</sup> The latter include mobile wallets and Quick Response (“QR”) Code Payments.<sup>58</sup> In 2012, a report produced by the Committee on Payment and Settlement Systems (“CPSS”), now the Committee on Payments and Market Infrastructures (“CPMI”), identified NFC as an area of much “potential for future growth, as it supports faster payment processing.”<sup>59</sup> The report, however, also noted that the success of NFC depends on its “speed, reliability, and security.”<sup>60</sup> While big technology firms such as Apple and Alibaba have been able to leverage NFC successfully,<sup>61</sup> major MNOs explored this payment technology with limited success due to subpar interoperability with other payment services.<sup>62</sup>

Security concerns associated with NFC payments gave rise to tokenization.<sup>63</sup> “Tokenization is the process of replacing sensitive information, such as a credit card or social security number, with a non-sensitive replacement value.”<sup>64</sup> In 2001, TrustCommerce (now “Sphere”), a provider of end-to-end integrated payments and

---

<sup>55</sup> See generally, ROHDE & SCHWARZ, NEAR FIELD COMMUNICATION (NFC) TECHNOLOGY AND MEASUREMENTS WHITE PAPER 3, 10 (2013), [https://www.rohde-schwarz.com/us/applications/near-field-communication-nfc-technology-and-measurements-white-paper\\_230854-15836.html](https://www.rohde-schwarz.com/us/applications/near-field-communication-nfc-technology-and-measurements-white-paper_230854-15836.html).

<sup>56</sup> See Emily Sorensen, *Different Types of Mobile Payments Explained*, MOBILE TRANSACTION (May 31, 2018), <https://www.mobiletransaction.org/different-types-of-mobile-payments/>.

<sup>57</sup> ROHDE & SCHWARZ, *supra* note 56, at 3, 10.

<sup>58</sup> See Sorensen, *supra* note 57.

<sup>59</sup> BIS COMM. ON PAYMENT & SETTLEMENT SYS., INNOVATIONS IN RETAIL PAYMENTS: REPORT OF THE WORKING GROUP ON INNOVATIONS IN RETAIL PAYMENTS 2 (2012), <https://www.bis.org/cpmi/publ/d102.pdf>

<sup>60</sup> *Id.* at 49.

<sup>61</sup> See THE PAYPERS, *supra* note 1, at 26, 27 (mentioning both Apply Pay and Alibaba-and Softbank-backed company, Paytm).

<sup>62</sup> See, e.g., Chris Welch, *Softcard is Shutting Down on March 31st, and Google Wallet will Replace It*, THE VERGE (Mar. 5, 2015, 12:35 AM), <https://www.theverge.com/2015/3/5/8152801/softcard-shutting-down-march-31>. For instance, Softcard, a mobile wallet system jointly developed by AT&T, T-Mobile, and Verizon Wireless, failed in part because it was only interoperable with a limited number of credit cards. *Id.*

<sup>63</sup> See Dennis Giese et al., *Security Analysis of Near-Field Communication (NFC) Payments* 3, 4-5 (May 16, 2018) (on file with Cornell University), <https://arxiv.org/pdf/1904.10623.pdf>; Naomi Lurie, *Why Tokenization is the Key to Mobile Payment Security*, TNW INSIDER (May 15, 2015), <https://thenextweb.com/insider/2015/05/15/why-tokenization-is-the-key-to-mobile-payment-security/>.

<sup>64</sup> TOWNSEND SEC., *TOKENIZATION: A COST-EFFECTIVE AND EASY PATH TO COMPLIANCE AND DATA PROTECTION* 1 (2010), <https://townsendsecurity.com/sites/default/files/Tokenization.pdf>.

security software, introduced the concept of tokenization to protect sensitive client payment data.<sup>65</sup> Most NFC payment systems, such as Apple Pay and Google Wallet, either rely on or conform to the EMVCo Payment Tokenization standard.<sup>66</sup> Despite tokenized payments' enhanced security features, several challenges remain.<sup>67</sup> For example, static tokens increase the risk of "re-use in fraudulent transactions."<sup>68</sup> Furthermore, a lack of interoperability between tokenization and legacy payment infrastructures threatens to hamper further innovation.<sup>69</sup>

### C. ELECTRONIC MONEY

Another area of innovation is electronic money or "e-money." The Bank for International Settlements defines the term to mean "multi-purpose prepaid cards . . . and prepaid or stored-value payment mechanisms for executing payments over open computer networks, such as the Internet."<sup>70</sup> Unlike other payment card transactions, which are also processed electronically, e-money payments are pre-funded.<sup>71</sup> The

<sup>65</sup> TRUSTCOMMERCE BLOG, *Where Did Tokenization Come From?* (Feb. 13, 2017), <https://www.trustcommerce.com/blog/where-did-tokenization-come-from/>.

<sup>66</sup> UL, APPLE PAY – WHAT DO WE KNOW?: UL'S INDEPENDENT ASSESSMENT 2, [https://www.planetbiometrics.com/creo\\_files/upload/article-files/apple\\_pay\\_-\\_what\\_do\\_we\\_know.pdf](https://www.planetbiometrics.com/creo_files/upload/article-files/apple_pay_-_what_do_we_know.pdf) (last visited Jul. 7, 2020). See U.S. PAYMENTS FORUM, EMV PAYMENT TOKENIZATION PRIMER AND LESSONS LEARNED 8, 12 (2019), <https://www.uspaymentsforum.org/wp-content/uploads/2019/06/EMV-Payment-Tokenization-Primer-Lessons-Learned-FINAL-June-2019.pdf>; Marianne Crowe et al., *Is Payment Tokenization Ready for Primetime? Perspectives from Industry Stakeholders on the Tokenization Landscape*, FED. RESERVE BANKS OF ATLANTA & BOS. (June 11, 2015), <https://www.bostonfed.org/publications/mobile-payments-industry-workgroup/is-payments-tokenization-ready-for-primetime-perspectives-from-industry-stakeholders.aspx>. EMVCo is owned by the six major global card payment brands (Visa, AmEx, MasterCard, Discover, JCB, and China Union Pay). EMVCo, LLC, *Overview of EMVCo* (2020), <https://www.emvco.com/about/overview/>. It "facilitates worldwide interoperability and acceptance of secure payment transactions. . . . by managing EMV® Specifications and related testing processes." *Id.* For more information regarding the technical framework of EMVCo tokenization, see EMVCo, LLC, *A GUIDE TO USE CASES* (2019), <https://www.emvco.com/emv-technologies/payment-tokenisation/>.

<sup>67</sup> See Susan Pandy & Marianne Crowe, *Mobile Payments Industry Workgroup Meeting Discussion on Tokenization Landscape in the U.S.: June 2-3, 2014*, FED. RESERVE BANK OF BOS. (Sept. 23, 2014), [https://www.bostonfed.org/publications/mobile-payments-industry-workgroup/summary-of-mobile-payments-industry-workgroup-mpiw-meeting-discussion-on-the-us-tokenization-landscape-june-23-2014.aspx?wt.source=bfo\\_mpiw\\_pr](https://www.bostonfed.org/publications/mobile-payments-industry-workgroup/summary-of-mobile-payments-industry-workgroup-mpiw-meeting-discussion-on-the-us-tokenization-landscape-june-23-2014.aspx?wt.source=bfo_mpiw_pr).

<sup>68</sup> See *id.* at 11.

<sup>69</sup> See *id.* at 12.

<sup>70</sup> See GRP. OF TEN WORKING PARTY ON ELEC. MONEY, BANK FOR INT'L SETTLEMENTS & INT'L MONETARY FUND, *ELECTRONIC MONEY: CONSUMER PROTECTION, LAW ENFORCEMENT, SUPERVISORY AND CROSS-BORDER ISSUES 2-3* (1997), <https://www.bis.org/publ/gten01.pdf>. Several official bodies have each issued their definitions. See, e.g., Council Directive 2009/110, art. 1.3, 2009 O.J. (L 267) 7 (EC); GENEVA INTERNET PLATFORM DIG. WATCH, *Cryptocurrencies*, <https://dig.watch/issues/cryptocurrencies> (last visited Jul. 7, 2020).

<sup>71</sup> See GENEVA INTERNET PLATFORM DIG. WATCH, *supra* note 71; BIS COMM. ON PAYMENTS & MKT. INFRASTRUCTURES & THE WORLD BANK GRP., *PAYMENT ASPECTS OF FINANCIAL INCLUSION*, *supra* note 25, at 13. Physical payment instruments are inefficient because they entail, *inter alia*, high payment

CPMI divides e-money products into two broad categories: card-based products, where values used to facilitate payments are stored on the chip of a card, and network-/software-based products, where values used to facilitate payments are stored on “the central server at the issuer of the e-money.”<sup>72</sup> E-money includes funds transferred through Automated Clearing Houses (“ACHs”), Virtual Credit Cards (“VCCs”), Electronic Fund Transfers (“EFTs”), and other networks.<sup>73</sup>

E-money may be issued by banks or non-bank financial institutions.<sup>74</sup> In practice, e-money transactions often involve both banks and non-banks.<sup>75</sup> This model may give rise to interoperability issues which central banks have addressed differently. The South African Reserve Bank, for instance, is reviewing the South African National Payment System Act of 1998.<sup>76</sup> In doing so, the Bank is proposing changes that would allow non-bank financial institutions to issue e-money and perform clearing and settlement of e-money transactions without the need to partner with a bank.<sup>77</sup> The People’s Bank of China (“PBOC”) has established a centralized payment clearing house to ensure interoperability and appropriate rules for clearing and settlement of similar e-money transactions between payment service providers.<sup>78</sup>

The growth of e-money products and the aggregate value of funds stored in the underlying e-money accounts may also give rise to the risk of misuse of customer funds.<sup>79</sup> Central banks around the world have implemented a variety of safeguards against misappropriation of payers’ e-money accounts. For instance, payment laws in Kenya, Paraguay, and Indonesia require e-money issuers to deposit customer funds

---

processing costs, lack of control and visibility, and vulnerability to fraud. See UNITED NATIONS, *Trade Facilitation Implementation Guide* (2012), <http://tfig.unece.org/contents/e-payments.htm>.

<sup>72</sup> Neda Popovska-Kamnar, *The Use of Electronic Money and Its Impact on Monetary Policy*, 1 J. CONTEMP. ECON. & BUS. ISSUES 79, 81-82 (2014). See BIS COMM. ON PAYMENT & SETTLEMENT SYS., SURVEY OF DEVELOPMENTS IN ELECTRONIC MONEY AND INTERNET AND MOBILE PAYMENTS 2-3 (2004), <https://www.bis.org/cpmi/publ/d62.pdf>.

<sup>73</sup> See BIS COMM. ON PAYMENTS & MKT. INFRASTRUCTURES & THE WORLD BANK GRP., PAYMENT ASPECTS OF FINANCIAL INCLUSION, *supra* note 25, at 13; GRP. OF TEN WORKING PARTY ON ELEC. MONEY, *supra* note 71, at 3.

<sup>74</sup> STEFAN STASCHEN & PATRICK MEAGHER, CGAP, BASIC REGULATORY ENABLERS FOR DIGITAL FINANCIAL SERVICES 5 (2018), <https://www.cgap.org/sites/default/files/researches/documents/Focus-Note-Basic-Regulatory-Enablers-for-DFS-May-2018.pdf>. Here, non-banks refer to non-depository financial institutions that are not subject to prudential regulations normally applicable to banks. *Id.*

<sup>75</sup> See MICHAEL TARAZI & PAUL BRELOFF, CGAP, NONBANK E-MONEY ISSUERS: REGULATORY APPROACHES TO PROTECTING CUSTOMER FUNDS 2-3 (2010), [https://www.law.berkeley.edu/files/CMS\\_-\\_Maurer\\_Bill\\_Nonbak\\_Emoney\\_Issuers\\_FN63\\_Rev.pdf](https://www.law.berkeley.edu/files/CMS_-_Maurer_Bill_Nonbak_Emoney_Issuers_FN63_Rev.pdf) (noting that even the non-bank e-money issuers still have to hold matching-value assets in pooled accounts in regulated banks).

<sup>76</sup> S. AFRICAN RESERVE BANK, REVIEW OF THE NATIONAL PAYMENT SYSTEM ACT 78 OF 1998 (2018), <http://www.treasury.gov.za/publications/other/NPS%20Act%20Review%20Policy%20Paper%20-%20final%20version%20-%2013%20September%202018.pdf>.

<sup>77</sup> *Id.* at 49-50.

<sup>78</sup> See Part IV.

<sup>79</sup> See ALL. FOR FIN. INCLUSION MOBILE FIN. SERV. WORKING GRP., MOBILE FINANCIAL SERVICES: CONSUMER PROTECTION IN MOBILE FINANCIAL SERVICES 8 (2014), [http://www.afi-global.org/sites/default/files/publications/mfswg\\_guideline\\_note\\_7\\_consumer\\_protection\\_in\\_mfs.pdf](http://www.afi-global.org/sites/default/files/publications/mfswg_guideline_note_7_consumer_protection_in_mfs.pdf).

in commercial banks or other financial institutions approved by their respective central banks.<sup>80</sup> Alternatively, the regulations in India and Peru mandate that funds designated for investment be invested in government securities or other instruments issued by the central bank.<sup>81</sup> Central banks in Brazil and Colombia, among others, also offer the option of depositing customer funds in an account at the central bank.<sup>82</sup>

#### D. CRYPTOCURRENCY

Perhaps the biggest disruption to traditional payment systems in the last decade has been cryptocurrencies. Cryptocurrencies come in many shapes and sizes (figuratively speaking, of course). Some use their own “unit of account”; instead of dollars or yen, they are denominated in “bitcoin” or “ether.”<sup>83</sup> Others, called stablecoins,<sup>84</sup> use an existing unit, like the dollar, and try to trade at par with similarly denominated monetary instruments like deposits or cash.<sup>85</sup>

Cryptocurrencies can be either centralized or decentralized.<sup>86</sup> Centralized cryptocurrencies, such as central bank digital currencies (“CBDCs”), form payment systems where “the central bank, or some trusted private company, keeps track of the transfer of tokens.”<sup>87</sup> A decentralized virtual currency, however, relies upon cryptographic proof in lieu of trusted networks, and is recorded on a distributed ledger.<sup>88</sup> The European Banking Authority (“EBA”) has opined that cryptocurrencies may advance financial inclusion in countries “where financial services are not widely available, where users have a high risk profile . . . where financial services are too

---

<sup>80</sup> See, e.g., THE NATIONAL PAYMENT SYSTEM REGULATIONS, Kenya Gazette Supplement No. 119, Art. 25-26 (2014) for Kenya; ROSA M. OLIVEROS & LUCIA PACHECO, PROTECTION OF CUSTOMERS’ FUNDS IN ELECTRONIC MONEY: A MYRIAD OF REGULATORY APPROACHES, BBVA RESEARCH 9, 11 (2016), [https://www.bbvaresearch.com/wp-content/uploads/2016/10/Safeguardingelectronicmoneyfunds\\_en.pdf](https://www.bbvaresearch.com/wp-content/uploads/2016/10/Safeguardingelectronicmoneyfunds_en.pdf).

<sup>81</sup> See RESERVE BANK OF INDIA, GUIDELINES FOR LICENSING OF PAYMENTS BANKS art. 5 (2014), [https://www.rbi.org.in/scripts/bs\\_viewcontent.aspx?Id=2900](https://www.rbi.org.in/scripts/bs_viewcontent.aspx?Id=2900); OLIVEROS & PACHECO, *supra* note 81, at 9, 11.

<sup>82</sup> OLIVEROS & PACHECO, *supra* note 81, at 8.

<sup>83</sup> See Lev Menand, *Regulate Virtual Currencies as Currency*, JUST MONEY (Feb. 14, 2020), <https://justmoney.org/l-menand-regulate-virtual-currencies-as-currency/>.

<sup>84</sup> Stablecoins are a form “of cryptoasset whose value is linked to an external anchor, be it a fiat currency or a commodity, collateralized or not, or an algorithm that manages the price controlling of the quantity of the crypto-coin in circulation.” Santiago Fernandez de Lis, *Central Bank Digital Currencies: Features, Options, Pros and Cons*, in DO WE NEED CENTRAL BANK DIGITAL CURRENCY?: ECONOMICS, TECHNOLOGY AND INSTITUTIONS 54 (Ernest Gnan & Donato Masciandaro eds., 2018).

<sup>85</sup> Menand, *supra* note 84.

(distinguishing between several different types of cryptocurrency).

<sup>86</sup> See JON DANIELSSON, SYSTEMIC RISK CTR., CRYPTOCURRENCIES: POLICY, ECONOMICS AND FAIRNESS: SRC DISCUSSION PAPER No. 8610 10 (2018), <http://www.systemicrisk.ac.uk/sites/default/files/downloads/publications/dp-86.pdf>.

<sup>87</sup> *Id.*

<sup>88</sup> See, e.g., SATOSHI NAKAMOTO, BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM 1 (2008), <https://bitcoin.org/bitcoin.pdf>.

expensive for individuals, or where the administrative burden for obtaining an account is high.”<sup>89</sup> Nevertheless, research has shown that decentralized cryptocurrencies such as Bitcoin not only generate huge mining costs, but are also inefficient in their long-run design.<sup>90</sup> This is due to transaction fees, delayed confirmation, lags in settlement, and unstable value.<sup>91</sup> A study conducted by researchers at the Bank of Canada suggests that such concerns may be less relevant in retail transactions.<sup>92</sup> If this proves to be correct, small transaction sizes with large volume could make a blockchain-based payment system less costly than a system with large transaction sizes.<sup>93</sup>

In 2019, Facebook announced a plan to develop a centralized virtual currency in a new unit of account, Libra, backed by a basket of monetary instruments denominated in traditional fiat currencies.<sup>94</sup> The currency would be governed by the Libra Association and “built on a secure, scalable, and reliable blockchain.”<sup>95</sup> Libra’s advocates argued that, unlike Bitcoin and other cryptocurrencies, Libra would have price stability and centralization, which would be achieved by pooling customer funds into the Libra Reserve (“The Reserve”).<sup>96</sup> Thus, Libra would function as a *de facto* “quasi-sovereign issuer of currency”<sup>97</sup> insofar as the Reserve would hold “a basket of bank deposits and short-term government securities for every Libra,” the composition

---

<sup>89</sup> See European Banking Authority, EBA Opinion on ‘Virtual Currencies’, at 18, EBA/Op/2014/08 (Jul. 4, 2014), <https://eba.europa.eu/sites/default/documents/files/documents/10180/657547/81409b94-4222-45d7-ba3b-7deb5863ab57/EBA-Op-2014-08%20Opinion%20on%20Virtual%20Currencies.pdf?retry=1>.

<sup>90</sup> See Jonathan Chiu et al., *The Economics of Cryptocurrencies – Bitcoin and Beyond* 2-3 (Bank of Can., Working Paper 2019-40, 2019), <https://www.bankofcanada.ca/wp-content/uploads/2019/09/swp2019-40.pdf>.

<sup>91</sup> *Id.*

<sup>92</sup> See *id.* at 30.

<sup>93</sup> See *id.*

<sup>94</sup> See THE LIBRA ASS’N, AN INTRODUCTION TO LIBRA 3 (2019), [https://libra.org/en-US/wp-content/uploads/sites/23/2019/06/LibraWhitePaper\\_en\\_US.pdf](https://libra.org/en-US/wp-content/uploads/sites/23/2019/06/LibraWhitePaper_en_US.pdf).

<sup>95</sup> See *id.* The Libra Association is an independent non-profit organization based in Switzerland. *Id.* Major enterprises such as Facebook, Uber, PayPal, MasterCard, Visa, eBay, Coinbase, Vodafone, and Spotify joined the Libra Association as Founding Members, although some of these firms have since withdrawn. *Id.* at 4. See also Russell Brandom, *Why So Many Companies Bailed on Facebook’s Libra Project at Once*, THE VERGE (Oct. 11, 2019, 6:18 PM), <https://www.theverge.com/2019/10/11/20910453/libra-association-facebook-visa-mastercard-stripe-leaving>.

<sup>96</sup> See THE LIBRA ASS’N, WHITE PAPER V2.0, 10-14 (2020), <https://libra.org/en-US/white-paper/>.

<sup>97</sup> See Yves Mersch, Member of the Exec. Bd., European Cent. Bank, Money and Private Currencies: Reflections on Libra, Speech at the ECB Legal Conference, Frankfurt am Main (Sept. 2, 2019) (transcript available at European Central Bank website), <https://www.ecb.europa.eu/press/key/date/2019/html/ecb.sp190902~aedded9219.en.html>.

of which is subject to change based on market conditions.<sup>98</sup> In doing so, Libra would in principle be less volatile in price than other cryptocurrencies.<sup>99</sup>

Since the announcement, however, central banks and other financial regulators responded skeptically,<sup>100</sup> casting regulatory uncertainty over the project.<sup>101</sup> Several major participants in the initiative backed out, and earlier this year, the Libra Association abandoned its plan to issue a new unit of account.<sup>102</sup> Instead, it decided to create different stablecoins denominated in existing fiat currencies.<sup>103</sup>

### III. Current Issues

This part explores current issues in payments and highlights ways that central banks can tackle these issues to advance financial inclusion. Such solutions include improving payment speed, expanding access, reducing fragmentation, increasing standardization, and eliminating predatory practices.

---

<sup>98</sup> THE LIBRA ASS'N, AN INTRODUCTION TO LIBRA, *supra* note 95, at 3; Caitlin Long, *Bitcoin, The Dollar and Facebook's Cryptocurrency: Price Volatility Versus Systemic Volatility*, FORBES (June 29, 2019, 4:45 PM), <https://www.forbes.com/sites/caitlinlong/2019/06/29/bitcoin-the-dollar-and-facebooks-cryptocurrency-price-volatility-versus-systemic-volatility/#4ad2cb8b88b8>.

<sup>99</sup> See Long, *supra* note 99 (referencing NASSIM NICHOLAS TALEB, *ANTIFRAGILE: THINGS THAT GAIN FROM DISORDER* (Random House 2012)). Fiat currencies are susceptible to systemic financial instability because they are subject to “artificial suppression of natural volatility” by central banks. *Id.*

<sup>100</sup> See Mehreen, Sam Fleming, & Caroline Binham, *Central Banks to Grill Facebook Over Libra*, FIN. TIMES (Sept. 15, 2019), <https://www.ft.com/content/11bfda8c-d6fb-11e9-8f9b-77216ebef17>; Richard Meyer, *Libra Crypto is 'Undoubtedly' a Wakeup Call for Central Banks, Says EBC Exec*, COINDESK (updated Sept. 26, 2019, 6:12 AM), <https://www.coindesk.com/libra-crypto-is-undoubtedly-a-wakeup-call-for-central-banks-says-ecb-exec> (quoting one of the European Central Bank Executive Board's members, Benoit Coeure: “Libra has undoubtedly been a wakeup call for central banks and policymaker [sic],’ and they should respond to these challenges.”).

<sup>101</sup> See Stephen O’Neal, *Libra Seen as Threat to National Currency Sovereignty, Pleads with G-7*, COINTELEGRAPH (Sept. 19, 2019), <https://cointelegraph.com/news/libra-seen-as-threat-to-national-currency-sovereignty-pleads-with-g-7>; Sherrod Brown, Ranking Member, Senate Comm. on Banking, Hous., & Urban Affairs, Opening Statement at Facilitating Faster Payments Full Committee Hearing (Sept. 25, 2019) (transcript available at U.S. Senate Committee on Banking, Housing, and Urban Affairs website), <https://www.banking.senate.gov/imo/media/doc/Brown%20Statement%209-25-19.pdf> (“Whether it’s Facebook thinking it can run its own currency, or big banks wanting a monopoly over our payment system, we can’t allow corporations to take over critical public infrastructure, so they can squeeze more profits out of working families.”).

<sup>102</sup> See Russell Brandom, *supra* note 96; Romain Dillet, *Facebook-backed association revamps Libra following regulatory concerns* (Apr. 16, 2020), <https://techcrunch.com/2020/04/16/facebook-backed-association-revamps-libra-following-regulatory-concerns/>

<sup>103</sup> Dillet, *supra* note 103.

## A. REAL-TIME PAYMENTS

Real-time payments<sup>104</sup> refer to transfers that update bank accounts instantly.<sup>105</sup> They are either supported by real-time gross settlement services (“RTGS”) systems or deferred net settlement services (“DNS”) systems.<sup>106</sup> With RTGS systems, individual transactions are separately and instantaneously cleared and settled,<sup>107</sup> whereas with DNS systems, a change is made to the payee’s account balance before the payer’s payment services provider has paid the payee’s bank or financial institution.<sup>108</sup> Centralized real-time settlement of wholesale payments has been largely accessible for many years, but that of retail payments is unevenly provided in different countries and even within countries to different customers.<sup>109</sup> A recent report captures the role of real-time payments in enabling financial inclusion in India.<sup>110</sup> This report uses the Unified Payments Interface, an instant RTGS system created by the National Payments Corporation of India, as an example of a financial service that brings instant “third-party transfers and bill settlement” to the financially underserved.<sup>111</sup> As is true in India, consumers and businesses in many countries and regions – such as Mexico, several countries in Europe, and Russia – are progressing towards being able to make real-time retail payments at low cost through central bank-run RTGS systems.<sup>112</sup>

---

<sup>104</sup> Real-time payments are often referred to as “instant payments” or “immediate payments.” ACI WORLDWIDE & AMERICAS MKT. INTELLIGENCE, REAL-TIME PAYMENTS IN LATIN AMERICA: POTENTIAL FOR MASSIVE DISRUPTION 5 (2018), <https://americasmi.com/wp-content/uploads/2019/01/aci-real-time-payments-in-latin-america-potential-for-massive-disruption-english-complete.pdf>. For purposes of this brief, these terms are used interchangeably.

<sup>105</sup> *Id.*

<sup>106</sup> BIS COMM. ON PAYMENT & SETTLEMENT SYS., REAL-TIME GROSS SETTLEMENT SYSTEMS 5 (1997), <https://www.bis.org/cpmi/publ/d22.pdf>.

<sup>107</sup> *Id.* at 10. The BIS defined RTGS as “[t]he real-time settlement of payments, transfer instructions or other obligations individually on a transaction-by-transaction basis.” BIS COMM. ON PAYMENT & SETTLEMENT SYS., A GLOSSARY OF TERMS USED IN PAYMENTS AND SETTLEMENT SYSTEMS 15 (2016), <https://www.bis.org/cpmi/publ/d00b.htm?&selection=56&scope=CPMI&c=a&base=term>.

<sup>108</sup> BIS COMM. ON PAYMENTS & MKT. INFRASTRUCTURES, FAST PAYMENTS – ENHANCING THE SPEED AND AVAILABILITY OF RETAIL PAYMENTS 32 (2016), <http://www.bis.org/cpmi/publ/d154.pdf>.

<sup>109</sup> See DELOITTE LLP, REAL-TIME PAYMENTS ARE CHANGING THE REALITY OF PAYMENTS 2, 5 (2015), <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/strategy/us-cons-real-time-payments.pdf>; Robert Pile et al., *The Federal Reserve Enters the Real-time Payments Fray*, EVERSHEDES SUTHERLAND (U.S.) LLP (Aug. 7, 2019), <https://www.lexology.com/library/detail.aspx?g=ac2ba4a6-1ccb-48d5-8334-be82e81c82c4>.

<sup>110</sup> See SHAMIKA RAVI, ACCELERATING FINANCIAL INCLUSION IN INDIA, THE BROOKINGS INST.: INDIA 17-18 (2019), <https://www.brookings.edu/wp-content/uploads/2019/03/Accelerating-Fin-Inclusion-2019-updated-8x10-v2.0.pdf>.

<sup>111</sup> *Id.*

<sup>112</sup> THE BANK OF RUSS., *The Bank of Russia and Market Participants Launch Faster Payment System* (Apr. 26, 2018), <http://www.cbr.ru/eng/press/event/?id=1808>; Martijn Os Michael Little, & Berend de Jong, *Real-Time Payments for Real-Time Banking*, Accenture Payment Services (2015), [https://www.accenture.com/t00010101T000000\\_w\\_/de-de/acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub\\_22/Accenture-Banking-Realtime-Payments-Realtime-Bank.pdf](https://www.accenture.com/t00010101T000000_w_/de-de/acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_22/Accenture-Banking-Realtime-Payments-Realtime-Bank.pdf). See also LEO LIPIS & R. ANDREW GÓMEZ, LIPIS ADVISORS, GET MORE FROM REAL-

As early as 2003, the BIS summarized the need for a new regulatory response to the widespread adoption of private RTGS systems.<sup>113</sup> One of their recommendations is to create centralized settlement systems.<sup>114</sup> A 2002 U.S. General Accounting Office's Report touches on the various degrees of central bank involvement in real-time payments as well as case studies of central bank-run RTGS systems.<sup>115</sup> Today, a consensus is growing that central banks should play a key role in operating real-time retail payments; many scholars are calling for direct provisioning of real-time clearing and settlement infrastructures when the market has failed to provide such services.<sup>116</sup>

Recognizing high pressure<sup>117</sup> and demand for faster retail payments, the Federal Reserve announced the development of FedNow, a service to provide real-time, instantaneous payment clearing services.<sup>118</sup> FedNow can be expected to reduce fees and the power of existing payment monopolies.<sup>119</sup> In addition, FedNow could level the

---

TIME PAYMENTS 6 (2019), <https://www.aciworldwide.com/-/media/files/collateral/trends/get-more-from-real-time-payments.pdf> (referencing Sweden and the U.K. as examples of countries where “consumers can make and receive real-time payments for free, but businesses are charged a small fee. . .”).

<sup>113</sup> See BIS COMM. ON PAYMENT & SETTLEMENT SYS., THE ROLE OF CENTRAL BANK MONEY IN PAYMENT SYSTEMS 4-6 (2003), <https://www.bis.org/cpmi/publ/d55.pdf>.

<sup>114</sup> See generally *id.*

<sup>115</sup> U.S. GEN. ACCOUNTABILITY OFFICE (formerly, U.S. GEN. ACCOUNTING OFFICE), GAO REPORT TO CONGRESSIONAL REQUESTER - PAYMENT SYSTEMS: CENTRAL BANK ROLES VARY, BUT GOALS ARE THE SAME (2002), <https://www.govinfo.gov/content/pkg/GAOREPORTS-GAO-02-303/html/GAOREPORTS-GAO-02-303.htm> (noting that “[c]entral banks also tend to have less operational involvement” in providing settlement and clearing services “in countries where there is a relatively concentrated banking industry.”). An example of a Central Bank-run RTGS system includes the Trans-European Automated Real-time Gross Settlement Express Transfer system (“TARGET”) operated by the European Central Bank. *Id.* TARGET allows system participants to borrow intraday credits at a zero-interest rate. Ruilin Zhou, FED. RESERVE BANK CHI., *Understanding Intraday Credit in Large-Value Payment Systems*, 24 ECON. PERSP. 29, 32 (2000).

<sup>116</sup> George Selgin and Aaron Klein, *We Shouldn't Have to Wait for FedNow to Have Faster Payments*, AMERICAN BANKER (February 28, 2020, 9:00 AM), <https://www.americanbanker.com/opinion/we-shouldnt-have-to-wait-for-fednow-to-have-faster-payments>. Cf. BIS COMM. ON PAYMENTS & MKT. INFRASTRUCTURES, FAST PAYMENTS-ENHANCING THE SPEED AND AVAILABILITY OF RETAIL PAYMENTS 64 (2016), <https://www.bis.org/cpmi/publ/d154.pdf>.

<sup>117</sup> See AARON KLEIN, THE BROOKINGS INST., THE FASTEST WAY TO ADDRESS INCOME INEQUALITY? IMPLEMENT A REAL TIME PAYMENT SYSTEM (2019), <https://www.brookings.edu/research/the-fastest-way-to-address-income-inequality-implement-a-real-time-payment-system/>.

<sup>118</sup> See Esther George, President & CEO, Fed. Reserve Bank of Kansas City, Testimony on behalf of The Federal Reserve System before the U.S. Senate Committee on Banking, Housing, and Urban Affairs at the Facilitating Faster Payments Full Committee Hearing (Sept. 25, 2019), at U.S. SENATE COMM. ON BANKING, HOUS., & URBAN AFFAIRS, at 1, <https://www.banking.senate.gov/imo/media/doc/George%20Testimony%209-25-19.pdf> (last visited July 7, 2020).

<sup>119</sup> See Tom Groenfeldt, *The Fed Should Develop Its Own Real-Time Payments*, FORBES (Jan. 30, 2019, 2:09 PM), <https://www.forbes.com/sites/tomgroenfeldt/2019/01/30/the-fed-should-develop-its-own-real-time-payments-say-three-former-fed-payment-experts/#355fc16c548e>.

playing field for mobile payment platforms so that they can more easily provide bank-like payment services.<sup>120</sup> Real-time payments can also help alleviate financial burdens of the underserved caused by slow payment times.<sup>121</sup> For example, instant payments reduce the likelihood of late fees and overdraft fees and limit the need for payday loans by eliminating the lag between payday and when a worker can access their money.<sup>122</sup>

## B. CROSS-BORDER PAYMENTS AND REMITTANCES

Cross-border payments<sup>123</sup> and remittances have increased steadily over the past three decades in the context of greater global migration.<sup>124</sup> Although efficient remittance services are conducive to the financial inclusion of low-income migrants,<sup>125</sup> the status quo of cross-border payments and remittances are regressive and inefficient.<sup>126</sup> This results in a huge tax on global commerce and results in financial exclusion.<sup>127</sup>

An ideal cross-border system would allow for instant payments. It would also be transparent<sup>128</sup> and permit two-way communication to verify payer information.<sup>129</sup> The current cross-border payment system, however, is inefficient partially due to its market structure.<sup>130</sup> This system generally transfers money through a hub-and-spoke

---

<sup>120</sup> Kate Rooney, *Mobile Payments Have Barely Caught On in the U.S., Despite the Rise of Smartphones*, CNBC (last updated Aug. 29, 2019, 6:32 PM), <https://www.cnbc.com/2019/08/29/why-mobile-payments-have-barely-caught-on-in-the-us.html>.

<sup>121</sup> Klein, *supra* note 14. See also Carol Coye Benson, Founding Partner, Glenbrook Partners, LLC, Testimony Before the U.S. Committee on Financial Services, Task Force on Financial Technology Hearing on “The Future of Real-Time Payments” (Sept. 26, 2019) (transcript available at U.S. Committee on Financial Services), <https://financialservices.house.gov/uploadedfiles/hhrg-116-ba00-wstate-bensonc-20190926.pdf> (noting the advantages of real-time payment systems, including increased financial inclusion).

<sup>122</sup> Klein, *supra* note 14.

<sup>123</sup> For the purpose of this brief, cross-border payments are interchangeable with international payments.

<sup>124</sup> THE WORLD BANK GRP., *LEVERAGING ECONOMIC MIGRATION FOR DEVELOPMENT: A BRIEFING FOR THE WORLD BANK BOARD* 15, Figure 2.6 (Sept., 2019), [https://www.knomad.org/sites/default/files/2019-08/World%20Bank%20Board%20Briefing%20Paper-LEVERAGING%20ECONOMIC%20MIGRATION%20FOR%20DEVELOPMENT\\_0.pdf](https://www.knomad.org/sites/default/files/2019-08/World%20Bank%20Board%20Briefing%20Paper-LEVERAGING%20ECONOMIC%20MIGRATION%20FOR%20DEVELOPMENT_0.pdf).

<sup>125</sup> CONG. RESEARCH SERVS., *REMITTANCES: BACKGROUND AND ISSUES FOR CONGRESS* 7 (Updated Dec. 02, 2019), <https://fas.org/sgp/crs/misc/R43217.pdf>.

<sup>126</sup> Athey, *supra* note 17.

<sup>127</sup> *Id.*

<sup>128</sup> See PYMNTS, *Global Cross-Border Payments Expected to Grow, but Challenges Remain* (Aug. 16, 2019), <https://www.pymnts.com/news/cross-border-commerce/2019/global-payments-growth-challenges/>.

<sup>129</sup> Athey, *supra* note 17.

<sup>130</sup> Dong He, Deputy Dir., Monetary and Capital Mkts. Dep’t, Fintech and Cross-Border Payments, Speech at Ripple-Central Bank Summit (Nov. 1, 2017) (transcript available at IMF website), <https://www.imf.org/en/News/Articles/2017/11/01/sp103017-fintech-and-cross-border-payments>.

payment network where correspondent banks serve as hubs.<sup>131</sup> These incumbent hubs charge lower fees for large, more-sophisticated institutional clients while imposing higher fees on low-income individuals.<sup>132</sup> The network effects of this distribution model create high barriers to entry for new remittance and cross-border payment providers.<sup>133</sup> In addition, regulations on cross-border payments are largely focused on anti-money laundering and other risks rather than on consumer welfare.<sup>134</sup>

Several fintech companies, including TransferWise and Remitly, have sought to decrease the costs of remittances – a common goal among consumers, regulators, and many service providers.<sup>135</sup> The 2019 Bali Fintech Agenda, notes that fintech innovations have the potential to increase the efficiency of cross-border payment systems by disrupting existing barriers to entry.<sup>136</sup> Additionally, a 2017 IMF report discusses the potential benefit of introducing distributed ledger technology into cross-border payments.<sup>137</sup> In January 2017, SWIFT, the largest global payments network provider, announced the launch of a proof of concept to “explore whether distributed ledger technology (DLT) can be used by banks to improve the reconciliation of their . . . databases in real time.”<sup>138</sup>

As regulators, central banks might augment these efforts by working together to encourage international financial institutions and payments processors to lower fees for small-dollar remittance payments. Another potential way to improve cross-border

---

<sup>131</sup> See Athey, *supra* note 17.

<sup>132</sup> See Athey, *supra* note 17.

<sup>133</sup> *Id.*; He, *supra* note 131.

<sup>134</sup> YOON S. PARK, VISA COMMERCIAL, THE INEFFICIENCIES OF CROSS-BORDER PAYMENTS: HOW CURRENT FORCES ARE SHAPING THE FUTURE (2006), <http://euro.ecom.cmu.edu/resources/elibrary/epay/crossborder.pdf>; Edward W. Kelley, Jr., Governor, Fed. Reserve Bd., Clearinghouses and Risk Management, Remarks at the 1996 Payments Systemic Risk Conference, Washington, D.C. (Dec. 3, 1996) (transcript available at the Federal Reserve Board website), <http://www.federalreserve.gov/boarddocs/speeches/1996/19961203.htm> (identifying credit, liquidity, legal, operational, and systemic risks as a major focus of payment regulations).

<sup>135</sup> Riki Matsumoto, *How Fintech Companies Like TransferWise are Reducing the Costs of Sending Remittances*, MEDIUM (Apr. 30, 2019), <https://medium.com/@rikimatsumoto/how-transferwise-is-radically-reducing-the-cost-of-sending-remittances-668f3726a848>; Roger Aitken, *Remitly Shaking Up Billion Dollar Remittances Industry Adds Massachusetts*, FORBES MAG. (Jan. 14, 2017, 1:48 PM), <https://www.forbes.com/sites/rogeraitken/2017/01/14/remitly-shaking-up-billion-dollar-digital-remittances-market-adds-massachusetts-to-network/#7487d31049b5>.

<sup>136</sup> THE WORLD BANK GRP. & THE INT’L MONETARY FUND, THE BALI FINTECH AGENDA – CHAPEAU PAPER 17-19 (Sept. 19, 2018), <http://documents.worldbank.org/curated/en/390701539097118625/pdf/130563-BR-PUBLIC-on-10-11-18-2-30-AM-BFA-2018-Sep-Bali-Fintech-Agenda-Board-Paper.pdf>.

<sup>137</sup> DONG HE ET AL., INT’L MONETARY FUND, IMF STAFF DISCUSSION NOTE - FINTECH AND FINANCIAL SERVICES: INITIAL CONSIDERATIONS (Jun. 19, 2017), <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2017/06/16/Fintech-and-Financial-Services-Initial-Considerations-44985>.

<sup>138</sup> SWIFT, *SWIFT Explores Blockchain as Part of its Global Payments Innovation Initiative* (Jan. 12, 2017), <https://www.swift.com/news-events/press-releases/swift-explores-blockchain-as-part-of-its-global-payments-innovation-initiative>.

payment efficiency would be for central banks to issue digital currency. In 2019, the Bank of Canada and the Monetary Authority of Singapore successfully performed the first blockchain cross-border payment using their respective CBDC prototypes,<sup>139</sup> with the Bank of England joining the next phase of this experiment.<sup>140</sup> Though these pilots have completed several stages,<sup>141</sup> there is still much more work that needs to be done to assess the tradeoffs involved in CBDC.

### C. MOBILE PAYMENTS

Mobile payments are another emerging technology that central banks can harness to improve financial inclusion. Mobile payments are payments that are made using smart phones or other mobile devices.<sup>142</sup> Mobile payment networks are often limited within a given jurisdiction and use the sovereign currency as the unit of account.<sup>143</sup> The use of sovereign currency promises account holders transferability of mobile balances to bank or credit accounts or cash.<sup>144</sup> In terms of use coverage, by 2015, mobile payment solutions were offered in 93 countries and have a higher rate of adoption in traditionally cash-based economies.<sup>145</sup>

Case studies have shown that central banks have primarily played a gate-keeper role, acting as licensor for non-bank mobile payment services providers. For example, the Central Bank of Nigeria issued guidelines for licensing, regulation, and operations of payment service banks, enabling mobile operators to introduce unbanked individuals to formal financial channels.<sup>146</sup> Similarly, the Reserve Bank of India granted

<sup>139</sup> See Hussam Kamel, *Are Central Banks Best Positioned to Tackle the Cross-Border Payments Conundrum?*, FINEXTRA BLOG (Sept. 10, 2019), <https://www.finextra.com/blogposting/17856/are-central-banks-best-positioned-to-tackle-the-cross-border-payments-conundrum>.

<sup>140</sup> See generally BANK OF CAN. ET AL., *CROSS-BORDER INTERBANK PAYMENTS AND SETTLEMENTS: EMERGING OPPORTUNITIES FOR DIGITAL TRANSFORMATION* (2018), <https://www.bankofengland.co.uk/-/media/boe/files/report/2018/cross-border-interbank-payments-and-settlements.pdf?la=en&hash=48AADDE3973FCB451E725CB70634A3AAFE7A45A3>.

<sup>141</sup> MONETARY AUTH. OF SING., *MAS Helps Develop Blockchain-Based Prototype for Multi-Currency Payments* (Nov. 11, 2019), <https://www.mas.gov.sg/news/media-releases/2019/mas-helps-develop-blockchain-based-prototype-for-multi-currency-payments>.

<sup>142</sup> See BIS COMM. ON PAYMENT & SETTLEMENT SYS., *INNOVATIONS IN RETAIL PAYMENTS: REPORT OF THE WORKING GROUP ON INNOVATIONS IN RETAIL PAYMENTS*, *supra* note 60, at 13. Mobile payments are “payments initiated and transmitted by access devices that are connected to the mobile communication network using voice technology, text messaging (via either SMS or USSD19 technology), or NFC.” *Id.*

<sup>143</sup> See, e.g., Kelly McNulty, *How Venmo Works and What to Know Before You Use It*, MARKETWATCH (April 17, 2019, 10:54 AM.), <https://www.marketwatch.com/story/how-venmo-works-and-what-to-know-before-you-use-it-2019-04-09>; Chanelle Bessette, *Cash App Money Transfer: What It Is, How to Use It*, NERDWALLET, INC. (January 8, 2020), <https://www.nerdwallet.com/blog/banking/cash-app-peer-to-peer-money-transfer-service/>.

<sup>144</sup> See *id.*

<sup>145</sup> GSM ASS'N, *STATE OF THE INDUSTRY REPORT ON MOBILE MONEY 6*, 9 (2015), [https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/04/SOTIR\\_2015.pdf](https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/04/SOTIR_2015.pdf).

<sup>146</sup> Oludare Senbore & Nafisa Adama, *Financial Inclusion: Central Bank of Nigeria Introduces Payment Service Banks*, INT'L LAW OFFICE (Mar. 22, 2019),

payments licenses to enable non-banks to accept small-scale deposits for payments purposes, without the ability to lend, as a bank may.<sup>147</sup> As will be discussed further in Part IV, central banks in China and Kenya have played a more active role in promoting and regulating mobile payments networks.

While mobile payments can help the unbanked where traditional financial service providers have not,<sup>148</sup> central banks first have to tackle numerous challenges. For instance, mobile payments can give rise to identification verification problems.<sup>149</sup> In addition, the Global System for Mobile Communications (“GMSA”) reports that mobile money is interoperable in only 60 countries, suggesting that mobile money interoperability needs improvement.<sup>150</sup>

#### D. CENTRAL BANK DIGITAL CURRENCY

Perhaps the most transformative potential payment innovation is the emergence of central bank digital money known as Central Bank Digital Currency or “CBDC.”<sup>151</sup> CBDC is a form of central bank liability that the central bank makes available to the public for transactions.<sup>152</sup> Central banks already issue a form of CBDC in the form of bank accounts at the central bank; however, these accounts are generally limited to banks, other financial institutions, and government entities.<sup>153</sup> CBDCs designed for broader public use could take a similar account form or could be structured as special digital wallets.<sup>154</sup>

In a recent BIS survey of 63 central banks, approximately one-third perceived CBDC as possible in the medium term.<sup>155</sup> The central banks of Norway, Sweden, Canada, Cambodia, Uruguay, and several others are actively investigating the possibility of

---

<https://www.internationallawoffice.com/Newsletters/Banking/Nigeria/Aluko-and-Oyeboode/Financial-inclusion-Central-Bank-of-Nigeria-introduces-payment-service-banks>.

<sup>147</sup> GUIDELINES FOR LICENSING OF PAYMENTS BANKS, RESERVE BANK OF INDIA 3 (2014),

<https://rbidocs.rbi.org.in/rdocs/Content/PDFs/PAYMENT271114.pdf>.

<sup>148</sup> See PYMNTS, *Payments At The Edge: Day 1*, *supra* note 5.

<sup>149</sup> Tanai Khiaonarong, *Oversight Issues in Mobile Payments* 17 (Int’l Monetary Fund, Working Paper No. WP/14/123, 2014), <https://www.imf.org/external/pubs/ft/wp/2014/wp14123.pdf>.

<sup>150</sup> GSM ASS’N, STATE OF THE INDUSTRY REPORT ON MOBILE MONEY 15 (2015),

[https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/04/SOTIR\\_2015.pdf](https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/04/SOTIR_2015.pdf).

<sup>151</sup> Itai Agur et al., *Designing Central Bank Digital Currencies*, (Int’l Monetary Fund, Working Paper No. WP/19/252, 2019), <https://www.imf.org/en/Publications/WP/Issues/2019/11/18/Designing-Central-Bank-Digital-Currencies-48739>.

<sup>152</sup> See *id.* at 1, 14.

<sup>153</sup> Morgan Ricks, John Crawford, & Lev Menand, *FedAccounts: Digital Dollars*, VAN. L. RESEARCH PAPER 1-2 (2020).

<sup>154</sup> See, e.g., *id.* at 18-33.

<sup>155</sup> CHRISTIAN BARONTINI & HENRY HOLDEN, BANK OF INT’L SETTLEMENTS PAPER NO. 101, PROCEEDING WITH CAUTION – A SURVEY ON CENTRAL BANK DIGITAL CURRENCY 6, 11 (2019), <https://www.bis.org/publ/bppdf/bispap101.pdf>.

introducing CBDC.<sup>156</sup> And, as will be discussed in Part IV, China began a CBDC pilot program in four cities earlier this year.

The Swiss government has taken a skeptical view toward an electronic Swiss franc, reasoning that such a move would bring new risks to financial stability without tangible benefits.<sup>157</sup> Nonetheless, the Swiss National Bank (“SNB”) is still actively experimenting with SIX Group, a Swiss payment provider, on a proof of concept that would allow participants to exchange tokenized assets in CBDC.<sup>158</sup>

Although CBDC efforts are not necessarily fueled by financial inclusion goals,<sup>159</sup> CBDC could be designed to produce significant financial inclusion benefits.<sup>160</sup> These benefits might include reducing payment system fragmentation,<sup>161</sup> increasing interoperability of mobile payments,<sup>162</sup> and providing the unbanked and underbanked with access to financial services.<sup>163</sup> Nonetheless, there are significant tradeoffs as well, which we will explore CBDC in depth in Issue Brief No. 4.

---

<sup>156</sup> P. Berkmen, K. Beaton, D. Gershenson, J. Arze del Granado, K. Ishi, M. Kim, E. Kopp, & M. Rousset, *Fintech in Latin America and the Caribbean: Stocktaking* 32 (Int’l Monetary Fund, Working Paper No. WP/19/71, 2019), <https://www.imf.org/en/Publications/WP/Issues/2019/03/26/Fintech-in-Latin-America-and-the-Caribbean-Stocktaking-46677>.

<sup>157</sup> Daniel Palmer, ‘New Risks’: Swiss Government Skeptical on Central Bank Digital Currency, COINDESK (updated Dec. 13, 2019), <https://www.coindesk.com/new-risks-swiss-government-skeptical-on-central-bank-digital-currency>.

<sup>158</sup> Megha Bhattacharya, *SNB and SIX to Explore Digital Central Bank Money and DLT*, IBS INTELLIGENCE, <https://ibsintelligence.com/ibs-journal/ibs-news/snb-six-to-explore-digital-central-bank-money-and-dlt/> (last visited Jul. 7, 2020).

<sup>159</sup> For instance, PBOC’s efforts in developing its digital currency is reported to have been grounded in privacy and financial stability concerns, spawned by the introduction of Libra. See Naomi Xu Elegant, *Why China’s Digital Currency is a ‘Wake-Up Call for the U.S.’*, FORTUNE (Nov. 1, 2019, 4:14 AM), <https://fortune.com/2019/11/01/china-digital-currency-libra-wakeup-call-us/>. On a global level, the Bank of England governor, Mark Carney, has proposed that a central bank-supported digital currency replace the U.S. dollar as a global reserve currency. See Brian Swint, *Carney Urges Libra-Like Reserve Currency to End Dollar Dominance*, BLOOMBERG (Aug. 23, 2019, 2:00 PM), <https://www.bloomberg.com/news/articles/2019-08-23/carney-urges-libra-like-reserve-currency-to-end-dollar-dominance>.

<sup>160</sup> See INT’L TELECOMM. UNION NEWS, *How Central Bank Digital Currencies Can Boost Financial Inclusion: IMF’s John Kiff (VIDEO)* (June 20, 2019), <https://news.itu.int/how-central-bank-digital-currencies-can-boost-financial-inclusion-imfs-john-kiff-video/>.

<sup>161</sup> See MORGAN RICKS, JOHN CRAWFORD, & LEV MENAND, THE GREAT DEMOCRACY INITIATIVE, *CENTRAL BANKING FOR ALL: A PUBLIC OPTION FOR BANK ACCOUNTS* 3-4 (2018), <https://greatdemocracyinitiative.org/wp-content/uploads/2018/06/FedAccountsGDI.pdf>.

<sup>162</sup> BARRY COOPER ET AL., CENFRI, *THE USE CASES OF CENTRAL BANK DIGITAL CURRENCY FOR FINANCIAL INCLUSION: A CASE FOR MOBILE MONEY* 20 (2019), [https://cenfri.org/wp-content/uploads/2019/06/CBDC-and-financial-inclusion\\_A-case-for-mobile-money.pdf](https://cenfri.org/wp-content/uploads/2019/06/CBDC-and-financial-inclusion_A-case-for-mobile-money.pdf).

<sup>163</sup> See INT’L TELECOMM. UNION NEWS, *supra* note 161.

## E. INTEROPERABILITY

Interoperability<sup>164</sup> between payment systems is another crucial front in the effort to further financial inclusion.<sup>165</sup> The CPMI-WBG Task Force on Payment Aspects of Financial Inclusion found that increased interoperability can improve financial viability, information and communications technology (“ICT”) infrastructures, payment product design, and transaction accounts accessibility.<sup>166</sup> The World Bank considers “system-wide, cross-system, and infrastructure-level” interoperability to be relevant in the context of retail payments.<sup>167</sup> In a later report, the World Bank further states that “[t]he role of policy-makers is not necessarily to mandate interoperability, but to engage stakeholders in defining the key technological, operational and financial standards that underpin the core architecture for processing transactions.”<sup>168</sup>

Various central banks are working to facilitate payment system interoperability. For example, “the Central Bank of Liberia mandated in its Mobile Money Regulation of May 14, 2014 that all authorized institutions licensed under its regulations should provide systems that are interoperable. . . .”<sup>169</sup> Similarly, the Central Bank of Nigeria strengthened the implementation of the Nigeria Central Switch (“NCS”) by amending the Guidelines on Transactional Switching in Nigeria.<sup>170</sup> The Bank also allowed two private switches to utilize the infrastructure of the Nigerian Inter-Bank Settlement

---

<sup>164</sup> Interoperability here describes “a situation in which payment instruments belonging to a given scheme may be used in other countries and in systems installed by other schemes.” BIS COMM. ON PAYMENT & SETTLEMENT SYS., A GLOSSARY OF TERMS USED IN PAYMENTS AND SETTLEMENT SYSTEMS, *supra* note 108, at 27.

<sup>165</sup> Massimo Cirasino, Thomas Lammer, & Harish Natarajan, *Solving Payments Interoperability for Universal Financial Access*, WORLD BANK BLOGS (Feb. 25, 2016), <http://blogs.worldbank.org/psd/solving-payments-interoperability-universal-financial-access>.

<sup>166</sup> See BIS COMM. ON PAYMENTS & MKT. INFRASTRUCTURES & THE WORLD BANK GRP., PAYMENT ASPECTS OF FINANCIAL INCLUSION, *supra* note 25, at 34, 38n.68.

<sup>167</sup> See THE WORLD BANK GRP., FINANCIAL INFRASTRUCTURE SERIES - PAYMENT SYSTEMS POLICY AND RESEARCH: DEVELOPING A COMPREHENSIVE NATIONAL RETAIL PAYMENTS STRATEGY 47 (2012) (emphasis omitted), <http://documents.worldbank.org/curated/en/839121469729131991/pdf/84076-REPLACEMENT-FILE-PUBLIC-Developing-comprehensive-national-retail-payments-strategy.pdf>.

<sup>168</sup> THE WORLD BANK GRP. & THE WORLD ECON. FORUM, INNOVATION IN ELECTRONIC PAYMENT ADOPTION: THE CASE OF SMALL RETAILERS 39 (2016), [http://www3.weforum.org/docs/Innovative\\_Solutions\\_Accelerate\\_Adoption\\_Electronic\\_Payments\\_Merchants\\_report\\_2016.pdf](http://www3.weforum.org/docs/Innovative_Solutions_Accelerate_Adoption_Electronic_Payments_Merchants_report_2016.pdf).

<sup>169</sup> See ITU-T FOCUS GRP. DIG. FIN. SERVS., THE REGULATOR'S PERSPECTIVE ON THE RIGHT TIMING FOR INDUCING INTEROPERABILITY: FINDINGS OF A SURVEY AMONG FOCUS GROUP MEMBERS 8 (2017), [https://www.itu.int/en/ITU-T/focusgroups/dfs/Documents/201702/ITU\\_FGDFS\\_Report-Right-Timing-for-Inducing-Interoperability.pdf](https://www.itu.int/en/ITU-T/focusgroups/dfs/Documents/201702/ITU_FGDFS_Report-Right-Timing-for-Inducing-Interoperability.pdf).

<sup>170</sup> See generally, CENT. BANK OF NIGERIA, GUIDELINES ON TRANSACTIONS SWITCHING IN NIGERIA (2016), <https://www.cbn.gov.ng/out/2016/bpsd/approved%20guidelines%20on%20transaction%20switching%20in%20nigeria.pdf>.

System (“NIBSS”), authorizing their use of interoperable “Cash-In-Cash-Out” services<sup>171</sup>

Central banks can also advance financial inclusion by facilitating access to government payments, including pensions and social cash transfers.<sup>172</sup> A 2014 report prepared for the G20 Australian Presidency to the G20 Global Partnership for Financial Inclusion points out that governments can use the need to send electronic government payments as an opportunity to provide unbanked households basic deposit accounts to receive their payments.<sup>173</sup>

#### IV. Three Case Studies

Many central banks are advancing financial inclusion by improving their payment systems. This section considers the work of central banks in China, Kenya, and the Philippines, each of which have launched major initiatives to improve speed and access and eliminate predatory practices.

##### A. PEOPLE’S BANK OF CHINA

China is at the forefront of two major payment system innovations: low-fee, high-speed digital payment networks that use mobile phone technology and central bank digital currency.

China has two mobile phone-based payment networks: Alipay, operated by the online retailer Alibaba, and WeChat Pay, operated by the social network Tencent.<sup>174</sup> Both are cheaper, faster, and more inclusive than card-based networks used in advanced economies like the United States.<sup>175</sup> Instead of using costly point-of-sale terminals and landline internet or telephone connections, these networks rely on smartphone devices and QR codes.<sup>176</sup> Each user has a digital wallet that records an account balance, and a unique QR code – a two-dimensional bar code that is associated with their wallet.<sup>177</sup> Using a smartphone, a buyer can scan a seller’s QR code and enter an amount to transfer.<sup>178</sup> This even allows for transactions where one party does not

---

<sup>171</sup> ALL. FOR FIN. INCLUSION, *Central Bank of Nigeria Approves First Licenses for Super Agent Banking* (Aug. 1, 2016), <https://www.afi-global.org/news/2016/08/central-bank-nigeria-approves-first-licenses-super-agent-banking>.

<sup>172</sup> See Silvia Baur-Yazbeck, *A New Generation of Government-to-Person Payments is Emerging*, CGAP BLOG (Oct. 1, 2019), <https://www.cgap.org/blog/new-generation-government-person-payments-emerging>.

<sup>173</sup> See THE WORLD BANK GRP., THE BETTER THAN CASH ALL., & THE BILL & MELINDA GATES FOUND., THE OPPORTUNITIES OF DIGITIZING PAYMENTS 16 (2014), [https://docs.gatesfoundation.org/documents/g20%20report\\_final.pdf](https://docs.gatesfoundation.org/documents/g20%20report_final.pdf).

<sup>174</sup> KLEIN, *supra* note 11, at 4.

<sup>175</sup> See *id.* at 10-12.

<sup>176</sup> *Id.* at 6, 7.

<sup>177</sup> *Id.* at 9.

<sup>178</sup> *Id.* at 10.

have a phone or internet connection.<sup>179</sup> For example, people who survive by panhandling are able to ask for and receive money merely by presenting a QR code.<sup>180</sup> Unlike card transactions in the United States, which involve high fees for retailers and consumers, Alipay and WeChat Pay also permit fee-free in-network transactions.<sup>181</sup> So, a small retailer in China could buy from suppliers and sell to consumers at zero cost if each counterparty uses Alipay or WeChat Pay.<sup>182</sup>

Alipay and WeChat Pay have grown rapidly. As of 2018, WeChat Pay boasted 1.1 billion active users and Alipay, 900 million.<sup>183</sup> In the largest cities, over 90 percent of people now use one of these networks as their principal means of payment.<sup>184</sup> Accordingly, transaction volumes on these platforms have grown from less than 10 trillion yuan in 2013 to over 250 trillion yuan in 2018.<sup>185</sup>

The PBOC has played a significant role regarding these networks. For example, beginning in 2019, the PBOC required that Alibaba and Tencent back all of their digital wallet account balances with deposit balances at one of China's banks.<sup>186</sup> Chinese banks also generally allow consumers to upload funds from their bank accounts into their digital wallets at no cost, and if the sending bank charges a fee, it is usually paid by the platform.<sup>187</sup> Similarly, account holders can move funds out of their wallets into accounts for only a small fee, which varies with the size of the transaction.<sup>188</sup>

Beginning in 2017, the PBOC required all online payment transactions conducted using third-party payment platforms to be administered through a centralized online clearing house, the NetsUnion Clearing Corporation ("NUCC").<sup>189</sup> Founded on the principle of "Co-Build, Co-Own, Co-Share," the NUCC offers payment service providers ("PSPs") the opportunity to invest as joint venture partners.<sup>190</sup> The PBOC

---

<sup>179</sup> *Id.* at 7.

<sup>180</sup> *Id.* at 4, 7.

<sup>181</sup> *Id.* at 12-13.

<sup>182</sup> *Id.* at 13-14.

<sup>183</sup> *Id.* at 8.

<sup>184</sup> *Id.* at 8.

<sup>185</sup> *Id.*

<sup>186</sup> Denise Jia, *PBOC to Raise Reserve-Funds Ratio for Third-Party Payment Firms to 100%*, CAIXIN (June 30, 2018, 10:32 AM), <https://www.caixinglobal.com/2018-06-30/pboc-to-raise-reserve-funds-ratio-for-third-party-payment-firms-to-100-101288780.html>.

<sup>187</sup> KLEIN, *supra* note 11, at 10.

<sup>188</sup> *Id.* at 14.

<sup>189</sup> Guanyu Jiang Feiyinhang Zhifu Jigou Wangluo Zhifu Yewu You Zhilian Moshi Qianyi Zhi Wanglian Pingtai Chuli de Tongzhi (关于将非银行支付机构网络支付业务由直连模式迁移至网联平台处理的通知) [Notification on Nonbank Payment Organization Net-work Payment Operations Shifting from the Direct Model to China NetsUnion Platform Handling] (promulgated by the People's Bank of China, Dec. 13, 2018).

<sup>190</sup> NETSUNION CLEARING CORP., *About Us: Company Overview*, <https://www.nucc.com/about.html> (last visited June 2020).

and the Payment & Clearing Association of China are the two largest shareholders, together holding a 38 percent stake in NetsUnion.<sup>191</sup> PSPs own the remaining 63%, with Alipay and WeChat Pay both owning almost a 10% stake.<sup>192</sup> By centralizing the settlement and clearing of digital payments, the PBOC enhanced transaction security.<sup>193</sup> (It also made it easier for government officials to monitor and access payment information.)<sup>194</sup> To promote inclusion, the PBOC also created a tiered system for accounts with both banks and nonbank digital PSPs, allowing for a range of flexibility in requirements based on account type.<sup>195</sup>

Earlier this year, after six years of research and 74 patent applications,<sup>196</sup> the PBOC took another step forward by rolling out a pilot testing program for digital money in the form of an e-yuan.<sup>197</sup> The new CBDC runs on a centralized network operated by the PBOC.<sup>198</sup> Like Alipay and WeChat Pay, it relies on digital wallets.<sup>199</sup> Unlike these networks, China's new CBDC does not require connection to a bank account, so it allows unbanked individuals to transact in the online economy.<sup>200</sup> Nor will transactions in digital yuan involve any fees – they can be exchanged like cash.<sup>201</sup>

<sup>191</sup> Jinshan Hong, *How China's Clamping Down on the Mobile Payment Industry*, FORBES MAG. (Aug. 18, 2017, 2:35 AM), <https://www.forbes.com/sites/jinshanhong/2017/08/18/how-chinas-central-bank-is-clamping-down-on-the-mobile-payment-industry/#2da6044650be>.

<sup>192</sup> See *id.*; LIU JIN, INST. FOR FINTECH RESEARCH, THE REGULATORY MODEL OF NON-BANK PAYMENT INSTITUTIONS IN CHINA AND INTERNATIONAL COMPARISON 6-7 (2018), [https://www.pbcfsf.tsinghua.edu.cn/Upload/file/20180619/20180619135207\\_9112.pdf](https://www.pbcfsf.tsinghua.edu.cn/Upload/file/20180619/20180619135207_9112.pdf); CHINA BANKING NEWS, *NetsUnion Clearing Corporation* (2018), <http://www.chinabankingnews.com/wiki/netsunion-clearing-corporation/>.

<sup>193</sup> See Xu Yanyan, *China to Process All Online Payments via Centralized Clearing Platform from June 2018*, YICAI GLOB. (Aug. 07, 2017), <https://www.yicai.com/news/china-to-process-all-online-payments-via-centralized-clearing-platform-from-june-2018>. SINA CORP., *Central Bank Cautious to Digital Currency: Governor* (Apr. 12, 2018, 2:19 PM), <http://english.sina.com/buz/f/2018-04-12/detail-ifyzeyqc0213956.shtml> (quoting the PBOC Governor Yi Gang's statement that "the Chinese national online payment clearing platform, NetsUnion Clearing Corp., was established mainly to guarantee fair play and the security of online payments.").

<sup>194</sup> Martin Chorzempa, *Beijing's Grip on Internet Finance is Tightening*, PETERSON INST. FOR INT'L ECON. (Jan. 9, 2018, 4:45 PM), <https://www.piie.com/blogs/china-economic-watch/beijings-grip-internet-finance-tightening>.

<sup>195</sup> Agustin Carstens, General Manager, BIS, *The Future of Money and the Payment System: What Role for Central Banks?*, Lecture at Princeton University 8 (Dec. 5, 2019) (transcript available on BIS website), <https://www.bis.org/speeches/sp191205.pdf>.

<sup>196</sup> Results generated from NAT'L INTELLECTUAL PROP. ADMIN., PRC, *China and Global Patent Examination Information Inquiry*, <http://cpquery.cnipa.gov.cn/> (last visited Jul. 7, 2020).

<sup>197</sup> Marie Huillet, *supra* note 12..

<sup>198</sup> Zhiguo He, *What is China's New CBDC, and What is it Not?*, FORKAST NEWS, <https://forkast.news/china-cbdc-dcep-central-bank-digital-currency-yuan-zhiguo-he/> (last updated May 22, 2020).

<sup>199</sup> See *id.*

<sup>200</sup> *Id.*

<sup>201</sup> *Id.*; LEDGER INSIGHTS, *China is Ready for Central Bank Digital Currency Issuance. Here's the Plan*, <https://www.ledgerinsights.com/china-ready-central-bank-digital-currency-cbdc/> (last visited July 29, 2020).

The Chinese government launched a pilot program in four major cities, and is now using the pilot CBDC to pay officials and subsidize transportation expenses for local workers in Suzhou.<sup>202</sup> The government is also requiring banks in these cities to sign CBDC distribution agreements and set up digital wallets for their workers.<sup>203</sup> Alibaba, Tencent, and China’s “big four” banks have signed on to participate.<sup>204</sup> Eventually, analysts believe the PBOC will make the digital yuan available internationally.<sup>205</sup>

## B. CENTRAL BANK OF KENYA

With a 2018 value of 3.98 trillion Kenyan Shillings in mobile money transactions, the Central Bank of Kenya (“CBK”) is a leader in promoting financial inclusion through mobile payments.<sup>206</sup> This is primarily because of its role in supporting the development of M-Pesa.<sup>207</sup> M-Pesa is a mobile phone-based money transfer service launched in 2007 by Vodafone and Safaricom.<sup>208</sup> A bank account is not required for one to use M-Pesa.<sup>209</sup> Instead, M-Pesa converts cash into digital account balances,

<sup>202</sup> Ian Hall, *China to Test Digital Currency in Four Cities*, GLOB. GOV’T FORUM (Apr. 30, 2020), <https://www.globalgovernmentforum.com/china-to-test-digital-currency-in-four-cities/>.

<sup>203</sup> *Id.*; Sarah Tran, *China’s Central Bank Digital Currency DCEP to be Operational for Local Government Employees Starting in May*, BLOCKCHAIN.NEWS (Apr. 16, 2020), <https://blockchain.news/news/china-central-bank-digital-currency-dcep-operational-local-government-employees-may>.

<sup>204</sup> *See* Tran, *supra* note 204; Michael del Castillo, *Alibaba, Tencent, Five Others to Receive First Chinese Government Cryptocurrency*, FORBES MAG. (Aug. 27, 2019, 5:13 PM), <https://www.forbes.com/sites/michaeldelcastillo/2019/08/27/alibaba-tencent-five-others-to-recvieve-first-chinese-government-cryptocurrency/#25c8ada01a51>.

<sup>205</sup> Hall, *supra* note 203; Tran, *supra* note 204.

<sup>206</sup> *See* Alex Rolfe, *Mobile Money Transactions Equivalent of Half of Kenya’s GDP*, PAYMENTS CARDS & MOBILE (Jan. 25, 2019), <https://www.paymentscardsandmobile.com/mobile-money-transactions-half-of-kenyas-gdp/>. In 2006, only 27% of the population had access to formal financial services, with 33% relying on informal services and 40% fully excluded. Biran Muthiora, GLOB. SYS. FOR MOBILE COMM’NS, ENABLING MOBILE MONEY POLICIES IN KENYA: FOSTERING A DIGITAL FINANCIAL REVOLUTION 4 (2015), [https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/02/2015\\_MMU\\_Enabling-Mobile-Money-Policies-in-Kenya.pdf](https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/02/2015_MMU_Enabling-Mobile-Money-Policies-in-Kenya.pdf). As of 2013, increased use of mobile money led to 67% of the population’s having access to formal financial services. *Id.* at Foreword, 4.

<sup>207</sup> *See* ALL. FOR FIN. INCLUSION, ENABLING MOBILE MONEY TRANSFER: THE CENTRAL BANK OF KENYA’S TREATMENT OF M-PESA 8 (2010), [https://www.afi-global.org/sites/default/files/publications/afi\\_casestudy\\_mpesa\\_en.pdf](https://www.afi-global.org/sites/default/files/publications/afi_casestudy_mpesa_en.pdf) (noting the connection between M-Pesa’s successful launch, and CBK’s public statement declaring M-Pesa’s legal status and its regulatory approval process).

<sup>208</sup> Murithi Mutiga, *Kenya’s Banking Revolution Lights a Fire*, N.Y. TIMES (Jan. 20, 2014), <https://www.nytimes.com/2014/01/21/opinion/kenyas-banking-revolution-lights-a-fire.html>.

<sup>209</sup> LILIANA ROJAS-SUAREZ, INTER-AM. DEV. BANK, FINANCIAL INCLUSION IN LATIN AMERICA: FACTS, OBSTACLES AND CENTRAL BANKS’ POLICY ISSUES 28 n.38 (2016), <https://publications.iadb.org/publications/english/document/Financial-Inclusion-in-Latin-America-Facts-Obstacles-and-Central-Banks-Policy-Issues.pdf>.

and consumer funds are then deposited into trust accounts with commercial banks.<sup>210</sup> Like Alipay and WeChat Pay, M-Pesa balances are fully secured, backed 1:1 with bank deposits.<sup>211</sup>

Like Alipay and WeChat Pay, M-Pesa grew rapidly. In 2006, “only 19 percent of Kenya’s population . . . had bank accounts.”<sup>212</sup> By 2014, M-Pesa had 18 million active subscribers.<sup>213</sup> M-Pesa now plays a major role in the Kenyan economy, accounting for transactions amounting to over 30 percent of the country’s 2012 GDP.<sup>214</sup>

M-Pesa, by so dramatically improving financial inclusion, has had a tangible impact on economic and financial well-being.<sup>215</sup> M-Pesa allows individuals to access “a wider network of social support” when facing income and health shocks.<sup>216</sup> Households with M-Pesa are able to consume more goods and services, either because of “increased labor or capital income, or simply [due to] transfers between individuals with different propensities to consume.”<sup>217</sup> One study estimates that M-Pesa has aided nearly 195,000 households in overcoming poverty, with a particularly positive impact on the economic lives of poor women.<sup>218</sup>

Although M-Pesa was a private sector initiative, spearheaded by Vodafone Group<sup>219</sup>, it would not have been possible without support from the CBK. The CBK provided key regulatory approvals in 2007.<sup>220</sup> The CBK was also developing a framework for mobile banking and regulations to address money laundering.<sup>221</sup> In 2014, the M-Pesa agent network was expanded to include more banks and telecommunication companies.<sup>222</sup> In 2018, the CBK also issued an official statement on mobile payments interoperability to further improve its national mobile payments scheme and expand access.<sup>223</sup>

---

<sup>210</sup> *See id.*

<sup>211</sup> Claire Alexandre, *10 Things You Thought You Knew About M-Pesa*, CGAP BLOG (Nov. 22, 2010), <https://www.cgap.org/blog/10-things-you-thought-you-knew-about-m-pesa#:~:text=Any%20amount%20which%20goes%20through,counted%20as%20part%20of%20M1>.

<sup>212</sup> ALL. FOR FIN. INCLUSION, ENABLING MOBILE MONEY TRANSFER THE CENTRAL BANK OF KENYA’S TREATMENT OF M-PESA, *supra* note 208, at 2.

<sup>213</sup> Mutiga, *supra* note 209.

<sup>214</sup> *Id.*

<sup>215</sup> Tavneet Suri & William Jack, *The Long-Run Poverty and Gender Impacts of Mobile Money*, 354 SCIENCE 1288, 1288 (2016), <https://science.sciencemag.org/content/354/6317/1288>.

<sup>216</sup> *Id.*

<sup>217</sup> *Id.* at 1291.

<sup>218</sup> *See id.* at 1288, 1291.

<sup>219</sup> ALL. FOR FIN. INCLUSION, ENABLING MOBILE MONEY TRANSFER THE CENTRAL BANK OF KENYA’S TREATMENT OF M-PESA, *supra* note 208, at 4.

<sup>220</sup> *Id.* at 4-5.

<sup>221</sup> *Id.* at 8.

<sup>222</sup> Suri & Jack, *supra* note 216, at 1292.

<sup>223</sup> THE CENT. BANK OF KENYA, *Press Release: Mobile Money Interoperability* (Apr. 10, 2018), [https://www.centralbank.go.ke/uploads/press\\_releases/1648360391\\_Press%20Release%20-%20Mobile%20Money%20Interoperability.pdf](https://www.centralbank.go.ke/uploads/press_releases/1648360391_Press%20Release%20-%20Mobile%20Money%20Interoperability.pdf).

### C. CENTRAL BANK OF THE PHILIPPINES

Another central bank on the cutting edge of payment system innovation is the Philippines Central Bank, Bangko Sentral ng Pilipinas (“BSP”). In 2019, the BSP launched an online payment system, eGov Pay, to aid citizens in making government transactions.<sup>224</sup> The BSP is also heading the creation of a national QR code standard in an effort to reduce cash use and payment errors.<sup>225</sup> The BSP is aiming to digitize 20 percent of total retail payments by the end of 2020, up from one percent in 2013.<sup>226</sup> To that end, the BSP developed a National Retail Payments System (“NRPS”).<sup>227</sup>

On March 23, 2018, the BSP issued Memorandum No. M-2018-12 (“MC 2018-12”), article 4 of which directs BSP Supervised Financial Institutions (“BSFIs”) to ensure the availability of electronic payment facilities to their clients.<sup>228</sup> The Memorandum was issued pursuant to an earlier issuance of the BSP, Circular No. 980, which adopted the NRPS.<sup>229</sup> The Circular states, “BSFIs shall make electronic payments available in all its delivery channels whenever applicable.”<sup>230</sup> The “non-availability of electronic payment in a delivery channel requires written justification from the BSFI.”<sup>231</sup> “BSFIs that already offer electronic financial and payment services” are required to ensure “that they are able to offer both sending and receiving funds to [their] clients.”<sup>232</sup> By requiring interoperability, the central bank is increasing the likelihood that its emerging digital payments systems will grow rapidly and work efficiently with low costs and low fees for consumers and retailers.

### V. Conclusion

In too many places today the less money you have, the more you have to pay to use it. Innovations in payment systems can reverse this troubling inequality by improving access to digital networks, speeding settlement time, reducing

---

<sup>224</sup> Ian Hall, *Philippines Central Bank Launches Digital Payments Platform*, GLOB. GOV'T FORUM (Nov. 28, 2019), <https://www.globalgovernmentforum.com/philippines-central-bank-launches-digital-payments-platform/>.

<sup>225</sup> *Id.*

<sup>226</sup> BANGKO SENTRAL NG PILIPINAS, *National Retail Payment System*, [http://www.bsp.gov.ph/payments/nrps\\_overview.asp](http://www.bsp.gov.ph/payments/nrps_overview.asp) (last visited Jul, 7, 2020).

<sup>227</sup> *Id.* See also Tommaso Padoa-Schioppa, *supra* note 25 (referring to uniformity as one of the keys for central banks in retail payments. Here, uniformity means that “for any instrument, the cost, speed and safety of making a payment are the same, regardless of where in the currency area payer and payee are situated.”).

<sup>228</sup> BANGKO SENTRAL NG PILIPINAS, Memorandum No. M-2018-012, art. 4 (Mar. 23, 2018), <http://www.bsp.gov.ph/downloads/regulations/attachments/2018/m012.pdf>.

<sup>229</sup> BANGKO SENTRAL NG PILIPINAS, Circular No. 980 § 1, subsec. xL205.t/4t205Q.L147055.L14705p.1/4805N.1 (Nov. 6, 2017), <http://www.bsp.gov.ph/downloads/regulations/attachments/2017/c980.pdf>.

<sup>230</sup> *Id.* at subsec. xL205.5/4L20sQ.s14tlss.s/470sp.5/4805N.5(a)(1).

<sup>231</sup> BANGKO SENTRAL NG PILIPINAS, Memorandum No. M-2018-012, *supra* note 229, at art. 4.

<sup>232</sup> *Id.*

fragmentation, and eliminating predatory practices. Emerging technologies from virtual currencies to mobile payments and QR codes present opportunities for central banks to advance this important work. Recent initiatives in China, Kenya, and the Philippines provide examples of how central banks could harness the power of the private sector and combine it with public approaches to ensure that the world's payments infrastructure helps to reduce poverty and inequality, and advances the ability of the businesses, households, and governments to fuel economic growth and development.