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Regulating Digital Currencies: Towards an Analytical Framework

Steven L. Schwarcz[1]

Abstract: *Digital currencies have the potential to improve the speed and efficiency of payments and to broaden financial inclusion. The principal goal is to facilitate payments among consumers on a day-to-day basis as an alternative to cash, both domestically and across national borders. This Article begins by critically examining and critiquing the ongoing progress to try to develop retail digital currencies, focusing on the two most feasible approaches: central bank digital currencies (CBDC), and privately-issued currencies that are backed by assets having intrinsic value (stablecoins). The Article then analyzes how these digital currencies should be regulated and supervised, exploring their similarities and differences. Both CBDC and stablecoins raise innovative legal issues as well as the types of legal issues normally associated with payment systems, although in novel contexts. If widely used, stablecoins also could impair central banks' ability to control monetary policy and possibly undermine confidence in the value or operational continuity of currencies, which could threaten international monetary and financial stability. Stablecoin regulation must also address those potential threats.*

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[1] Stanley A. Star Distinguished Professor of Law & Business, Duke University School of Law; Senior Fellow, the Centre for International Governance Innovation (CIGI); Liberty Fellow, University of Leeds School of Law. The author thanks Jason Allen, Ross Buckley, Bob Fay, Brandon Garrett, Joyce Hansen, Hideki Kanda, Rohinton P. Medhora, Lev Menand, Hans Tjio, Tobias H. Tröger, . . . , and participants in the University of Leeds School of Law 2021 Liberty Fellowship Address for valuable comments and Xiuqi ("George") Zhu, Eric Horsley, Carson Calloway, and Qinwen ("Kevin") Zhang for invaluable research assistance.

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INTRODUCTION

Their potential to improve the speed and efficiency of payments and to broaden financial inclusion makes digital currencies—monetary currencies that are evidenced electronically and not in physically tangible form—an important part of our future.[2] Large payments among businesses and financial institutions ("wholesale" payments") already occur digitally,[3] and bitcoin has been with us for more than a decade.[4] Three recent events, however, have catapulted the prospect of a "retail" digital currency[5]—one that is used by consumers on a day-to-day basis as an alternative to cash, both domestically and across national borders—to the fore.[6]

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[2] *Cf*. President's Working Group on Financial Markets, Statement on Key Regulatory and Supervisory Issues Relevant to Certain Stablecoins 1 (Dec. 23, 2020) (finding that "[d]igital payments . . . have the potential to improve efficiencies, increase competition, lower costs, and foster broader financial inclusion"), available at https://home.treasury.gov/system/files/136/PWG-Stablecoin-Statement-12-23-2020-CLEAN.pdf.

[3] Fedwire® Funds Service, https://www.frbservices.org/assets/financial-services/wires/funds.pdf. *Cf. infra* note 68 and accompanying text (explaining "wholesale" funds transfers). Wholesale digital payments operate through electronic funds transfers. *Id*. As this Article discusses, retail digital payments are expected to operate the same way. *See infra* notes 108-109 and accompanying text.

[4] S. Nakamoto, *Bitcoin: A Peer-To-Peer Electronic Cash System*, https://bitcoin.org/bitcoin.pdf (2008).

[5] All funds transfers can be classified as either wholesale or retail. BIS Annual Economic Report 2020, at 68, https://www.bis.org/publ/arpdf/ar2020e3.pdf.

[6] Patrycja Beniak, *Central bank digital currency and monetary policy: a literature review*, MPRA Paper 96663, p. 2 University Library of Munich, Germany (2019).

First, the People's Bank of China has been working on a retail digital currency since 2014 and now has trial runs ongoing in four cities.[7] The U.S. government fears that such a digital currency, if successful, might further leverage the yuan into position to replace the dollar as the world's reserve currency.[8] Secondly, Facebook announced in 2019 that it will be developing Libra, a blockchain-based global digital currency.[9] Under the threat of private competition that might impair governmental control over monetary policy,[10] many central banks, including the

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[7] Jonathan Cheng, *China Rolls Out Pilot Test of Digital Currency*, WALL ST. J. (Apr. 20, 2020, 8:22 AM), https://www.wsj.com/articles/china-rolls-out-pilot-test-of-digital-currency-11587385339; Hannah Murphy & Yuan Yang, *Patents Reveal Extent of China's Digital Currency Plans*, FINANCIAL TIMES (Feb. 12, 2020), https://www.ft.com/content/f10e94cc-4d74-11ea-95a0-43d18ec715f5#comments-anchor (noting that patents filed address ways of linking digital wallets with existing retail bank accounts).

[8] *See, e.g.*, Aditi Kumar & Eric Rosenbach, *Could China's Digital Currency Unseat the Dollar?*, FOREIGN AFFAIRS (May 20, 2020), https://www.foreignaffairs.com/articles/china/2020-05-20/could-chinas-digital-currency-unseat-dollar; Rebecca Isjwara, *China May Seek to Raise Yuan's Stature via a Digital Avatar*, S&P GLOB. MKT. INTELLIGENCE (Sep. 23, 2020), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/china-may-seek-to-raise-yuan-s-stature-via-a-digital-avatar-60106560.

[9] Libra Association, *Introducing Libra*, LIBRA ASS'N (June 19, 2019), https://libra.org/en-US/updates/introducing-libra/. Libra is proposed to be backed by sovereign fiat currencies in order to avoid volatile price fluctuations. The Libra Association has assembled a group of influential members including Facebook, Uber, Lyft, and Shopify. Technically, the Libra Association is the issuer of Libra. *See id*. & https://paytechlaw.com/en/is-libra-e-money/. Recently, the Libra Association apparently has changed its name to the Diem Association. *See* https://www.diem.com/en-us/association/#the_members (last visited Jan. 12, 2021). *Cf*. Julie Muhn, *Libra Association rebrands as Diem Association*, FINOVATE BLOG (Dec. 1, 2020), available at https://finovate.com/libra-association-rebrands-as-diem-association/ ("Taking the opportunity to seize a fresh start that comes with a new year, Facebook's Libra Association has rebranded to Diem Association. The group chose the name Diem, which is Latin for 'day' to signal a new day for the association. The rebrand will not change the mission of the organization . . . .").

[10] Governments usually delegate authority to their central banks to use monetary policy to maintain a healthy balance between unemployment and inflation by expanding or contracting the economy as needed. *See generally,* Koshy Mathai, *Monetary Policy: Stabilizing Prices and Output*, INT'L MONETARY FUND: FIN. & DEV., (Feb. 24, 2020), imf.org/external/pubs/ft/fandd/basics/monpol.htm. In general, the central banks' strategy for effectuating monetary policy is to manage the monetary supply by controlling interest rates. *Id*. One prominent strategy for controlling interest rates is to offer interest on deposits held at the central bank. *See generally,* David Bowman et al., *Interest on excess reserves as a monetary policy instrument: The experience of foreign central banks*, 966 Int'l Finance Discussion Paper 1 (2010), https://www.federalreserve.gov/pubs/ifdp/2010/996/ifdp996.pdf (summarizing the

Federal Reserve, have voiced concerns over the Facebook project and accelerated their own work into digital currencies.[11] More recently, to control transmission of the COVID-19 virus, retail businesses have restricted the exchange of physical cash.[12]

In response to these events, the U.S. government and multinational organizations have begun exploring the feasibility of developing retail digital currencies for domestic and global payments. In late 2020, the Bank for International Settlements ("BIS")[13] in collaboration with the U.S. Federal Reserve and other central banks issued a report assessing "the feasibility of publicly available [central bank digital currencies] in helping central banks deliver their public policy objectives" (hereinafter, the "BIS CBDC Report").[14] At the same time, the Financial Stability Board ("FSB"), a G20-sponsored "international body that monitors and makes

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experience of eight major central banks using interest rates on reserve deposits to effectuate monetary policy). The Federal Reserve, for example, adjusts the monetary supply by manipulating the federal funds rate ("FFR") (the rate banks charge each other for overnight loans). *See generally,* BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM, *The Federal Reserve System Purposes & Functions*, 27- (10th ed. 2016), https://www.federalreserve.gov/aboutthefed/files/pf_3.pdf. When the FFR is high, loans are more expensive and banks charge higher interest rates, thereby contracting the money supply and lowering inflation. *Id*. When the FFR is low, loans are cheaper, thereby expanding the money supply and increasing output. *Id*.

[11] Kevin Carmichael, *Will the Coronavirus Prompt Central Bankers to Rethink Their Approach to Digital Currencies?*, CTR. FOR INT'L GOVERNANCE INNOVATION (May 25, 2020), https://www.cigionline.org/articles/will-coronavirus-prompt-central-bankers-rethink-their-approach-digital-currencies.

[12] Carmichael, *supra* note 11. Indeed, the idea of using digital currency for the benefit of the general public, and transmitted by a central bank, is already present in the mind of legislators. *Cf*. H.R. 6321, 116th Cong. § 101 (2020) (to provide economic relief from the pandemic, proposing legislation to provide for the creation of digital wallets funded with "digital dollars"). *See* Colin Wilhelm & Lydia Beyoud, *House Democrats Consider Digital Wallets for Crisis Payments (2)*, BLOOMBERG L. (Mar. 23, 2020, 4:33PM), https://www.bloomberglaw.com/bloomberglawnews/banking-law (discussing the proposed bill within the broader topic of digital currencies).

[13] The BIS is an international body, sponsored by many of the world's central banks, which acts "as a bank for central banks." Https://www.bis.org/.

[14] BANK FOR INTERNATIONAL SETTLEMENTS ET AL., CENTRAL BANK DIGITAL CURRENCIES: FOUNDATIONAL PRINCIPLES AND CORE FEATURES (Report No. 1 in a series of collaborations from a group of central banks, Oct. 13, 2020), available at https://www.bis.org/publ/othp33.pdf. The group of central banks consisted of the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Federal Reserve, Sveriges Riksbank, and the Swiss National Bank. *Id*.

recommendations about the global financial system,"[15] issued two reports, one setting out "ten high-level recommendations that seek to promote coordinated and effective regulation, supervision and oversight of [global stablecoin] arrangements to address the financial stability risks posed by [global stablecoins], both at the domestic and international level . . . " (hereinafter, the "FSB Stablecoin Report"),[16] and the other proposing a "roadmap" to "address the key challenges often faced by cross-border payments" (hereinafter, the "FSB Cross-border Payments Report").[17] Even more recently, the President's Working Group on Financial Markets issued a "statement reflect[ing] a commitment" to "promote the important benefits of [retail digital currency] innovation."[18]

Although these pronouncements provide only aspirational generalizations,[19] they help to define the emerging categories of digital currencies. One category is digital currencies sponsored by governmental central banks,[20] which typically are referred to as "CBDC."[21] The BIS CBDC Report and the FSB Cross-border Payments Report help to define this category.[22] Another category is privately-issued digital currencies. These currencies currently have a token-based

[15] *See* https://www.fsb.org/about/.
[16] FINANCIAL STABILITY BOARD, REGULATION, SUPERVISION AND OVERSIGHT OF "GLOBAL STABLECOIN" ARRANGEMENTS 2 (Oct. 13, 2020), available at https://www.fsb.org/wp-content/uploads/P131020-3.pdf.
[17] FINANCIAL STABILITY BOARD, ENHANCING CROSS-BORDER PAYMENTS 1 (Oct. 13, 2020), available at https://www.fsb.org/wp-content/uploads/P131020-1.pdf.
[18] Press Release, President's Working Group on Financial Markets (Dec. 23, 2020) (referring to President's Working Group on Financial Markets, *supra* note 2).
[19] The BIS CBDC Report (*see supra* note 14), for example, purports to outline "foundational principles" for a central bank digital currency but does not give an opinion on whether to issue such a currency, merely proposing that central banks continue to investigate the feasibility of such issuance. Furthermore, the BIS CBDC Report's "three key [foundational] principles" are elementary: "coexistence with cash and other types of money in a flexible and innovative payment system; support for wider policy objectives without doing harm to monetary and financial stability; and promote innovation and efficiency." *Id*. at 1.
[20] BIS CBDC Report, *supra* note 14, at 3.
[21] *Id*. at 2. CBDC is an acronym for central bank digital currency or currencies. *Id*.
[22] FSB Cross-border Payments Report, *supra* note 17, at 3-4; BIS CBDC Report, *supra* note 14.

digital form[23] that is "secured by cryptography" such as blockchain.[24] For that reason, privately-issued digital currencies sometimes are referred to as cryptocurrencies.[25]

Privately-issued digital currencies can be divided, in turn, into currencies that are, or are not, backed by assets having intrinsic value (sometimes called reference assets).[26] Privately-issued digital currencies that *are* backed by—meaning they are redeemable (that is, exchangeable) for—assets having intrinsic value are generally referred to as stablecoins.[27] The FSB Stablecoin Report helps to define this category, which is exemplified by Facebook's proposed Libra.[28] Privately-issued digital currencies that are *not* backed by assets having intrinsic value are simply generic cryptocurrencies,[29] as exemplified by bitcoin.[30]

This Article focuses—as do the BIS CBDC Report, the FSB Stablecoin Report, and the FSB Cross-border Payments Report—on CBDC and stablecoins. The Article does not address bitcoin or other privately-issued digital currencies that are *not* backed by assets having intrinsic

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[23] *Cf*. Jason G. Allen et al., *Legal and Regulatory Considerations for Digital Assets*, CAMBRIDGE CENTRE FOR ALTERNATIVE FINANCE 18 (2020), available at https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/legal-and-regulatory-considerations-for-digital-assets/ (defining tokenisation (in America, spelled tokenization) as "merely a new way of doing something familiar"—in this case, changing from paper-based to digital form the "written record" of "the economically and legally most important features of an asset") (italics omitted). Allen et al. further observe that digital assets "for the most part, pertain to existing and well-known legal concepts; they effectively represent a set of rights embodied in a new digital form." *Id*. at 6.

[24] Https://www.investopedia.com/terms/c/cryptocurrency.asp.

[25] Harish Natarajan et al., *Distributed Ledger Technology (DLT) and Blockchain* 3 (WORLD BANK GRP., Working Paper No. 122140, 2017), http://documents1.worldbank.org/curated/en/177911513714062215/pdf/122140-WP-PUBLIC-Distributed-Ledger-Technology-and-Blockchain-Fintech-Notes.pdf.

[26] Jess Cheng, *How to Build a Stablecoin: Certainty, Finality, and Stability Through Commercial Law Principles*, 17 BERK. BUS. L. J. 320, 322 (2020). Reference assets frequently are a governmental fiat currency. *Cf*. FSB Stablecoin Report, *supra* note 16, at 7 ("A stablecoin, particularly if linked to a fiat currency or a basket of [fiat] currencies, may become a widely used store of value").

[27] FSB Stablecoin Report, *supra* note 16, at 9.

[28] *See supra* note 9 and accompanying text.

[29] Cheng, *supra* note 26. As observed, all privately-issued digital currencies, including stablecoins, are cryptocurrencies. *See supra* notes 22-25 and accompanying text.

[30] *Cf. supra* note 4 and accompanying text (discussing bitcoin).

value. At least at present,[31] those currencies have unpredictably fluctuating market values[32] which undermines their ability to be used efficiently as an alternative to cash.[33] A successful currency must have a stable value.[34]

When used as currencies, CBDC and stablecoins raise both innovative legal issues as well as the types of legal issues normally associated with payment systems (including risk of loss, counterfeiting, privacy, money laundering, and consumer protection), although in novel contexts.[35] It therefore is critical to provide a "[r]obust legal framework" covering these digital currencies and "the underlying system and the broader institutional framework in which they exist."[36] To that end, this Article analyzes how these digital currencies should be regulated and supervised, exploring their similarities and their differences.

Because they are privately issued, stablecoins have even greater potential than CBDC to revolutionize the monetary system.[37] A global stablecoin, meaning "a widely adopted stablecoin

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[31] The original term sheet for Libra contemplated a future possibility in which Libra Dollars would become so generally accepted that, like fiat currency, it no longer would need separate asset backing to maintain its intrinsic value. *Cf*. J.S. Nelson, *Why Cryptocurrencies Should be Evaluated as Fiat Money*, COLUMBIA LAW SCHOOL BLUE SKY BLOG (Feb. 27, 2020) (arguing that cryptocurrencies should be evaluated by the quality of their institutional backing), available at https://clsbluesky.law.columbia.edu/2020/02/27/why-cryptocurrencies-should-be-evaluated-as-fiat-money/.

[32] *See, e.g.*, https://www.imf.org/en/Publications/fintech-notes/Issues/2020/01/09/Regulation-of-Crypto-Assets-48810, Figure 4, at 5 (illustrating bitcoin's radically fluctuating market price).

[33] *See, e.g.,* Cheng, *supra* note 26, at 321–22 (arguing that bitcoin-like crypto assets are unreliable payment options because of their severe price volatility); Paul Vigna, *Why Bitcoin Hasn't Gained Traction as a Form of Payment*, WALL St. J., Feb. 9, 2021 (reporting that bitcoin's volatility (and its cost) has made ordinary day-to-day transactions impractical), available at https://www.wsj.com/articles/why-bitcoin-hasnt-gained-traction-as-a-form-of-payment-11612886974?reflink=share_mobilewebshare.

[34] Cheng, *supra* note 26, at 321–22.

[35] *Cf. infra* note 172 and accompanying text (noting the FSB's argument that stablecoins should be regulated according to the "same-business, same-risks, same-rules" principle).

[36] BIS CBDC Report, *supra* note 14, at 11 (focusing on CBDC, though expressing principles equally applicable to stablecoins).

[37] I am not suggesting that stablecoins are more likely than CBDC to become the norm in monetary systems, merely that stablecoins are more revolutionary because they are different from government-issued currencies.

with a potential reach and use across multiple jurisdictions,"[38] might even be used, like the U.S. dollar, as a world reserve currency.[39] As will be discussed, though, global stablecoins could impair central banks' ability to control monetary policy and possibly undermine confidence in the value or operational continuity of currencies, which could threaten international monetary and financial stability.[40] This Article therefore also analyzes how global stablecoins should be regulated and supervised to protect stability, including by using inventive public-private partnerships to protect the value of stablecoins that are backed by government fiat currencies.

That global focus builds on the multinational organizations' foundational work, which highlights the role of law. The BIS CBDC Report and the FSB Stablecoin Report emphasize the importance of (though again providing only aspirational generalizations for[41]) promoting coordinated and effective cross-border regulation and supervision of CBDC and stablecoins.[42] The FSB Stablecoin Report names "sound legal underpinnings" as an "important building block" for "the use of stablecoins in multiple jurisdictions."[43] It also includes, as one of its "high-level recommendations," that "authorities should apply and, if necessary, develop effective regulatory, supervisory and oversight approaches and cross-border cooperation mechanisms within their respective mandate and legal frameworks."[44] Separately, the BIS and the International Organization of Securities Commissions (IOSCO) recognize that any financial market

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[38] FSB Cross-border Payments Report, *supra* note 17, at 1 (sometimes referring to a global stablecoin as a GSC).
[39] A reserve currency is one that is widely used for payment in international transactions, thereby reducing exchange-rate risk. *See, e.g.*, https://www.investopedia.com/terms/r/reservecurrency.asp.
[40] *See infra* notes 232-249 and accompanying text.
[41] *Cf. supra* note 19 and accompanying text (observing that those Reports provide only aspirational generalizations regarding the feasibility of developing retail digital currencies).
[42] *See supra* notes 15-17 and accompanying text. The FSB recently announced that it is working with the IMF, the World Bank, and the BIS to develop a regulatory framework for global stablecoins, with the goal of setting international standards by 2022 or 2023. FSB Stablecoin Report, *supra* note 16, at 7. See *id*. at 29 for a detailed timeline of developing an international standard for global stablecoins. The FSB also proposed that central banks, under the guidance of the IMF, the World Bank, and the BIS, explore cross-border CBDC payments. FSB Cross-border Payments Report, *supra* note 17, at 32.
[43] FSB Stablecoin Report, *supra* note 16, at 9.
[44] *Id*. at 27.

infrastructure "should have a well-founded, clear, transparent, and enforceable legal basis for each material aspect of its activities in all relevant jurisdictions."[45]

This Article proceeds as follows. Part I focuses on CBDC, with subpart A examining and critiquing how these digital currencies are developing and subpart B analyzing how they should be regulated. Part II of the Article focuses on stablecoins, with subpart A examining and critiquing how they are developing and subpart B analyzing how they should be regulated. Finally, Part III of the Article examines cross-border CBDC and stablecoin payments, with subpart A inquiring how to implement—and subparts B and C analyzing, respectively, how to regulate and supervise[46]—such payments.

To help avoid confusion that can result from the imprecise and inconsistent terminology sometimes used to discuss digital currencies,[47] Appendix A to this Article provides a glossary of terminology. Appendix B also provides a more detailed discussion comparing the account-based and token-based CBDC models and contrasting China's prototype digital yuan.

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[45] BANK FOR INT'L SETTLEMENTS & INT'L ORG. OF SECURITIES COMMISSIONS, PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES 1 (Apr. 2012), https://www.bis.org/cpmi/publ/d101a.pdf (hereinafter, "PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES"). Central banks similarly recognize a strong legal framework as a fundamental principle for controlling risks. *Cf.* Payments Canada, Bank of Canada, and R3, *Project Jasper: A Canadian Experiment with Distributed Ledger Technology for Domestic Interbank Payments Settlement,* at 58 (Sep. 29, 2017) https://www.payments.ca/sites/default/files/29-Sep-17/jasper_report_eng.pdf (evaluating payment-system performance by satisfying requirements in the PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES); Federal Reserve*, Fedwire Funds Service Disclosure*, (Dec. 23, 2019), https://www.frbservices.org/assets/financial-services/wires/funds-service-disclosure.pdf (stating that the Board of Governors of the Federal Reserve System has incorporated the PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES into Federal Reserve Policy on Payment System Risk).

[46] Parts I and II of this Article do not address supervision because, for domestic currencies, that would be an internal national question. In the United States, for example, the Federal Reserve and the Department of the Treasury are the monetary supervisors. *See, e.g.*, https://www.federalreserve.gov/paymentsystems/coin_about.htm. In countries outside the United States, CBDC would be supervised, by definition, by the applicable government central bank. *See supra* notes 20-21 and accompanying text (describing CBDC as standing for a *central bank* digital currency).

[47] *Cf.* Jason G. Allen et al., *supra* note 23, at 6, 53 (observing that, for digital assets, "even the nomenclature generally differ[s] for the same fundamental asset," and recommending that "[d]efinitions should be clear and unambiguous").

I. CENTRAL BANK DIGITAL CURRENCIES

A. Developing Central Bank Digital Currencies.

Although money generally is recognized as having at least three functions,[48] its most important function is as a medium of exchange, to facilitate the sale of goods and services.[49] The main challenges to developing any retail digital currency as a medium of exchange are increasing accessibility and reducing cost.[50] If the currency is intended to be used globally, its designers also will have to grapple with implementing cross-border payments. Accessibility refers to consumers having day-to-day access to, and the ability to transfer, digital currencies.[51] Cost refers to consumers achieving that access and transferability on a cost-effective basis given that retail currency transfers typically are small (sometimes called "low-value") compared to wholesale currency transfers.[52] Implementing cross-border payments refers to international acceptance and legality of the digital currency as a means of global exchange.[53] These considerations influence, implicitly if not explicitly, how central banks are developing their CBDC structures.[54]

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[48] Sarah Allen et al., "Design Choices for Central Bank Digital Currency: Policy and Technical Considerations" 9 (Nat'l Bureau of Econ. Research, Working Paper No. 27634, 2020) (discussing money functioning as a medium of exchange, a store of value, and a unit of account).
[49] *Cf.* Paul Wong & Jesse Leigh Maniff, Comparing Means of Payment: What Role for a Central Bank Digital Currency?, FEDS Notes (Aug. 13, 2020) (examining digital currencies as more cost-effective payment services), available at https://www.federalreserve.gov/econres/notes/feds-notes/comparing-means-of-payment-what-role-for-a-central-bank-digital-currency-20200813.htm.
[50] *Cf.* BIS CBDC Report, *supra* note 14, at 11 (including convenience, acceptance and availability, and low cost as core CBDC design features).
[51] *See, e.g.*, Tommaso Mancini-Griffol et al., *Casting Light on Central Bank Digital Currencies* 7, 29 (INT'L. MONETARY FUND, Staff Discussion Notes No. 18/08, Nov. 2018), available at https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/11/13/Casting-Light-on-Central-Bank-Digital-Currencies-46233.
[52] BIS CBDC Report, *supra* note 14, at 11.
[53] *Id*. at 7.
[54] *Id*. at 10–11, 13–14.

1. *Account-based versus Token-based CBDC.* Two approaches have emerged: account-based CBDC and token-based CBDC.[55] In an account-based CBDC, the currency represents an electronically registered claim against—that is, a deposit at[56]—the central bank or its agent bank (for example, a commercial bank).[57] A currency transfer involves debiting all or part of the transferor's (i.e., the payor's) claim and crediting that amount to the transferee's (i.e., the payee's) account with the central bank or its agent bank.[58] These are simply book entries in accounts that are held and managed by banks.

In a token-based CBDC, the currency represents tokens (sometimes called digital coins) issued by the central bank, each with a specific denomination.[59] In contrast to an account-based CBDC, in which the recordkeeping is maintained through the transferor and transferee deposit accounts, the recordkeeping for a token-based CBDC is maintained through other central-bank-specified forms of identifying currency transfers.[60] A currency transfer involves the transferor (i.e., the payor) producing a digital "signature" that verifies the transfer of token ownership to the transferee (i.e., the payee).[61]

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[55] *See* Appendix B for a more detailed discussion of the account-based and token-based CBDC models. A token-based currency model is sometimes referred to as coin-based.
[56] A deposit at a bank is the term generally used for a customer making a loan to the bank. Technically, the deposit evidences the customer's claim against the bank for repayment. Citizens Bk. v. Strumpf, 116 S. Ct. 286, 290 (1995).
[57] *See, e.g.*, Michael T. Bordo & Andrew T. Levine, Central Bank Digital Currency and the Future of Monetary Policy, NBER Working Paper No. 23711, at 6 (Aug. 2017), available at https://www.nber.org/system/files/working_papers/w23711/w23711.pdf (observing that "individuals and firms would hold funds electronically in CBDC accounts at the central bank or in specially designated accounts at supervised depository institutions"). *Cf.* CENTRAL BANK OF ICELAND, RAFKRÓNA? CENTRAL BANK DIGITAL CURRENCY INTERIM REPORT 12 (2018), https://www.cb.is/library/Skraarsafn---EN/Reports/Special_Publication_12.pdf (noting that a CBDC can be issued "as a registered, traceable deposit to a payment account"). *See also supra* note 3 (observing that wholesale digital payments operate through electronic funds transfers).
[58] BANK OF ENGLAND, CENTRAL BANK DIGITAL CURRENCY OPPORTUNITIES, CHALLENGES AND DESIGN 47 (Mar. 2020 Discussion Paper), https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf.
[59] *Id*. at 47.
[60] Such forms might involve the use of smart contracts, for example, to serve as an algorithmic trusted third party to execute and record transactions. Sarah Allen et al., *supra* note 48, at 47–48.
[61] BANK OF ENGLAND, *supra* note 58, at 47.

Different jurisdictions are taking different approaches to developing a retail CBDC. The European System of Central Banks has engaged in a proof-of-concept for a token-based CBDC, designed to preserve cash-like privacy for CBDC transactions.[62] The digital yuan being developed by the People's Bank of China appears to combine account-based and token-based features,[63] involving a cash-like liability that is distributed to the public through accounts at commercial banks and other trusted payment-system intermediaries.[64] In the United States, a retail CBDC is likely to be account-based, at least initially.[65] Recently, for example, two bills were introduced in the U.S. Congress – the Banking for all Act in the Senate, and the Automatic BOOST to Communities Act in the House of Representatives – that call for creating an account-based CBDC.[66]

Path dependence and logic independently compel the choice of an account-based retail CBDC in the United States. From a path-dependence standpoint, much of the existing U.S.

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[62] EUR. CENT. BANK, EXPLORING ANONYMITY IN CENTRAL BANK DIGITAL CURRENCIES 1–2 (2018), https://www.ecb.europa.eu/paym/intro/publications/pdf/ecb.mipinfocus191217.en.pdf.
[63] *Cf.* Douglas W. Arner *et al.*, *After Libra, Digital Yuan and COVID-19: Central Bank Digital Currencies and the New World of Money and Payment Systems*, 65 EUR. BANKING INST., 37 (June 11, 2020) (discussing how China's digital currency will be transferred). Although some claim that consumers lacking a bank account will be able to use China's digital currency, the details are sparse. *See* Karen Yeung, *What Is China's Cryptocurrency Alternative Sovereign Digital Currency and Why Is It Not Like Bitcoin?*, South China Morning Post (May 13, 2020, 10:35 AM) (claiming digital wallets can be used without linking to a bank account).
[64] *See* Raphael Auer, Giulio Cornelli, & Jon Frost, "Rise of the Central Bank Digital Currencies: Drivers, Approaches, and Technologies" 6 (CESifo Working Paper No. 8655, Oct. 2020), https://privpapers.ssrn.com/sol3/papers.cfm?abstract_id=3723552; Sarah Allen et al., *supra* note 48, at 82–83. *See also* Appendix B for a more detailed discussion of China's digital yuan.
[65] *Cf.* Morgan Ricks, John Crawford, & Lev Menand, *FedAccounts*, GEO. WASH. L. REV. (forthcoming) (focusing on a Federal Reserve Bank account-based system); Bordo & Levine, *supra* note 57, at 6–7 (favoring the account-based CBDC design because of its payment verification and transaction efficiency); Auer et al., *supra* note 64 (finding account-based CBDC designs to be the most common among ongoing retail CBDC projects).
[66] S. 3571, 116th Cong. § 2 (2020); H.R. 6553, 116th Cong. § 2 (2020). The underlying motivation of these bills are to provide consumers with COVID-19 relief using CBDC. *Id*. *Cf. infra* notes 181-182 and accompanying text (comparing a bill introduced in the U.S. Congress that calls for regulating stablecoins that are convertible into U.S. dollars).

infrastructure of both central and commercial banks[67]—as well as the widespread application of that infrastructure to wholesale digital funds transfers among businesses and financial institutions[68]—is already account-based.[69] Because an account-based retail digital currency also could—and as contemplated by this Article, would—operate through electronic funds transfers,[70] it should be able to use technologies largely already in place at commercial banks and merely extend their access to a wider user base.[71]

From a logical standpoint, an account-based retail CBDC may have lower operating cost and should be less disruptive to commercial borrowing than a token-based system. An account-based retail CBDC may have lower operating cost because currency transfers are effected simply through book entries.[72] That avoids the need to design and continuously update the security of cryptographic record keeping. It also should be less disruptive to commercial borrowing because consumers would maintain deposit accounts, thereby assuring the continuance of deposits as a relatively low cost source of funds from which banks can make business loans.[73] Admittedly, a token-based retail CBDC may be more accessible, at least initially, because not all consumers

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[67] For convenience, this policy papers refers to commercial banks broadly, as including all non-governmental banks.
[68] *See* UCC Article 4A, Prefatory Note.
[69] Financial institutions in the United States, for example, hold accounts at the Federal Reserve and use Fedwire to transfer money between these accounts.
[70] *Cf*. Charles M. Kahn & William Roberds, *The Design of Wholesale Payments Networks: The Importance of Incentives*, Federal Reserve Bank of Atlanta Economic Review 1 (1999); Committee on Payment and Settlement Systems, *The Role of Central Bank Money in Payment Systems*, Bank for Int'l Settlements 8 (Aug. 2003), https://www.bis.org/cpmi/publ/d55.pdf (observing that wholesale funds transfers between banks are already settled digitally).
[71] Following path dependence implicitly assumes that the cost of switching to a new path—in this case, to a token-based retail digital currency—would exceed its efficiency gains. Whether that assumption is valid ultimately will be an empirical question.
[72] *See supra* notes 57-58 and accompanying text.
[73] *Cf. infra* note 82 and accompanying text (observing that a reduction in consumer deposits could lead to more expensive bank funding, and thus higher interest rates on business loans). *But cf*. Benjamin Geva, *Virtual Currencies and the State*, JUST MONEY (Apr. 22, 2020), https://justmoney.org/b-geva-payment-in-virtual-currency/ (contending that a token-based CBDC could achieve efficiency gains by reducing the level of retail deposits—although with concomitant risks).

currently have deposit accounts.[74] That liability may be overcome by encouraging unbanked consumers to open such accounts in order to access CBDC.[75]

Furthermore, most of the advantages of a token-based digital currency (i.e., permission-less, anonymous, competitive, decentralized) are either undesired or inapplicable to a retail CBDC. A central bank normally wants to maintain surveillance and control over its national monetary system.[76] Token-based digital currencies, however, were developed to have strong privacy protections and not require third party intermediaries, such as banks.[77] To the extent these protections are carried over to a token-based CBDC, they may hinder the enforcement of anti-money laundering, know-your-customer, and counter-terrorism-financing regulations which require knowledge of financial transactions and customers.[78] A token-based CBDC also might impair a central bank's ability to execute monetary policy.[79] For these reasons, this Article hereinafter will focus on an account-based retail CBDC.[80]

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[74] *Cf.* Fed. Deposit Ins. Corp., *How America Banks: Household Use of Banking and Financial Services*, 2019 FDIC SURVEY 12 (2020), available at https://www.fdic.gov/analysis/household-survey/index.html (estimating that 7.3 million U.S. households do not have commercial bank accounts).

[75] That might, however, require partial government subsidies or other incentives where it would be unprofitable for banks to service remotely located or poor consumers.

[76] *See, e.g.,* Aleksander Berensten & Fabian Schar, *The Case for Central Bank Electronic Money and the Non-case for Central Bank Cryptocurrencies*, 100 FED. RES. BANK OF ST. LOUIS REV. 97 (2018).

[77] *Cf.* Raphael Auer & Rainer Böhme, *The Technology of Retail Central Bank Digital Currency*, BIS Q. REV., Mar. 2020, at 85, 94 (observing that a "token-based system . . . would offer good privacy by default").

[78] *Cf. infra* notes 133-137 and accompanying text (discussing anti-money laundering, know-your-customer, and counter-terrorism-financing policies). Bank-secrecy and similar regulation should be able to adequately protect consumer privacy for an account-based retail CBDC.

[79] *Cf.* Sarah Allen et al., *supra* note 48, at 62–69 (discussing CBDC's potential to transmit innovative monetary policies); Mohammad Davoodalhosseini, Francisco Rivadeneyra, & Yu Zhu, *CBDC and Monetary Policy* BANK OF CANADA STAFF ANALYTICAL NOTE 2020-4 (Feb. 2020), available at https://www.bankofcanada.ca/2020/02/staff-analytical-note-2020-4/ (arguing that an "account-based system allows for the policy interest rate to be time-varying and contingent on the balance held"). The BIS views the development of a viable retail digital currency as more important, however, than the ability to use the currency to make innovative monetary policies. BIS CBDC Report, *supra* note 14, at 5.

[80] This Article assumes the feasibility—now or in the near future—of technology required to manage an account-based retail CBDC. This assumption appears to be realistic. The Clearing House, a banking association and payments company that is owned by large commercial banks,

2. *Central Bank versus Commercial Bank Accounts*. A basic design question for an account-based retail CBDC is whether the accounts should be at the central bank or at commercial banks. Maintaining those accounts at commercial banks—what sometimes is called a "hybrid" CBDC structure[81]—should be less costly and disruptive because depositors would not need to change their current banking arrangements to use the CBDC, central banks would not need to reconfigure their deposit-taking to include consumer accounts, and commercial banks would not need to replace a primary source of their funding (currently consumer deposits)—which could lead to more expensive funding, and thus higher interest rates on business loans.[82] A hybrid CBDC structure also should be less susceptible to bank runs because in most jurisdictions, including the United States, deposit accounts with commercial banks already are protected against bank runs by virtue of deposit insurance,[83] whereas replacement funding would create the risk of maturity transformation—the asset-liability mismatch that results from the short-term funding of long-term projects[84]—that lacks a clearly established protection against

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has created its Real Time Payments (RTP) network to facilitate real-time digital retail funds transfers. *Real Time Payments*, The Clearing House, https://www.theclearinghouse.org/payment-systems/rtp. The Federal Reserve is developing FedNow, an interbank real-time funds transfer service that is faster than FedWire. *See infra* note 109. FedNow follows the lead of the Federal Reserve's Faster Payments Task Force, whose objective was to investigate and support faster payments in the United States. *See* https://fasterpaymentstaskforce.org/meet-the-task-force/mission-and-objectives/. The Task Force's goals included facilitating "payments to/from all types of payment Accounts based in the United States (U.S.) held at all Depository Institutions and Regulated Non-bank Account Providers." *Id*. And China is already testing a retail CBDC in four cities. Cheng, *supra* note 7. *Cf*. Appendix B, *infra* (discussing China's prototype digital yuan).

[81] Auer & Böhme, *supra* note 77, at 88–89. *See* Appendix A for a more detailed discussion of digital currency terminology.

[82] Jesús Fernández-Villaverde, et al., *Central Bank Digital Currency: Central Banking For All?* BECKER FRIEDMAN INST., (Working Paper 2020)

[83] *See* https://www.iadi.org/en/deposit-insurance-systems/dis-worldwide/. Whether a central bank inherently would be protected against a run would depend on factors peculiar to that bank. For example, could the central bank legally print money, would it politically be willing to do so, and (absent printing money) could it obtain emergency liquidity from another government unit?

[84] Jeanne Gobat et al., *The Net Stable Funding Ratio: Impact and Issues for Consideration* 3 (INT'L. MONETARY FUND, Working Paper No. 14/106, 2014), https://www.imf.org/external/pubs/ft/wp/2014/wp14106.pdf [https://perma.cc/9P89-VMZP].

runs. Still, central banks should consider prescribing rules and regulations governing commercial bank accounts used for CBDC.

B. Regulating Central Bank Digital Currencies.

1. *Establishing a Regulatory Framework*. As observed, an account-based retail CBDC could operate through electronic funds transfers using technologies already in place at commercial banks for wholesale electronic funds transfers.[85] To that extent, except insofar as differences between retail and wholesale currencies mandate, it should be regulated similarly to the regulation of wholesale digital funds transfers.[86] Most of the specific regulatory concerns—risk of loss, counterfeiting, privacy, and money laundering[87]—should be the same regardless of whether the digital funds transfers are retail or wholesale. As will be discussed, the main regulatory difference between retail and wholesale currencies concerns consumer protection.

[85] *See supra* note 70 and accompanying text.

[86] [Also consider any otherwise applicable normative regulatory goals, such as clarity (protecting expectations), flexibility, simplicity of implementation/low transaction costs, fairness, consistency, completeness. *See* Appendix (pp. 989-91) to *A Fundamental Inquiry Into the Statutory Rulemaking Process of Private Legislatures*, 29 GA. L. REV. 909 (1995). Tie that to the function of financial regulation to correct market failures, including market failures that increase systemic risk/ impair financial stability. *Cf*. Steven L. Schwarcz, *Conclusion: Closing Perspectives on Regulating Systemic Risk*, *in* SYSTEMIC RISK IN THE FINANCIAL SECTOR: TEN YEARS AFTER THE GLOBAL FINANCIAL CRISIS 263, 269 (Douglas Arner, Emilios Avgouleas, Danny Busch & Steven L. Schwarcz, eds., Centre for International Governance Innovation, 2019) (showing why financial regulation should be designed to help "correct market failures that could trigger and transmit systemic risk").]

[87] *See* Wouter Bassu et al., *Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations* 4 (INT'L. MONETARY FUND, Working Paper No. 2020/254, Nov. 2020), available at https://www.imf.org/en/Publications/WP/Issues/2020/11/20/Legal-Aspects-of-Central-Bank-Digital-Currency-Central-Bank-and-Monetary-Law-Considerations-49827 (identifying key legal issues of CBDC). *Cf*. PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES, *supra* note 45, at 11 n. 16 (listing financial market infrastructure objectives to include anti-money laundering, antiterrorist financing, data privacy, promotion of competition policy, and investor and consumer protections).

CBDC regulation also should be concerned with broader financial stability considerations.[88] For example, the BIS-led group of central bank governors (the "BIS-led Group") maintains that a CBDC "should not compromise monetary or financial stability."[89] To that end, a CBDC should not increase the risk of bank runs, e.g., by making them larger and/or faster, during a financial crisis.[90]

The BIS-led Group cautions, for example, that a CBDC should not cause a shift in retail deposits from commercial banks into central banks (which it refers to as disintermediation), which could lead commercial banks to rely on more expensive and less stable sources of funding.[91] This Article argues that a CBDC should be represented by book entries in accounts that are held and managed by commercial banks.[92] The BIS-led Group's caution supports that argument, countering the contention by some that moving to a CBDC would be an opportunity for central banks to make their own accounts more widely available, thereby potentially strengthening the ability of central banks to make monetary policy.[93]

In thinking about the appropriate regulatory framework, one also should consider an historical perspective. Currencies have changed their forms over the centuries, with regulation evolving to adapt to the changes. In the United States, for example, early currencies were in the form of gold and silver coins, where the currency itself had inherent value as a commodity.[94]

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[88] *Cf*. PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES, *supra* note 45, at 10-11 (observing that the broad public policy objectives of designing a financial market infrastructure are to "limit systemic risk and foster transparency and financial stability").
[89] BIS CBDC Report, *supra* note 14, at 1.
[90] BIS CBDC Report, *supra* note 14, at 12.
[91] *Id*. at 12, 16. *Cf*. Mitsutoshi Adachi, Matteo Cominetta, Christoph Kaufmann, & Anton van der Kraaij, *A regulatory and financial stability perspective on global stablecoins* Part 3 EUROPEAN CENTRAL BANK (May 5, 2020), available at https://www.ecb.europa.eu/pub/financial-stability/macroprudential-bulletin/html/ecb.mpbu202005_1~3e9ac10eb1.en.html#toc (observing that "countries with fragile domestic banking systems could see deposit holders preferring to exchange their deposits for stablecoins, resulting in a loss of funding for domestic banks").
[92] *See supra* notes 76-84 and accompanying text.
[93] *Cf*. Ricks et al., *supra* note 65, at 15–16 (advancing that contention); Berensten & Schar, *supra* note 76, at 102 (arguing that whereas only banks and other financial institutions are currently able to make deposits at the central bank, giving consumers access to interest-bearing CBDC accounts could widen the scope and effectiveness of central bank monetary policy).
[94] *See* https://www.moneyfactory.gov/uscurrency/history.html.

That changed to "silver certificates," where the paper currency was theoretically exchangeable for silver.[95] That, in turn, changed to "fiat currency" in the form of Federal Reserve notes, where the currency is simply a promissory note made by the U.S. Treasury.[96] Under the later-discussed "same-business, same-risks, same-rules principle,"[97] the evolution of regulation to adapt to CBDC should roughly parallel the evolution of regulation to adapt to these other changes—the form of a currency being tangible or intangible being mostly (though not entirely[98]) irrelevant to the business or risks of payments.

2. *Applying the Regulatory Framework*. In general, therefore, an account-based retail CBDC should be regulated similarly to the regulation of wholesale digital funds transfers.[99] Two primary sources of regulation govern those funds transfers. In the United States, they are regulated by Article 4A of the Uniform Commercial Code ("UCC"),[100] and in the European Union they are regulated by the European Directive on payment services in EU internal markets (the "EU Directive").[101]

This Article next will analyze the possible application of Article 4A and the EU Directive to an account-based retail CBDC, focusing on regulating risk of loss and counterfeiting. Therefore, the Article will analyze how laws governing non-digital forms of money should apply to an account-based retail CBDC, focusing on regulating privacy, money laundering, and consumer protection.

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[95] *Id*.
[96] *Id*.
[97] *See infra* note 172 and accompanying text.
[98] *Cf. infra* notes 117-122 and accompanying text (discussing how counterfeiting of digital and tangible currencies differs).
[99] Portions of this subpart B.2 discussed are based in part on the author's policy paper, *Central Bank Digital Currencies and Law*, forthcoming as a chapter in a book on central bank digital currencies being published by Peter Lang and edited by the Istituto Affari Internazionali (IAI).
[100] Cheng, *supra* note 26, at 326.
[101] *See* Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, 2015 O.J. (337) 35–127, available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32015L2366&qid=1610641825076.

Article 4A presents a valuable model for regulating an account-based retail CBDC. It covers in depth the rights, obligations, and liabilities of banks and other intermediaries, and their customers, involved with digital funds transfers, and it has a consistent vocabulary for describing those transfers.[102] Article 4A's regulatory coverage also has been widely influential both within the United States and internationally.[103] Within the United States, Article 4A not only has been enacted in all 50 states[104] but also governs both of the principal digital payment systems—the Federal Reserve wire transfer network ("Fedwire"), and the New York Clearing House Interbank Payments Systems ("CHIPS").[105]

Internationally, Article 4A and the United Nations Commission on International Trade Law's ("UNCITRAL") Model Law on International Credit Transfers use the same framework for classifying entities and transactions in digital funds transfers (for example, both focus on credit transfers and speak in terms of originators/beneficiaries and payment orders to banks).[106] Also, both Article 4A and UNCITRAL's Model Law influenced the EU Directive.[107]

At least technologically, there do not appear to be significant differences between retail and wholesale digital funds transfers. Transferring funds electronically from one customer's

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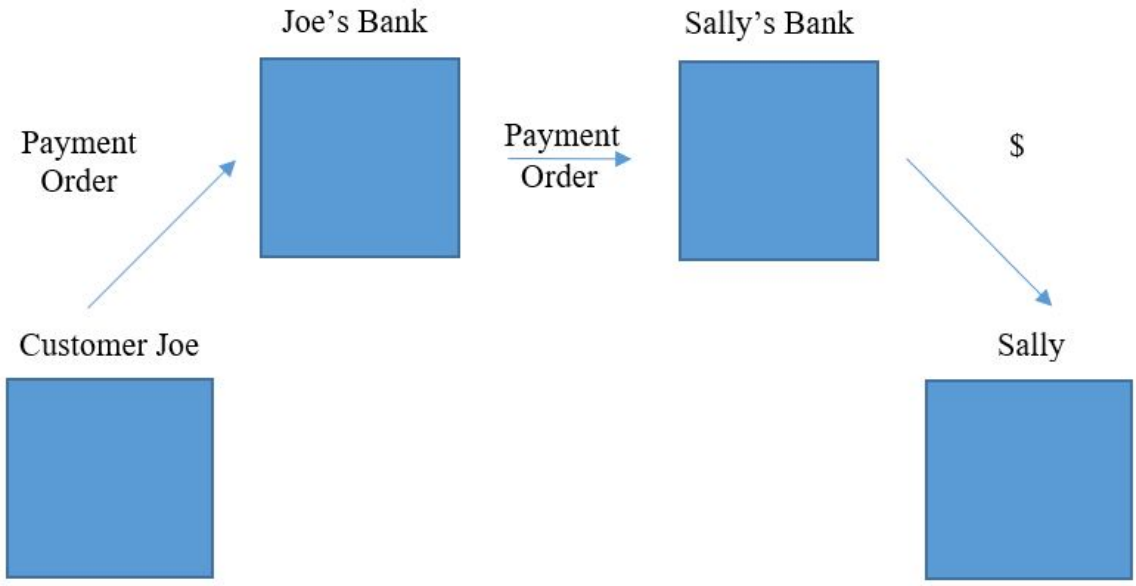
[102] The European Directive covers both credit and debit transfers, whereas Article 4A covers only credit transfers. *See* Benjamin Geva, *Payment Transactions under the E.U. Second Payment Services Directive—An Outsider's View*, 54 TEX. INT'L L.J. 211, 215. However, the distinction between credit and debit transfers is not an organizational principle in the Directive. Also, notwithstanding the Directive's slightly broader coverage, it lacks depth compared to Article 4A.
[103] Mark Sneddon, *The Effect of Uniform Commercial Code Article 4A on the Law of International Credit Transfers*, 29 LOY. L.A. L. REV. 1107, 1111-12 (1996); BARKLEY CLARK & BARBARA CLARK, 3 LAW OF BANK DEPOSITS, COLLECTIONS, & CREDIT CARDS § 17.02, (2)(d) (2020).
[104] Uniform Law Commission, *UCC Article 4A, Funds Transfers*, https://www.uniformlaws.org/committees/community-home?CommunityKey=2985cf6d-9c22-4abe-abf1-1f36f8a27201.
[105] 12 CFR 210.25; Clearing House Interbank Payments System, Public Disclosure of Legal, Governance, Risk Management, and Operating Framework 13 (June 2018). Fedwire and CHIPS also have choice-of-law provisions which specify that Article 4A will apply to all funds transfers processed in whole or in part by their systems. *Id*.
[106] *See generally* Carl Felsenfeld, *The Compatibility of the UNICTRAL Model Law on International Credit Transfers with Article 4A of the UCC*, 60 FORDHAM L. REV. S53 (1992).
[107] *Cf*. Sneddon, *supra* note 103, at 1109 (remarking on the influence of UCC Article 4A on the European Commission's proposed Directive on cross-border credit transfers).

bank account to that of another customer should be the same, in principle, whether the transfer is retail or wholesale.[108] As illustrated by the following schematic, a retail customer would initiate a funds transfer by sending a payment order to his bank; that bank would then (provided its customer's account has sufficient funds) electronically send a payment order through, for example, Fedwire or FedNow to the beneficiary's bank; and the beneficiary's bank would (again, subject to receiving funds) credit the beneficiary's account.[109]

[108] *Cf.* Ricks et al., *supra* note 65, at 15 (arguing that retail CBDC transactions could use the same wire transfer system currently used by the central bank).

[109] *Cf.* Federal Reserve Financial Services, FedNow Service product sheet https://www.frbservices.org/assets/financial-services/fednow/fednow-product-sheet.pdf (describing the payment flow for a credit transfer using the proposed FedNow interbank real-time settlement service, targeted to be available in 2023 or 2024, to enable financial institutions to deliver faster payment services to their customers).



Article 4A therefore should apply to an account-based retail CBDC much like it applies to wholesale digital currency. To that end, Article 4A regulates risk of loss and counterfeiting.

(a) *Risk of loss*. Risk of loss includes at least three risks: mistakenly transferring funds to the wrong person; fraud risk, including fraudulently transferring funds to a wrong person; and credit risk (sometimes called insolvency risk), including the risk of the "receiving bank" paying out before being paid. Article 4A covers these risks as follows.[110]

Mistaken transfer. Under UCC § 4A–207, a payment order with a nonexistent or unidentifiable person or account does not create a right in a person to receive the payment. Where the name and account number are known to the beneficiary's bank, however, that bank may pay the person referred to by the account number.[111]

[110] The EU Directive provides banks with less discretion in the choice to accept a payment order. This could reduce the bank's incentive to do as much due diligence as it otherwise would.
[111] *Cf. infra* note 112 and accompanying text (providing a more detailed explanation).

One possible small adjustment appropriate to adapt Article 4A to regulate retail CBDC transactions is in § 4A–207. Under subsection (a) of that section, if the name or bank account number of a payment order received by the beneficiary's bank refers to a nonexistent or unidentifiable person or account, no person has the right as a beneficiary to receive the payment—except as provided in subsection (b). Subsection (b) provides that if the name and bank account number associated with a particular payment order refer—unbeknownst to the beneficiary's bank—to different individuals (i.e., the name to one person and the bank account number to another), the beneficiary's bank may pay the person referred to by the account number.[112] This level of flexibility may make sense for wholesale wire transfers, because in larger transactions, especially business transactions, the parties may devote more care to provide the correct information—so errors should be relatively rare. Retail wire transfers may be more error prone.[113] For that reason, at least from the customers' standpoint, the stricter rule of subsection (a), that both the name and bank account number match, make sense. Still, that rule should be balanced by banking realities. At least currently, a "very large percentage of payment orders issued to the beneficiary's bank" are "processed by automated means using machines capable of" identifying "the number of a bank account," and "without human reading of the payment order itself."[114]

Fraud. UCC §§ 4A–202 to 4A–204 address authorization and acceptance of payment orders issued in the name of a customer. UCC § 4A–202(a) points to the law of agency to resolve a dispute where the person identified as sender refuses to pay on the grounds that it did not authorize the payment order. For example, if the payment order is sent by an officer of a corporation, the question would be whether that officer is an agent of the corporation with the power to authorize payment orders on the corporation's behalf. More commonly, a bank and its customer agree to security procedures that, if followed, result in an authorized payment order.[115]

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[112] UCC § 4A-207(b).
[113] A retail customer, for example, may be more likely to make a mistake when wiring $20 to a babysitter than a wholesale customer would be when wiring $25,000 to pay for a shipment of inventory.
[114] Official Comment 2 to UCC § 4A-207.
[115] UCC § 4A-202(b).

Credit risk. Under UCC § 4A–405(d), a "funds-transfer system rule may provide that payments made to beneficiaries of funds transfers made through the system are provisional until receipt of payment by beneficiary's bank of the payment order it accepted." UCC § 405(d) continues by providing conditions that, if met, would entitle the beneficiary's bank to a refund.

(b) *Counterfeiting*. Counterfeiting is defined as "the replication or manufacture of a financial instrument … with the intent to defraud an individual, entity, or government."[116] Traditionally, the counterfeiting risk for money has been concerned with illicit production of physical representations of the money, such as the unauthorized reproduction of U.S. dollar bills. The protections involve increasing the complexity and markings of bills.[117] These concerns have no obvious parallel for an account-based CBDC.

There are two possible ways to counterfeit an account-based CBDC, although both also could be classified as fraud: by double spending, and by making transfers involving an unverified account.[118] Double spending can occur when a payor uses the same money in an account to make two purchases before the transactions clear in the payment system.[119] Transfers involving an unverified account can occur when a payee causes the bank to credit money from a phantom account, which only appears to exist, to the payee's account and then quickly withdraws the money.[120] To the extent an account-based CBDC makes use of existing banking

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[116] Ralph E. McKinney Jr., Lawrence P. Shao, Dale H. Shao, & Duane C. Rosenlieb Jr., *The Evolution of Financial Instruments and the Legal Protection Against Counterfeiting: A Look at Coin, Paper, and Virtual Currencies*, 2015 U. ILL. J. L., TECH., & POL'Y 273, 299 (2015).
[117] *Id*. at 302-03.
[118] *See* Bank for Int'l Settlements, *Central Bank Digital Currencies*, at 4 (Mar. 2018), https://www.bis.org/cpmi/publ/d174.pdf (observing that the form of verification needed differs between token-based and account-based money).
[119] *Cf. id.* at 4 n.5 (observing the double spending problem for digital tokens). This Article's reference to double spending includes, of course, any multiple spending of the same money in an account.
[120] *See, e.g.*, Lily Hay Newman, *How Hackers Pulled Off a $20 Million Mexican Bank Heist*, WIRED (Mar. 15, 2019), https://www.wired.com/story/mexico-bank-hack/ (discussing a transfer initiated by hackers from a phantom account to a real account within the bank).

technology and systems (which is likely),[121] these counterfeiting risks should be comparable to counterfeiting risks in current wholesale digital banking.[122]

Article 4A covers these counterfeiting risks. It does not compel a bank to process transactions under conditions that might result in double spending,[123] such as when there are insufficient funds in an account.[124] Furthermore, existing account agreements authorize debits contingent on there being available balances.[125] The current banking system is thus already well guarded against the risk of double spending. A retail CBDC modelled off the current digital banking system should inherit the same (low) risk of double spending.

Likewise, Article 4A does not compel a bank to process transactions involving an unverified account. A bank has no obligation to accept a payment order.[126] Because acceptance obliges it to pay the receiving bank,[127] a sending bank has an incentive to ensure that funds are available for reimbursement before it accepts a payment order.

The discussion so far has analyzed how Article 4A could regulate risk of loss and counterfeiting for an account-based retail CBDC. Next consider how laws governing non-digital forms of money should apply to an account-based retail CBDC. That discussion will focus on regulating privacy, money laundering, and consumer protection.

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[121] Ricks et al., *supra* note 65 (manuscript at 3).
[122] The security threat caused by a possible centralization of accounts in the central bank would still need to be considered.
[123] Neither UCC Article 4A nor the Electronic Fund Transfer Act (EFTA) compels a bank to process a transaction when there are insufficient funds in an account. Under UCC § 4A-212, absent an explicit agreement, a bank has no duty to accept a received payment order.
[124] Under UCC § 4A-212, absent an explicit agreement, a bank has no duty to accept a received payment order. The EFTA, as codified in part at 15 U.S.C. 1693h, makes insufficient funds in a customer's account an explicit exception to a bank's liability for damages caused by a failure to make a digital funds transfer.
[125] *E.g.*, Wells Fargo Bank, N.A., *Deposit Account Agreement*, at 44 (July 24, 2019), https://www.wellsfargo.com/fetch-pdf?formNumber=CCB2018C&subProductCode=ANY. Given both the legal framework at *supra* note 45 and the account agreements banks have crafted, double spending is a small risk in an account-based system where a third party—the bank—oversees a transaction.
[126] *See supra* note 32.
[127] UCC § 4A-402(c).

(c) *Privacy*. Central bank digital currencies may help to centralize data about the money supply. There is a long-established privacy interest in protecting individual financial records from federal government access.[128] To the extent CBDC impacts privacy—for example, by making funds transfers easier to trace—how should privacy and access to capital be balanced? Governments generally protect their citizens' privacy better than private entities, such as a non-government sponsor of a digital currency.[129]

It also may be interesting to consider if a kind of central-commercial bank "federalism" is more effective when it comes to security measures to protect privacy. If the account-based CBDC is a totally centralized system, then any security vulnerability is systemic, everyone will be affected. However, if the account-based CBDC makes use of infrastructure and security measures at commercial banks, then a vulnerability at one bank would not necessarily be present at other commercial banks (because of the variability of security measures in place).

(d) *Money laundering*. UCC Article 4A does not regulate money laundering. Modern money-laundering regulation originated in 1989, when the G7 nations established an inter-governmental body, the Financial Action Task Force ("FATF"), to address this threat to the

[128] Congress enacted the Right to Financial Privacy Act of 1978, for example, to prevent banks and other financial institutions from disclosing a person's financial information to the government unless the records are disclosed pursuant to subpoena or search warrant. *See* 29 U.S.C. §§ 3401-3422.

[129] *Cf. FTC Imposes $5 Billion Penalty and Sweeping New Privacy Restrictions on Facebook*, (2019), https://www.ftc.gov/news-events/press-releases/2019/07/ftc-imposes-5-billion-penalty-sweeping-new-privacy-restrictions (last visited Jul 16, 2020) (reporting that Facebook agreed to pay a penalty of $5 billion to settle charges that it "violated a 2012 FTC order by deceiving users about their ability to control the privacy of their personal information"); Natasha Lomas, *Libra, Facebook's Global Digital Currency Plan, Is Fuzzy on Privacy, Watchdogs Warn*, TECHCRUNCH (Aug. 5, 2019, 2:47 PM), https://techcrunch.com/2019/08/05/libra-facebooks-global-digital-currency-plan-is-fuzzy-on-privacy-watchdogs-warn/ (noting the lack of detailed information on Libra's privacy protections and describing the concerns of a set of international privacy watchdogs); Spencer Bokat-Lindell, *Can We Trust Facebook to Run a Bank?*, N. Y. TIMES, Oct. 24, 2019, https://www.nytimes.com/2019/10/24/opinion/facebook-libra-zuckerberg.html (discussing privacy concerns over Libra).

banking system.[130] The FATF's mission expanded in 2001 to counter the use of the financial system for terrorism financing.[131] There currently are 39 members of the FATF, covering many of the largest financial hubs.[132]

Globally, anti-money-laundering ("AML") laws generally follow the FATF's recommendations.[133] The FATF seeks "to set standards and promote effective implementation of legal, regulatory and operational measures for combating money laundering, terrorist financing and other related threats to the integrity of the international financial system."[134] To this end, it makes recommendations for an AML legal framework in member countries.[135]

If the introduction of a CBDC leaves the commercial banking sector as the retail depository institutions, no change should be needed, in principle, to AML laws because the CBDC would not impact the FATF recommendations. Changes to AML laws might be needed, though, if the CBDC scheme contemplates that retail CBDC account holders have accounts directly with the central bank; that would raise questions whether the central bank or commercial banks should be obligated to meet the recommendation's requirements.

In practice, however, a retail CBDC might require certain changes to AML laws. For example, FATF Recommendation 10 creates an obligation for financial institutions to conduct customer due diligence (also known as Know-Your-Customer ("KYC") laws). If this recommendation requires every retail transaction to be scrutinized, it would impose high transaction costs due to the sheer volume of those transactions.[136] That volume would swell to

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[130] Fin. Action Task Force, *History of the FATF*, https://www.fatf-gafi.org/about/historyofthefatf/.
[131] *Id*.
[132] *Id*.
[133] *Id*.
[134] Fin. Action Task Force, *What do we do*, https://www.fatf-gafi.org/about/whatwedo/.
[135] Fin. Action Task Force, *International Standards on Combating Money Laundering and the Financing of Terrorism & Proliferation* (June 2019), www.fatf-gafi.org/recommendations.html.
[136] FATF Recommendation 17 allows financial institutions to outsource their customer due diligence requirements to third parties; however, liability remains with the delegating party. Fin. Action Task Force, *supra* note 135. For a retail CBDC this could mean central banks are outsourcing customer due diligence to commercial banks. In may be preferable, contra

include what now are physical transfers of cash. To reduce these costs, AML laws could place a floor on the value of transfers that would trigger the need to conduct customer due diligence.[137]

(e) *Consumer protection*. Although UCC Article 4A covers many domestic and international digital funds transfers, it was designed for use by relatively sophisticated parties, such as businesses and financial institutions.[138] In the United States, the Electronic Fund Transfer Act ("EFTA") governs a range of existing retail digital funds transfers, including ATM deposits and withdrawals and most mobile payment apps (such as PayPal, Venmo, and Zelle).[139]

In contrast to Article 4A, the EFTA pays little attention to what digital funds transfers consist of or how they are carried out; rather, the primary purpose of the EFTA is one of consumer protection: to give consumers certain rights when engaging in digital funds transfers.[140] For example, the EFTA limits consumer liability for unauthorized transactions,[141] ensures that banks adequately inform consumers of their rights (and protects consumers from being forced to waive those rights),[142] protects consumers from being charged excessive fees,[143] and gives consumers a means of redressing erroneous transactions.[144]

To illustrate these different regulatory approaches, assume a customer of Bank A accidently discloses information that enables a third party to make an unauthorized transaction. Under Article 4A, the customer will be liable for the unauthorized transaction so long as Bank A,

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Recommendation 17, to have commercial banks responsible to the central bank for failed due diligence.

[137] *Cf*. 31 CFR 1010.311 (setting U.S. reporting practices requiring financial institutions only to report "each deposit, withdrawal, exchange of currency or other payment or transfer, by, through, or to such financial institution which involves a transaction in currency of more than $10,000 . . . .").

[138] *See supra* note 68 and accompanying text.

[139] 12 C.F.R. § 205.3. In part because of the Supremacy Clause of the U.S. Constitution, the EFTA, which is federal law, supersedes inconsistent provisions of Article 4A, which is state law. *Cf*. UCC § 4A-108 and Off. Cmt. 1 (stating and explaining the EFTA's supremacy).

[140] 15 U.S.C. § 1693.

[141] § 1693g.

[142] § 1693c.

[143] § 1693o-2.

[144] § 1693f.

in good faith, follows a commercially reasonable, and mutually agreed upon, security procedure.[145] Under the EFTA, the customer's liability for the unauthorized transaction is subject to a dollar limitation.[146] Another important difference between Article 4A and the EFTA is the extent to which customers and their banks can vary the terms of their agreements. Article 4A affords much more flexibility to contractually vary the rights and obligations of a party to a digital funds transfer. So long as Article 4A does not expressly provide otherwise, the terms of a funds transfer can be varied.[147] The EFTA does not permit consumer rights to be waived.[148]

These differences between Article 4A and the EFTA reflect their different purposes. Article 4A was written with wholesale funds transactions in mind and contemplates sophisticated users. In contrast, the EFTA was written to protect everyday retail customers, and this policy goal is reflected in provisions that limit consumer liabilities and protect their rights.

CBDC regulation should draw both from Article 4A and the EFTA. It should draw from Article 4A to the extent such regulation governs how digital funds transfers should occur—through a series of payment orders between clearly defined parties—and how generally to allocate rights and obligations between those parties. It should draw from the EFTA to the extent regulators regard holders of retail CBDC to need overriding consumer protection.

II. STABLECOINS

In contrast to central-bank sponsored CBDC, stablecoins are privately sponsored and issued. As with any other retail digital currency, the main developmental challenges include increasing accessibility—the ability of consumers to have day-to-day access to, and to transfer, the currency—and reducing cost—the ability of consumers to achieve that access and

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[145] Francis J. Facciolo, *Unauthorized Payment Transactions and Who Should Bear the Losses*, CHI.-KENT L. REV. 605, 614 (2008).
[146] 15 U.S.C. § 1693g(a) (limiting that liability to $50 if Bank A is properly notified of the unauthorized transaction, and otherwise $500).
[147] UCC § 4A-501.
[148] 15 USCS § 1693l.

transferability on a cost-effective basis.[149] Stablecoins also face a third developmental challenge: assuring their stable value by designing reliable redemption rights.

A. Developing Stablecoins.

Like all other privately-issued digital currencies, stablecoins are cryptocurrencies.[150] This means that they have a token-based digital form that is secured by cryptography.[151] In general, therefore, stablecoins should have the same high accessibility and low cost of other cryptocurrencies.[152] Some stablecoins, such as Libra, may have even higher accessibility.[153]

Other things being equal, the higher its accessibility and the lower its cost, the more widely used a stablecoin may become.[154] The extent to which other things are equal will turn on the third developmental challenge: assuring the stablecoin's stable value by designing reliable redemption rights.

Recall that the fact that stablecoins are backed by (i.e., exchangeable for) assets having intrinsic value, such as government fiat currencies, makes them different from other privately-

[149] *See supra* notes 50-52 and accompanying text.
[150] *See supra* note 24 and accompanying text.
[151] *See id*.
[152] *See, e.g.,* Nakamoto, *supra* note 4; Galvin Wood, *Ethereum: A Secure Decentralised Generalised Transaction Ledger* (2020), available at https://ethereum.github.io/yellowpaper/paper.pdf.
[153] Discussions of the cryptography of privately-issued digital currencies often discuss accessibility by focusing on the rate at which transactions can be processed. Libra's cryptography is expected to be able to process at least 1,000 transactions per second. ZACHARY AMSDEN ET AL., THE LIBRA BLOCKCHAIN 22 (2020), https://developers.diem.com/papers/the-diem-blockchain/2020-05-26.pdf. In contrast, the cryptography of Bitcoin and Ethereum can process only seven and 20 transactions per second, respectively. MCKINSEY & CO., BLOCKCHAIN 2.0: WHAT'S IN STORE FOR THE TWO ENDS—SEMICONDUCTORS (SUPPLIERS) AND INDUSTRIALS (CONSUMERS)? 33 (2019), https://www.mckinsey.com/~/media/McKinsey/Industries/Semiconductors/Our%20Insights/McKinsey%20on%20Semiconductors%20Issue%207/McK_Semiconductors_Oct2019-Full%20Book-V12-RGB.pdf.
[154] *Cf*. BIS CBDC Paper*, supra* note 14, at 14 (noting that "[t]he CBDC system will need to be able to meet the volume and throughput (transactions per second) requirements at a justifiable cost").

issued digital currencies.[155] A stablecoin's value depends on the ability of its holders to exchange their coins for the reference assets, on demand made to the relevant issuer of the coins.[156] Any failure of the issuer to satisfy such redemption rights, or even the perception that such a failure might occur, would likely lead to a loss of confidence in the stablecoin and a collapse in its value.[157] That would expose the issuer and stablecoin holders to default risk, similar to the liquidity "run" risk of a bank run—that the issuer might be unable to obtain sufficient reference assets to satisfy correlated demands by stablecoin holders. It also would expose the issuer to valuation risk on the reference asset—the risk that the issuer would have to acquire additional reference assets to satisfy demand at a time when the market price of the reference assets has gone up.

To illustrate these risks, consider Facebook's current proposal for issuing Libra. Libra will be launched as a single-currency stablecoin, i.e., Libra Dollars, within the United States, and its reference asset will be limited to U.S. dollars.[158] By pegging a Libra Dollar to a U.S. dollar, Facebook will be agreeing to exchange (at whatever exchange rate is set) U.S. dollars to holders of Libra Dollars requesting the exchange. The default risk is that Facebook might be, or might perceived to be, unable to obtain sufficient U.S. dollars to satisfy correlated demands by Libra Dollar holders. The valuation risk is that Facebook would have to acquire additional U.S. dollars to satisfy demand at a time when the U.S. dollar has risen in value.[159]

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[155] *See supra* notes 26-27 and accompanying text.
[156] *See* FSB Stablecoin Report, *supra* note 16, at 10 (identifying redemption as a core function of a stablecoin arrangement).
[157] *Id*. at 15. The FSB itself recognizes this distinction between operational factors and value. When discussing the impact of global stablecoins on financial stability, it differentiates "operational disruption" which "might have significant impacts on economic activity and financial system functioning," and variations in "value" of global stablecoins which "might cause significant fluctuations in users' wealth" that are "sizeable enough to affect spending decisions and economic activity." *See* text accompanying note 241, *infra*.
[158] The Diem Association, *Libra White Paper v2.0* at 2 (2020), https://wp.diem.com/en-US/wp-content/uploads/sites/23/2020/04/Libra_WhitePaperV2_April2020.pdf. This is much more modest than the original goal of issuing multicurrency-pegged Libra coins. The Diem Association, *An Introduction to Libra* 7 (2019), available at https://sls.gmu.edu/pfrt/wp-content/uploads/sites/54/2020/02/LibraWhitePaper_en_US-Rev0723.pdf.
[159] Technically, in this example, valuation risk means that the U.S. dollar has risen in value compared to the value of Libra Dollars. In a perfect market, that should not occur absent default

Facebook or any other issuer of a viable stablecoin[160] will need to protect currency holders and itself from these risks.[161] An issuer could attempt to hedge these risks with derivatives, but the derivatives market might not be deep enough to provide that hedge for an affordable price.[162] The issuer could try to collateralize its obligation to exchange the reference asset for the stablecoin,[163] but that could be very expensive.[164] To try to protect against these risks, Facebook's Libra Dollars are expected to be fully backed by a managed reserve of the U.S. dollar reference assets, which also could be expensive.[165] This Article later examines how inventive public-private partnerships could more cost-effectively protect the value of stablecoins that are backed by government fiat currencies.[166]

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risk. In reality, though, even the perception of default risk could cause that to occur. *See supra* note 157 and accompanying text.

[160] Although technically the Libra Association, not Facebook, is the issuer of Libra (*see supra* note 9), Facebook may suffer reputational costs if it fails to protect currency holders.

[161] *Cf*. Mario Bellia & Sebastian Schich, "What Makes Private Stablecoins Stable?," available at (Oct. 26, 2020 working paper), available at https://ssrn.com/abstract=3718954 (finding evidence that the backing of stablecoin exchange risks plus external auditing to enhance the credibility of such backing are "crucial for the stability in terms of exchange rate of privately issued stablecoins").

[162] In comparison, failing to find an affordable market hedge, Enron hedged the value of its "merchant assets" through structured finance, which through an unexpected confluence of falls in market value led to its default. Enron created 'independent' SPVs, capitalized with Enron publicly traded stock, to guarantee (i.e., hedge) the value of its merchant assets; but Enron did not anticipate a concurrent collapse of both the merchant-asset values and its stock value.

[163] *Cf*. Bellia & Schich, *supra* note 161 (arguing that one way for privately-issued stablecoins whose reference asset is a fiat currency to be successful in terms of delivering stability is for the stablecoin to be collateralized by that fiat currency).

[164] Craig Calcaterra et al., *Stable Cryptocurrencies: First Order Principles*, 3 STAN J. BLOCKCHAIN L. & POL'Y 62, 64 (2020), available at https://stanford-jblp.pubpub.org/pub/stable-cryptocurencies-principles/release/1. *Cf.* Sam Bourgi, *Tether's Market Cap is Growing at a Near-record Pace*, COINTELEGRAPH (Nov. 27, 2020), https://cointelegraph.com/news/tether-s-market-cap-is-growing-at-a-near-record-pace (observing that a full collateralization of Tether, a U.S. dollar-backed stablecoin, would require $19 billion cash and short-term securities, and that although Tether "is supposedly backed by real U.S. dollar reserves, Tether has never produced a full audit of its bank accounts").

[165] *See* Libra White Paper v2.0, *supra* note 158, at 12 (noting that the Libra reserve will consist of 80% short-term, low-credit risk government securities and 20% cash). Libra also claims that the Libra reserve will be furthered endowed with a capital buffer. *Id.* at 12–13.

[166] *See infra* note 188 and accompanying text.

B. Regulating Stablecoins.

In contrast to CBDC, the regulation of privately-issued stablecoins starts from a blanker slate because there is even less precedent.[167] Subpart 1 next suggests a regulatory framework based on the collective views of the G7 finance ministers, central bank governors, and the FSB. Subpart 2 then supplements that framework by engaging in a more normative regulatory analysis.

1. *A Regulatory Framework based on the views of the G7 Finance Ministers, Central Bank Governors, and the FSB*. The G7 finance ministers and central bank governors assert that any digital payment services, including stablecoins, "should be appropriately supervised and regulated to address" certain specified challenges and risks, including "financial stability, consumer protection, privacy, . . . cybersecurity, operational resilience, money laundering, terrorist and proliferation financing, market integrity, governance, and legal certainty."[168] The underlying challenge and risk of cybersecurity would appear to be counterfeiting, which (as discussed) would encompass double spending and making transfers involving an unverified account.[169] The financial stability challenge would necessarily encompass operational resilience,

[167] *See* FSB Stablecoin Report, *supra* note 16, at 17 (observing that "most jurisdictions do not currently have regulatory regimes specific to . . . stablecoins"). *But cf*. Cheng, *supra* note 26, at 324 (arguing that existing commercial law principles can be used to regulate stablecoins).
[168] G7 Finance Ministers and Central Bank Governors' Statement on Digital Payments (Oct. 13, 2020), available at https://home.treasury.gov/news/press-releases/sm1152. This list also includes "taxation," but that is neither a challenge nor a risk.
[169] *See supra* note 118 and accompanying text (observing that these forms of "counterfeiting" also could be classified as fraud).

market integrity, governance, and legal certainty.[170] Expressed in this way, these challenges and risks roughly parallel those discussed in connection with CBDC regulation.[171]

The FSB maintains that stablecoin regulation should start by "identify[ing] the activity performed by a stablecoin arrangement and the participants involved, and apply[ing] the relevant existing regulation to that activity or entity according to the "*same-business, same-risks, same-rules*" principle.[172] Under that principle, the FSB surveyed the "functions and activities" of stablecoins that "are most frequently covered" by regulation.[173] Principally, these functions and activities relate to protecting the right of stablecoin holders to redeem such currencies for the reference assets.[174]

A regulatory framework for stablecoins based on the collective views of the G7 Finance Ministers, Central Bank Governors, and the FSB thus would parallel the framework discussed for CBDC regulation and would add protecting the right of stablecoin holders to redeem their currencies for the reference assets.

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[170] *Cf*. Financial Stability Board, *Decentralised Financial Technologies*: *Report of Financial Stability, Regulatory and Governance Implications* 6–7 (Jun. 2019), https://www.fsb.org/wp-content/uploads/P060619.pdf (discussing how decentralized financial technologies may raise risks to financial stability, including operational and market integrity risks of similar technologies being concentrated in a relatively small set of persons or entities; governance risks insofar as there may be diffused or unclear responsibility and accountability in a decentralized financial system; legal risk based on uncertainty regarding permissionless systems, anonymous participants, and unclear liabilities arising from smart contracts; and other operational and legal risks arising from permissionless systems that involve large networks of anonymous users); Tobias Adrian, Financial Counsellor and Director, Int'l Monetary Fund, Remarks at the IMF-Swiss National Bank Conference (May 14, 2019) (discussing the financial stability concerns that stablecoins face as digital stores of value).

[171] *See supra* notes 85-148 and accompanying text.

[172] FSB Stablecoin Report, *supra* note 16, at 17 (emphasis in original, hyphenation added).

[173] *Id*.

[174] *Id*. (identifying "the issuance and redemption of stablecoins; managing reserve assets; providing custody/trust services for stablecoin reserve assets; exchanging and trading stablecoins (including reselling to retail users) and storing the private keys providing access to stablecoins (wallets)"). The FSB's survey shows that jurisdictions were less likely to regulate "the governance of the stablecoin arrangement, the operation of the infrastructure of a stablecoin arrangement and the validation of transactions." *Id*.

2. *Supplementing the foregoing Framework by Engaging in a more Normative Regulatory Analysis*. The G7 finance ministers and central bank governors do not explain how they identify the stablecoin-related challenges and risks that they say should be regulated, while the FSB merely employs a survey. To assure completeness, this Article next engages in a more normative analysis of how privately-issued stablecoins should be regulated. Although this analysis occasionally uses Libra as an example, it focuses on the fundamental substantive rights associated with stablecoins rather than any particular stablecoin's form.[175]

The purpose of financial regulation is, and should be, to help correct market failures.[176] For stablecoins, the primary market failure is negative externalities—harm to third parties.[177] Stablecoins can pose externalities both to their holders (that is, the stablecoin users) and to governments.

There appear to be two significant externalities to holders. There is a risk that they may be unable to redeem their stablecoins, at the agreed rate of exchange, for the reference assets backing their stablecoins. That inability not only would harm such of those holders seeking currency redemption but also would impair the value of the stablecoins. Another significant

[175] *Cf*. Jason G. Allen et al., *supra* note 23, at 53 (recommending that "Regulatory authorities should focus on the substance of the [digital] asset and the rights associated with it, rather than its form, unless the form changes the substantive nature of the asset.").
[176] *See* Richard A. Posner, *Theories of Economic Regulation*, 5 BELL J. ECON. & MGMT. SCI. 335, 335 (1974) ("[Economic] regulation is supplied in response to the demand of the public for the correction of inefficient and inequitable market practices.").
[177] *Cf.* Cristina Cuervo et al., *Regulation of Crypto Assets* (INT'L. MONETARY FUND, FinTech Notes No. 19/03, 2020), available at https://www.imf.org/en/Publications/fintech-notes/Issues/2020/01/09/Regulation-of-Crypto-Assets-48810 (identifying key risks associated with stablecoins and their potential effects). Although, technically, externalities are not market failures but the result of market failures, economists typically categorize them as market failures.

externality to holders is the risk that the protective cryptology underlying stablecoins may fail or be compromised.[178] Regulation is needed to help protect against these externalities.[179]

The G7 Finance Ministers, Central Bank Governors, and the FSB already recognize the redemption risk.[180] In recently proposed legislation, the U.S. Congress similarly recognizes this risk. The Stablecoin Classification and Regulation Act of 2020, which has been introduced as a bill in the House of Representatives,[181] would require any stablecoin convertible into U.S. dollars to be issued only by an insured depository institution that is a member of the Federal Reserve System.[182] The issuer would be required to "take all possible actions to ensure that" that stablecoin is convertible into dollars at the agreed redemption value, on a holder's demand.[183] Such actions would include depositing reserves as collateral, unless the issuer knows that the stablecoins are insured deposits.[184] Similarly, in response to a request from the Libra Association to the Swiss Financial Market Supervisory Authority ("FINMA") asking how it would classify the planned Libra stablecoin under Swiss supervisory law, FINMA responded that a "necessary condition for being granted a license as a payment system would be that the returns and risks associated with the management of the reserve were borne entirely by the Libra Association and not – as in the case of a fund provider – by the 'stable coin' holders."[185]

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[178] *Cf*. Guglielmo Maria Caporaale et al., "Cyber-attacks and Cryptocurrencies" 15 (BRUNEL U. DEP'T OF ECON. AND FIN, Working Paper No. 2003, Feb. 2020), https://www.brunel.ac.uk/economics-and-finance/research/pdf/2003-Feb-GMC-Cyber-attacks-and-Cryptocurrencies.pdf (finding that "general cryptocurrencies are highly vulnerable to cyber-attacks, owing to the underlying blockchain technology").

[179] *Cf*. FSB Stablecoin Report, *supra* note 16, at 35 (providing the "high-level recommendation" that "Authorities should ensure that [global stablecoin] arrangements provide legal clarity to users on the nature and enforceability of any redemption rights and the process for redemption, where applicable.").

[180] *Cf. supra* note 77 and accompanying text (discussing protecting the right of stablecoin holders to redeem their currencies for the reference assets).

[181] *See* https://tlaib.house.gov/sites/tlaib.house.gov/files/STABLEAct.pdf/.

[182] *Id*. at 11-12.

[183] *Id*. at 13-14.

[184] *Id*. at 14.

[185] "FINMA publishes 'stable coin' guidelines" (Sep. 11, 2019), available at https://www.finma.ch/en/news/2019/09/20190911-mm-stable-coins/.

To protect against the risk that the protective cryptology underlying stablecoins may fail or be compromised, regulators might require stablecoin issuers to back up that cryptology through separate networks. The most likely failure might occur, for example, if certain validator nodes are compromised or stop operating.[186] Regulators could protect against that risk by requiring the stablecoin issuer to maintain backup validators.

Stablecoins also can pose externalities to governments. The primary externality is the risk that a stablecoin could become so widely used that it would undermine the ability of a government to use its currency to affect monetary, and thus economic, policy.[187] Regulation also is needed to help to protect against this risk.

At least where the reference asset for the stablecoin is a government's fiat currency, the government might consider mandating a strategic public-private partnership[188] to protect against this risk. As part of this partnership, the government might offer the stablecoin issuer some protection against the redemption risk. For example, the partnership could permit the government to use the stablecoin to affect monetary policy, such as by controlling the issuance of new stablecoins (and hence the money supply).[189] In return, possibly for a fee,[190] the government

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[186] Financial Stability Board, *Addressing the Regulatory, Supervisory, and Oversight challenges Raised by "Global Stablecoin" Arrangements* 13 (Apr. 2020), https://www.fsb.org/wp-content/uploads/P140420-1.pdf.

[187] *Cf. supra* note 10 and accompanying text (discussing monetary policy).

[188] *Cf. supra* note 166 and accompanying text (discussing the possibility of a public-private partnership to address U.S.-dollar backing for stablecoins) and *infra* note 250 and accompanying text (discussing how a public-private partnership could help to reduce adverse confidence effects).

[189] *Cf.* Scott A. Wolla, *A New Frontier: Monetary Policy with Ample Reserves*, PAGE ONE ECONOMICS 1-2 (May 2019, Fed. Reserve Bk. of St. Louis) (discussing how the Federal Reserve affects monetary policy by conducting open market operations to manage the money supply), available at https://files.stlouisfed.org/files/htdocs/publications/page1-econ/2019/05/03/a-new-frontier-monetary-policy-with-ample-reserves_SE.pdf; Team Circle, *Circle Partners with Bolivarian Republic of Venezuela and Airtm to Deliver Aid to Venezuelans Using USDC* (Nov. 20, 2020), https://www.circle.com/blog/circle-partners-with-bolivarian-republic-of-venezuela-and-airtm-to-deliver-aid-to-venezuelans-using-usdc (discussing how government used a stablecoin to carry out financial intervention).

[190] The U.S. Federal Deposit Insurance Corporation (FDIC) charges banks for providing deposit insurance, which a stablecoin-redemption guarantee would resemble. *See infra* note 191 and

could guarantee the issuer's ability to redeem its stablecoins, potentially reducing the issuer's cost of collateralizing or hedging its redemption obligation by effectively making the stablecoins insured deposits.[191]

There are precedents for government risk-sharing in order to facilitate socially important projects. In the United States, for instance, the CARES Act's Main Street Lending Program contemplates private-sector lending, on otherwise commercially reasonable terms, to eligible small and medium-sized business enterprises (SMEs) that would be viable but for the COVID-19 pandemic.[192] After each loan is made, the private-sector lender will sell an 85% or 95% (depending on the type of loan[193]) interest in that loan to a special purpose vehicle (the "Main Street SPV") established and operated by the Federal Reserve Bank of Boston. The U.S. Department of the Treasury has made a $75 billion equity investment in the Main Street SPV. The private-sector lender and the Main Street SPV—and thus the federal government, to the extent of its $75 billion equity—would share loan losses pari passu, according to their relevant percentages.[194] The Affordable Care Act represents another government risk-sharing precedent in order to facilitate a socially important project.[195] As part of that Act, Congress approved a Risk Corridor program designed to "cabin the risks" of health insurers by obligating the federal government to compensate those insurers for unexpectedly unprofitable plans during the first three years of the Act's effectiveness.[196] Similarly, the Price-Anderson Act represents government risk-sharing in order to facilitate nuclear energy development.[197] Under that Act, the

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accompanying text. Charging an appropriate fee would help to internalize costs and reduce moral hazard.

[191] *Cf. supra* note 184 and accompanying text (exempting stablecoins that are insured deposits from collateral requirements).

[192] Coronavirus Aid, Relief, and Economic Security Act.

[193] The Main Street program includes three facilities, each authorized by the Fed under § 13(3) of the Federal Reserve Act. These facilities use the same Eligible Lender and Eligible Borrower criteria and have many of similar features, including for loan maturities (including one-year payment deferrals on principal and interest) and interest rates.

[194] FEDERAL RESERVE BANK OF BOSTON, *Main Street Lending Program Frequently Asked Questions: For-Profit Frequently Asked Questions*, 13, 14, 17 (2020), available at https://www.federalreserve.gov/monetarypolicy/mainstreetlending.htm#term-sheet.

[195] Patient Protection and Affordable Care Act, Pub. L. No. 111-148, 124 Stat. 119 (2010).

[196] Me. Cmty. Health Options v. United States, 140 S. Ct. 1308, 1315 (2020).

[197] Price-Anderson Nuclear Liability Act of 1957, Pub. L. No. 85-256, 71 Stat. 576.

federal government provided up to $500 million of protection for nuclear-reactor accident risk, payable only after a private sector $60 million first-loss position would become depleted.[198]

To facilitate stablecoin development, a government and a private-sector stablecoin issuer could partner by creating, for example, a special purpose vehicle (SPV) that issues the stablecoin pegged to the government's fiat currency. The partnership arrangement could give the government control of the stablecoin to the extent needed to manage monetary policy.[199] The government could hedge the redemption risks by guaranteeing the SPV's obligation to exchange the fiat currency for the stablecoin. For instance, the U.S. government and Facebook could partner to give the U.S. government control of Libra to the extent needed to manage monetary policy, and the U.S. government could (possibly for a fee) guarantee the obligation to redeem Libra stablecoins for dollars at the agreed exchange rate.[200]

Another externality that stablecoins pose to governments is disintermediation, in this context meaning the risk that a stablecoin becomes so widely used that it significantly reduces bank deposits, causing commercial banks to rely on more expensive and less stable sources of funding.[201] Disintermediation is especially likely to occur in countries whose fiat currencies are less stable than accessible stablecoins.[202] To control disintermediation, regulators would first

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[198] Michael G. Faure & Tom Vanden Borre, *Compensating Nuclear Damage: A Comparative Economic Analysis of the U.S and International Liability Schemes*, 33 WM. & MARY ENVTL. LAW & POL'Y REV. 220, 221 (2008).

[199] *Cf. supra* note 189 and accompanying text (discussing how that could be done).

[200] Libra may be planning, in the future, to expand its reference assets to other currencies for cross-border currency transfers. For that purpose, it may be considering a private-public partnership, with an international organization, such as the International Monetary Fund ("IMF"), to address potential operational and exchange risks prior to that expansion.

[201] Alexander Kriwoluzky & Chi Hyun Kim, *Public or Private? The Future of Money* 15, EUR. PARLIAMENT Monetary Dialogue Paper (Dec. 2019), https://www.europarl.europa.eu/cmsdata/207653/13.%20PE%20642.356%20DIW%20final%20publication-original.pdf. Compare text accompanying note 91, *supra* (discussing disintermediation in a CBDC context).

[202] Kriwoluzky & Kim, *supra* note 201. Stablecoin-motivated disintermediation could cause a secondary externality if a stablecoin issuer is required to invest in safe assets to collateralize its redemption obligation. That could increase the demand for—and thus the price of—those safe assets, which the country's banks might be required to hold. Katrin Assenmacher, *Monetary policy implications of digital currencies*, 5, SUERF Policy Note, Issue No 165, May 2020. That

need to monitor its occurrence.[203] Once observed, disintermediation could be controlled, for example, by raising interest rates on bank deposits.[204]

III. CROSS-BORDER DIGITAL CURRENCY PAYMENTS

Because payments routinely cross national borders, CBDCs and stablecoins should be designed to be used both domestically and in cross-border transactions. The FSB, in coordination with other relevant international organizations and standard-setting bodies, has stressed the importance of "address[ing] the key challenges often faced by cross-border payments and the frictions in existing processes that contribute to these challenges."[205] Subpart A next discusses how to implement such cross-border payments, taking into account how they differ from domestic digital payments. Thereafter, subpart B examines how to regulate such cross-border payments, focusing on their potential to pose a threat to global monetary and financial stability. Finally, subpart C analyses how to supervise such cross-border payments across multiple jurisdictions.

A. Implementing Cross-border Digital Currency Payments.

As with developing any retail digital currency as a medium of exchange, the main challenges to cross-border implementation are increasing accessibility and reducing cost.[206]

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in turn would increase bank costs, thereby potentially increasing interest rates. *The two sides of the (stable)coin*, Speech by Fabio Panetta, Member of the Executive Board of the ECB, Nov. 2020, https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp201104~7908460f0d.en.html. Increased interest rates would increase the cost of capital, which could reduce economic activity. ECB Occasional Paper Series No 247, *Stablecoins: Implications for Monetary Policy, Financial Stability, Market Infrastructure and Payments, and Banking Supervision in the Euro Area*, 20, Sept. 2020.

[203] *Cf*. Douglas Arner, Raphael Auer, & Jon Frost, *Stablecoins: Risks, Potential and Regulation* 18, BIS Working Paper No. 905, Nov. 2020, https://www.bis.org/publ/work905.pdf (discussing monitoring via "embedded supervision," which automatically would access transaction-level data on DLT-based stablecoin ledgers to enable regulators to take timely actions).

[204] Mancini-Griffol et al., *supra* note 51, at 21.

[205] FSB Cross-border Payments Report, *supra* note 17, at 1.

[206] *Cf. id*. (identifying the key challenges often faced by cross-border payments as including "high costs [and] limited access"). *See also supra* note 50 and accompanying text.

These challenges must be viewed, however, in the context of ensuring the international acceptance and legality of the digital currency as a means of global exchange.[207]

1. *Implementing Cross-border CBDC Payments*. Under this Article's model of an account-based retail CBDC, cross-border retail payments would be made exactly as cross-border wholesale digital currency payments currently are made.[208] Consider, for example, a cross-border funds transfer sent through the CHIPS clearing system[209] from a CHIPS Participant bank in the United States to a CHIPS Participant bank in Germany.[210] Each payment instruction would parallel that for domestic funds transfers, except that the banks would be in different jurisdictions. That difference, however, would be irrelevant if both banks are members of a cooperative payments system, such as CHIPS. For an account-based retail CBDC, central banks would have strong incentives—CBDC being a central bank currency—to work together to assure the continued existence and improvement of such cooperative payments systems.

2. *Implementing Cross-border Stablecoin Payments*. Global stablecoins have the potential to more efficiently facilitate cross-border payments. Cross-border payments have been suffering from high costs and inaccessibility.[211] The high costs are due, among other factors, to bank-intermediation fees, lack of standardization for communicating payment information, and the need to coordinate and comply with the laws of multiple jurisdictions.[212] The inaccessibility is due to the fact that not all consumers currently have deposit accounts[213]—a problem that is

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[207] *Cf. supra* note 53 and accompanying text.
[208] *Cf. supra* notes 108-109 and accompanying text (schematically diagramming the payment system).
[209] *See supra* note 104 and accompanying text.
[210] *Cf. CHIPS Participants*, The Clearing House (Feb. 7, 2020), https://www.theclearinghouse.org/-/media/new/tch/documents/payment-systems/chips_participants_revised_02-07-2020.pdf (listing banks from multiple continents as participants in the CHIPS clearing system).
[211] *Cf.* Morten Bech & Jenny Hancock, *Innovations in Payments* 28 (BIS QUARTERLY REV., Mar. 2020) (discussing the high costs and inefficiency of cross-border payments).
[212] Committee on Payment and Market Infrastructures, *G7 Working Group on Stablecoins: Investigating the Impact of Global Stablecoins* 4, BANK FOR INT'L SETTLEMENTS (Oct. 2019), available at https://www.bis.org/cpmi/publ/d187.pdf.
[213] *Cf. supra* note 74 and accompanying text (observing the high number of unbanked U.S. consumers).

especially acute for residents of developing countries.[214] Developing countries could find it difficult to motivate banks to service remotely located or poor consumers.[215]

Using global stablecoins to make cross-border payments could help to address these shortcomings and broaden financial inclusion. Stablecoin payments generally are made through peer-to-peer arrangements,[216] which would avoid bank-intermediation fees and at least some of the need for standardizing the communication of payment information.[217] Using global stablecoins also could address inaccessibility because consumers would not need to have deposit accounts to make cross-border payments.[218] Furthermore, global stablecoins could help to address another cross-border-payment challenge: low speed.[219] Libra, for example, is expected to be able to process at least 1,000 payment transactions per second,[220] which is more than two-and-a-half times faster than SWIFT, the "world's leading provider of secure financial messaging services,"[221] currently processes payment transactions.[222]

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[214] *See* WORLD BANK GRP., THE GLOBAL FINDEX DATABASE 2017: MEASURING FINANCIAL INCLUSION AND THE FINTECH REVOLUTION 4 (2017), available at https://globalfindex.worldbank.org/ ("[V]irtually all [1.7 billion] unbanked adults live in the developing world."). *Cf. infra* note 244 and accompanying text (observing that in emerging market and developing economies, the likelihood of global stablecoins becoming a mainstream store of value may be higher than in advanced economies).

[215] *Cf. supra* note 75 (suggesting that the U.S. government consider paying subsidies or providing other incentives to motivate banks to service remotely located or poor consumers).

[216] Libra's current design, for example, permits a payor to directly transact with a payee so long as the payor inputs the payee's wallet address. *See* SAM BLACKSHEAR ET AL., MOVE: A LANGUAGE WITH PROGRAMMABLE RESOURCES 8–9 (2020), https://developers.diem.com/papers/diem-move-a-language-with-programmable-resources/2020-05-26.pdf.

[217] Committee on Payment and Market Infrastructures, *supra* note 212, at 53.

[218] *Cf. supra* note 60 and accompanying text (observing that the recordkeeping for a token-based digital currency is not maintained through deposit accounts but via other specified forms of identifying currency transfers).

[219] *See* FSB Cross-border Payments Report, *supra* note 17, at 1 (identifying low speed as another key challenge for cross-border payments).

[220] *See supra* note 153 and accompanying text.

[221] *See* https://www.swift.com/about-us.

[222] In 2019, for example, SWIFT carried out around 33.6 million daily payment transactions, such as money-transfer instructions. *See* https://www.investopedia.com/articles/personal-finance/050515/how-swift-system-works.asp (citing SWIFT IN FIGURES 2 (Dec. 2019 YTD), available at https://www.swift.com/sites/default/files/documents/sif_201912.pdf). That is the numerical equivalent of approximately 389 payment transactions per second.

The remaining implementation challenge is regulatory: the high cost of coordinating and complying with the laws of multiple jurisdictions.[223] Subpart B.2 below will address that cost as part of its analysis of regulating cross-border stablecoin payments.

B. Regulating Cross-border Digital Currency Payments.

This Article already has examined how digital currencies generally should be regulated to ensure their legitimacy.[224] The analysis of cross-border regulation in this subpart B presumes, as a necessary (albeit insufficient) condition of international acceptance, that such currencies are regulated domestically in all applicable jurisdictions so as to ensure that legitimacy. Even if that presumption is met, two critical implementation challenges remain: minimizing the high cost of coordinating and complying with the national laws of different jurisdictions, and controlling the risk—which goes beyond the particular interests of individual nations—that cross-border digital currency payments pose to international monetary and financial stability.[225] Consider how CBDC and stablecoin regulation should be designed to address these cross-border challenges.

1. *Regulating Cross-border CBDC Payments*. Because central banks sponsor CBDCs, regulation should naturally evolve to address these challenges for cross-border CBDC payments. As exemplified by the Basel Capital Accords, central banks have strong tradition and precedent to coordinate and cooperate to address cross-border bank regulatory inconsistencies.[226] They likewise should be expected to coordinate and cooperate to address, and help to reduce, cross-border CBDC regulatory compliance costs. Central banks also have a primary duty to protect monetary and financial stability.[227] They therefore should be expected to avoid sponsoring any CBDC that poses a threat to that stability.

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[223] *See* text accompanying note 212, *supra*.
[224] *See* Parts I.B & II.B, *supra*.
[225] *See* Committee on Payment and Market Infrastructures, *supra* note 212, at 2.
[226] As there is strong precedent for close central bank cooperation and coordination. *See* https://www.bis.org/bcbs/history.htm#basel_i.
[227] *See, e.g.*, BANK OF ENGLAND, *supra* note 58, at 5 ("The Bank of England's objectives, as set by Parliament, are to maintain monetary and financial stability."); Board of Governors of the Federal Reserve System, *Purposes & Functions*,

2. *Regulating Cross-border Stablecoin Payments*. Because they are privately issued, stablecoins present more complex cross-border regulatory challenges. Recall that the first challenge is to minimize the high cost of coordinating and complying with the national laws of different jurisdictions.[228] When facing similar challenges in other contexts, regulators have devised a solution: persuade the relevant jurisdictions to enact, as their national law, a uniform model law. The UCC itself epitomizes such a model law,[229] designed to reduce the high cost of coordinating and complying with the different commercial laws of U.S. states in multistate commercial transactions.[230] To address that stablecoin cross-border regulatory challenge, this Article recommends that a neutral and respected international organization consider drafting a model law proposing uniform text to be enacted into national law by jurisdictions that recognize global stablecoin payments.[231]

The second challenge is to control the risk that cross-border digital currency payments pose to international monetary and financial stability.[232] The FSB has expressed concern that a widely adopted global stablecoin, as Libra is intended to become, "could become systemically important in and across one or many jurisdictions, including as a means of making payments."[233] That potentially could impair central banks' ability to control monetary policy.[234] The finance

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https://www.federalreserve.gov/aboutthefed/pf.htm; The People's Bank of China, *Purposes and Functions*, http://www.pbc.gov.cn/en/3688066/3688080/index.html; Bank of Canada, *Contingency Planning for a Central Bank Digital Currency* (Feb. 2020), https://www.bankofcanada.ca/2020/02/contingency-planning-central-bank-digital-currency/#2-Public-policy-considerations.

[228] *See* text accompanying note 212, *supra*.

[229] *See supra* note 100 and accompanying text.

[230] Uniform Commercial Code - Uniform Law Commission, https://www.uniformlaws.org/acts/ucc (last visited Jan. 14, 2021).

[231] *Cf*. Steven L. Schwarcz, "A Global Model-Law Strategy for Regulating Digital Currencies" (draft on file with author, examining how such a uniform model law could be drafted and enacted).

[232] *Cf*. Jason G. Allen et al. *supra* note 23, at 5 (observing "concerns raised by major central banks on the impact of privately-issued digital currency on the wider financial system").

[233] FSB Stablecoin Report, *supra* note 16, at 1.

[234] *Cf. supra* notes 10 & 73 and accompanying text (discussing central bank control of monetary policy). The FSB therefore has set a goal of providing an international framework for regulating global stablecoins. *See* FSB Stablecoin Report, *supra* note 16, at 29.

ministers of the G7, together with governors of various central banks, likewise have cautioned that the emergence of global stablecoins could impair financial stability, announcing that no global stablecoin project should begin operation until it adequately addresses relevant legal, regulatory, and oversight requirements through appropriate design and by adhering to applicable standards.[235] The U.S. government recently reiterated that caution.[236]

If widely used, global stablecoins could threaten financial stability both directly and indirectly. Directly, they could impair central banks' ability to control monetary policy by reducing the amount of money over which central banks can exercise such policy.[237] Central-bank-exercised monetary policy is systemically important.[238] Regulation could help to protect against this direct threat by implementing the type of stablecoin public-private partnership that delegates control over monetary policy to the government.[239]

Indirectly, the threat to financial stability would depend on whether the global stablecoin is used for payments or as a common store of value. If widely used for payments, "any operational disruption in the [global stablecoin] arrangement might have significant impacts on economic activity and financial system functioning."[240] Holders relying on the stablecoin to make regular payments would face "significant operational disruptions," which "could quickly affect real economic activity, e.g. by blocking remittances and other payments."[241] Regulation could help to protect against this operational disruption threat by requiring the stablecoin

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[235] G7 Finance Ministers and Central Bank Governors' Statement on Digital Payments, *supra* note 168.
[236] President's Working Group on Financial Markets, *supra* note 2, at 2.
[237] *See* text accompanying note 234, *supra*.
[238] *See, e.g.,* Alan S. Blinder, *How Central Should the Central Bank Be?*, 48 J. OF ECON. LITERATURE 123, 124 (2010) (discussing how central banks conduct monetary policy to preserve financial stability).
[239] *See supra* notes 188-191 and accompanying text.
[240] FSB Stablecoin Report, *supra* note 16, at 13.
[241] *Id*. *Cf*. Adachi et al., *supra* note 91, Part 3 (noting the "risk of contagion spreading to the wider financial system as a result of an impaired [global] stablecoin arrangement").

infrastructure to include secure hardware technology as well as additional security mechanisms in addition to cryptographic protections.[242]

If widely used as a common store of value, "even a moderate variation in [the global stablecoin's] value might cause significant fluctuations in holders' wealth. Such wealth effects may be sizeable enough to affect spending decisions and economic activity."[243] Furthermore, these wealth effects "may be particularly pronounced in [emerging market and developing economies] where the likelihood of [global stablecoins] becoming a mainstream store of value may be higher than in advanced economies."[244] Regulation could help protect against this global-stablecoin valuation risk the same way that it could help to protect against any other stablecoin valuation risk.[245]

The interconnectedness of the financial system suggests similar ways that global stablecoins could impair financial stability. For example, the failure or even financial distress of a financial institution that "acts as reseller/market-maker of" a global stablecoin could undermine confidence in the value of that stablecoin or its operational continuity.[246] The loss in value of a global stablecoin also "might expose the financial institutions [holding large amounts of that stablecoin] to adverse confidence effects."[247] A similar loss in confidence, caused by the collapse in value of mortgage-backed securities, triggered Lehman Brothers' failure,[248] which in turn precipitated the 2008 global financial crisis:

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[242] *See* Sarah Allen et al., *supra* note 48, at 54–61. These protections also could include those discussed in Part II.B, *supra*, for protecting against domestic cryptographic and non-cryptographic operational threats.
[243] *Id*.
[244] *Id*. at 14. Furthermore, "during periods of stress, households in [emerging market and developing economies] might come to regard [global stablecoins] as a safe store of value over existing fiat currencies and exacerbate destabilising capital flows. Volatile capital flows can have a destabilising effect on exchange rates and on domestic bank funding and intermediation." *Id*.
[245] *Cf. supra* notes 181-200 and accompanying text (discussing how regulation could help protect against stablecoin valuation risk).
[246] FSB Stablecoin Report, *supra* note 16, at 13.
[247] *Id*.
[248] Steven L. Schwarcz, *Central Clearing of Financial Contracts: Theory and Regulatory Implications*, 167 U. PA. L. REV. 1327, 1340-41 (2019) (discussing how the fear of counterparty risk led to Lehman's failure).

> [The bankruptcy of Lehman Brothers in 2008 was triggered by] the collapse of the market for mortgage-backed securities. Many of these securities were collateralized in part by risky subprime home mortgages, which were expected to be refinanced through home appreciation. When home prices stopped appreciating, the borrowers could not refinance. In many cases, they defaulted. These defaults caused substantial amounts of investment-grade-rated mortgage-backed securities to be downgraded and, in some cases, to default. Investors began losing confidence in these and other rated securities, and their market prices started falling. Lehman Brothers, which held large amounts of mortgage-backed securities, was particularly exposed. Lehman's counterparties began demanding additional safeguards, which Lehman could not provide. Absent a government bailout, Lehman filed for bankruptcy.[249]

The type of public-private partnership previously discussed could protect against adverse confidence risks by assuring redemption rights.[250] Regulation also could help to protect against failure and financial distress by authorizing systemically important stablecoin issuers and market-makers to gain access to central bank reserves, much as central banks provide to domestic banks within their reserve system.[251] Central banks could charge such issuers and market-makers appropriate fees for providing this type of protection, in order to internalize costs and reduce moral hazard.[252] Critical payment obligations might also be required to be centrally cleared, much as central clearing is being used to try to reduce systemic risk in derivatives transactions.[253]

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[249] Steven L. Schwarcz, *Controlling Financial Chaos: The Power and Limits of Law*, 2012 WIS. L. REV. 815, 817 (citations omitted). Lehman's bankruptcy triggered the financial crisis, causing "securities markets to panic," which "accelerated the death spiral, causing financial firms holding mortgage-backed securities to appear, if not be, more financially risky; requiring highly leveraged firms to engage in fire-sales of assets (thereby exacerbating the fall in prices); and shutting off credit markets, which impacted the real economy." *Id*. *Cf.* Viral Acharya, Thomas Philippon, Matthew Richardson & Nouriel Roubini, *The Financial Crisis of 2007-2009: Causes and Remedies*, 18 FIN. MKTS. INSTS. & INSTRUMENTS 89, 93 (2009) (stating that Lehman's bankruptcy "led to the near collapse of the financial system").

[250] *See supra* note 188-191 and accompanying text.

[251] *See* https://www.imf.org/en/Publications/fintech-notes/Issues/2019/07/12/The-Rise-of-Digital-Money-47097, at 14–15.

[252] *Cf*. *supra* note 190 and accompanying text (observing that the FDIC charges fees for providing deposit insurance).

[253] *Cf*. *Central Clearing of Financial Contracts*, *supra* note 248, at 1343-44 (discussing centrally clearing systemically important non-derivative financial contracts). *Cf*. Steven L. Schwarcz, *Systematic Regulation of Systemic Risk*, 2019 WIS. L. REV. 1, 44-47 (explaining tight coupling

C. Supervising Cross-border Digital Currency Payments.

Finally, next consider how to supervise cross-border digital payments across multiple jurisdictions.

1. *Supervising Cross-border CBDC Payments*. Because central banks sponsor and control CBDC, they would be the logical overall supervisors. As discussed, CBDC-sponsoring central banks should have strong incentives to cooperate and closely coordinate.[254]

For the reasons explained,[255] this Article contemplates a hybrid account-based CBDC in which commercial banks maintain the accounts. Under that system, the relevant supervisors should include the regulators supervising the commercial banks. Consider the example of a cross-border funds transfer sent through the CHIPS clearing system from a CHIPS Participant bank in the United States to a CHIPS Participant bank in Germany.[256] Although the U.S. Federal Reserve regulates CHIPS,[257] commercial bank regulators in the United States would supervise the sending bank and commercial bank regulators in Germany and the EU would supervise the receiving bank.[258]

2. *Supervising Cross-border Stablecoin Payments*. Because global stablecoins can present a real threat to monetary and financial stability, there may well be a need for an

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and interactive complexity and tying them to interconnectedness and also examining how regulation could help to reduce tight coupling and interactive complexity).

[254] *See supra* notes 210 & 226-227 and accompanying text.

[255] *See supra* notes 81-84 and accompanying text.

[256] *See supra* notes 209-210 and accompanying text.

[257] *Designated Financial Market Utilities*, FEDERAL RESERVE BOARD (Jan. 29, 2015), https://www.federalreserve.gov/paymentsystems/designated_fmu_about.htm; Congressional Research Service, *Who Regulates Who? An Overview of the U.S. Financial Regulatory Framework*, CONGRESSIONAL RESEARCH SERVICE (Mar. 10, 2020), https://fas.org/sgp/crs/misc/R44918.pdf.

[258] *Banks & Financial Services Providers*, FEDERAL FINANCIAL SUPERVISORY AUTHORITY (Mar. 22, 2016), https://www.bafin.de/EN/Aufsicht/BankenFinanzdienstleister/bankenfinanzdienstleister_node_en.html.

international body to supervise cross-border stablecoin payments. The need for such a body reflects the internalization principle: that regulatory responsibilities should generally be assigned to the unit of government that can best internalize, or at least is positioned to analyze how best to internalize, the full costs of the underlying regulated activity.[259] The rationale for this principle is that government entities will have optimal incentives to take into account the full costs and benefits of their regulatory decisions only if the impacts of those decisions are felt entirely within their jurisdictions.[260]

A multi-governmental organization could best internalize—or at least, should be positioned to analyze how best to internalize—the risk of cross-border stablecoin payments to international monetary and financial stability. Such a supervisory body might be modeled, for example, on the FATF, the inter-governmental body that produces best-practice recommendations for combating money laundering, terrorist financing, and other related threats to the integrity of the international financial system.[261] Given their first-rate reputations and their strong interests in cross-border digital currencies, the BIS or the FSB might wish to help sponsor such a supervisory body.

Although political considerations likely will influence the makeup and agenda of any such supervisory body, the FSB has given preliminary thought to how global stablecoins should be supervised. Observing that "[c]hallenges could arise around the ability to supervise and oversee [global] stablecoin arrangements holistically, rather than in a piecemeal fashion based on individual functions and activities,"[262] the FSB identifies two possible "approaches for cross-border supervision and oversight."[263] Although one such approach applies to banks and other

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[259] *Cf*. Daniel Schwarcz & Steven L. Schwarcz, *Regulating Systemic Risk in Insurance*, 81 U. CHI. L. REV. 1569, 1628-30 (2014) (discussing the internalization principle in the context of regulation systemic risk from insurance activities).
[260] *Id*. National regulation of activities that produce negative externalities internationally will generally lead to underregulation of those activities. *Id*.
[261] *See supra* notes 133-135 and accompanying text. Such an international regulator might also be modelled, for example, on TARGET2, the real-time gross settlement (RTGS) payment system of the eurozone, which is owned and operated by the Eurosystem. *See What is TARGET2?*, EUROPEAN CENTRAL BANK, https://www.ecb.europa.eu/paym/target/target2/html/index.en.html.
[262] FSB Stablecoin Report, *supra* note 16, at 24.
[263] *Id*.

"prudentially regulated financial institutions,"[264] the more relevant approach applies to financial market infrastructures, *including payment systems*.[265] Under that approach, the infrastructure's most direct supervisor—which the FSB calls the "lead overseer," and whose "objective . . . is to gain sufficient knowledge of the [infrastructure's domestic and foreign] operations . . . as a whole so as to monitor and assess [any] risks [including systemic risks] and vulnerabilities"[266]—would coordinate with the relevant authorities in other jurisdictions, based on the cross-border services involved.[267]

The FSB's preliminary thought about how global stablecoins should be supervised does not, in other words, necessarily contemplate an international supervisory body. Rather, the stablecoin's lead overseer is likely to be a national regulator. In the case of Libra, for example, it could be the U.S. Federal Reserve or the Department of the Treasury,[268] which would coordinate with the relevant national authorities in other jurisdictions that recognize Libra payments. Such informal intergovernmental coordination could work, of course, but query whether it would optimally serve to monitor and assess threats to monetary and financial stability that go beyond the concerns of the lead overseer's jurisdiction.[269] The problem could become especially acute if multiple global stablecoins, with lead overseers in multiple jurisdictions, start to become widely used.

The FSB also raises doubt about whether the financial-market-infrastructure approach, which applies to cross-border supervision and oversight of payment systems,[270] is appropriate for

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[264] *Id*. In this context, the supervisory authority (which the FSB calls the "home supervisor") is normally the "supervisor in the jurisdiction where the head office or parent entity of a financial institution is headquartered." *Id*. This supervisor typically cooperates "with supervisors in jurisdictions where subsidiaries or branches are located" (which the FSB calls "host supervisors"). *Id.*

[265] *Id*.

[266] *Id*.

[267] *Id.*

[268] *See* note 46, *supra*.

[269] *Cf. supra* notes 259-260 and accompanying text (arguing that, under the internalization principle, an international supervisory body may be better positioned to monitor and assess those threats).

[270] *See supra* note 265 and accompanying text.

supervising global stablecoins. It argues that such a "stablecoin arrangement may involve functions that extend beyond those of a traditional" financial market infrastructure."[271] Although that argument is confusing because it does not actually address "functions" but their administration, the FSB accurately observes that global stablecoin arrangements "are [or at least, can be] operated through a loose network of entities and dispersed ownership and control structures. This is the case in particular if there is no entity responsible for the governance of the [global stablecoin] arrangement or if the back-end core functions (governance, issuance of coins, stabilisation mechanism, or transfer mechanism) of the [global stablecoin] arrangement are performed by different entities in different jurisdictions."[272] Based on that observation, the FSB proposes that cross-border supervision and oversight of global stablecoins should be implemented through ad hoc agreements, such as memorandums of understanding, to "help support cooperation and coordination."[273]

There is a clearer way to explain the FSB's doubt about whether the financial-market-infrastructure approach is appropriate for supervising global stablecoins. Whereas in principle that approach is appropriate for supervision,[274] some global stablecoins may lack lead overseers.[275] Supervisory coordination then may become more ad hoc.[276] That provides an even more compelling reason, however, why an international supervisory body may be needed.

CONCLUSIONS

A significant portion of the currency transfers among businesses and financial institutions already occur digitally, without the need for cash. The next generation of cashless currency

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[271] FSB Stablecoin Report, *supra* note 16, at 24.
[272] *Id*. at 25.
[273] *Id*.
[274] *Cf. supra* note 265 and accompanying text (observing that financial market infrastructures include payment systems).
[275] *See* text accompanying note 272, *supra*.
[276] *Cf. supra* note 273 and accompanying text (proposing that cross-border supervision and oversight of global stablecoins should then be implemented through ad hoc agreements).

transfers will be retail, involving consumers.[277] Retail digital currencies not only have the potential to improve the speed and efficiency of payments, both domestically and worldwide, but also to broaden financial inclusion to consumers who lack bank accounts because they are poor or remotely located.

This Article critically examines and critiques the evolving types of retail digital currencies that are likely to become widely used. These include Federal Reserve and other central-bank-sponsored currencies, which represent governmental fiat money in digital form. They also include privately-issued "stablecoins," which are backed by reference assets.

Although governments recognize that law is critical to the development of these digital currencies, they are just beginning to envision regulatory design. This Article shows that retail digital currencies present innovative legal issues as well as the types of legal issues normally associated with payment systems—including risk of loss, counterfeiting, privacy, money laundering, and consumer protection—although in novel contexts. If widely used, privately-issued stablecoins also could impair central banks' ability to control monetary policy and possibly undermine confidence in the value or operational continuity of currencies, which could threaten international monetary and financial stability. Furthermore, digital currencies used for making international payments require coordinated and effective cross-border regulation and supervision. This Article rigorously and systematically analyzes how these retail digital currencies should be regulated and supervised.

[277] This Article does not argue that digital currencies replace cash, merely that they should "coexist[] with cash and other types of money in a flexible and innovative payment system." *Cf. supra* note 19 (in which the BIS advocates that coexistence as a key foundational principle for designing retail digital currencies). At least in the near future, cash will be needed for micro-retail payment transactions, especially for unbanked consumers.

APPENDIX A – GLOSSARY

This glossary sets forth the most widely accepted uses of terminology to discuss digital currencies. [TO COME. THE FOLLOWING IS HIGHLY PRELIMINARY AND SUBJECT TO THE AUTHOR'S REVIEW.]

Distributed Ledger Technology (DLT). DLT is a digital recordkeeping system that does not require a centralized recordkeeping process.[278] Independent computers serve as nodes for a DLT to record, share, and synchronize transactions in their respective data stores.[279] When new transaction data are added by a node, the information is broadcasted on the DLT network, and the transaction validity is collectively determined by network participants through a specified consensus algorithm.[280] Once verified, each node will have the exact same up-to-date record.[281] There are many possible implementations for DLT. DLT can be either permissioned or permissionless, depending on whether the nodes need permission to make changes to the ledger.[282] DLT can also be either public or private, depending on who can be a participant on the network.[283]

Blockchain. Blockchain is a type of DLT.[284] Blockchain organizes transaction records into a package called 'block', which is connected to a continuously growing, append-only data structure 'chain' that follows a chronological order.[285] Once a new block containing transaction records are verified, each node on the network will add the new block to its own ledger.[286] The

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[278] Harish Natarajan et al., *Distributed Ledger Technology (DLT) and Blockchain*, WORLD BANK GROUP, at 2 (2017), http://documents1.worldbank.org/curated/en/177911513714062215/pdf/122140-WP-PUBLIC-Distributed-Ledger-Technology-and-Blockchain-Fintech-Notes.pdf.
[279] *Id*. at vii.
[280] *See Id*. at 1.
[281] *Id*.
[282] *Id*. at 2.
[283] *Id*.
[284] *Id*. at 1.
[285] *Id*.
[286] *Id*.

blocks cannot be changed retroactively without redoing the validation for all blocks.[287] *Direct CBDC Model*. The CBDC payment system is operated by the central bank.[288] In the direct CBDC model, the central bank must either require all potential CBDC holders to open an account at the central bank in order to maintain a CBDC balance,[289] or assign CBDC token ownership to some form of consumer digital wallet.[290] A central bank would face significantly increased operation as it needs to build a client-facing infrastructure, and conduct customer due diligence.[291]

Indirect/Two-tiered CBDC Model. CBDC exists not as a direct claim on the central bank.[292] Instead, it exists as a claim against the issuing commercial banks.[293] Under this approach, commercial banks would have to issue their own intermediate CBDC.[294] The indirect/two-tiered model is incompatible for CBDC issued at a central-bank level.

Hybrid CBDC Model. The key distinction with the Indirect/Two-tiered CBDC Model is that under the hybrid CBDC model, CBDC exists as a claim against the central bank, rather than a claim against a commercial bank. Commercial banks serve as the intermediary layer between CBDC and consumers. A central bank effectively maintains the traditional divide of delegating the task of managing individual accounts and customer relationships to commercial banks.[295]

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[287] *Id*. at 9.
[288] Auer & Böhme, *supra* note 77, at 90.
[289] *See also* FedAccounts.
[290] https://blogs.lse.ac.uk/businessreview/2020/05/26/central-bank-digital-currency-the-devil-is-in-the-details/.
[291] *Id*.
[292] Auer & Böhme, *supra* note 77, at 88.
[293] *Id*. at 88–89.
[294] *Id*. at 89.
[295] Sarah Allen et al., *supra* note 48, at 25–26.

APPENDIX B – ACCOUNT-BASED AND TOKEN-BASED CBDC MODELS

Set forth below is a more detailed discussion comparing the account-based and token-based CBDC models and contrasting China's prototype digital yuan. [TO COME. THE FOLLOWING IS HIGHLY PRELIMINARY AND SUBJECT TO THE AUTHOR'S REVIEW.]

Token-based CBDC. A token-based CBDC is created with a specific denomination.[296] The key distinction between a token-based CBDC and an account-based CBDC is the verification process. Token-based CBDC transactions generally follow Bitcoin's Unspent Transaction Output Model ("UTXO").[297] A simple transfer of CBDC tokens occurs by creating 2 transaction outputs and signing over 1 output to the recipient and retaining the other output for the sender.[298] For example, Alice owns 10 CBDC and wants to send 4 to Bob. This transaction will create two transactions output, one with 4 CBDC and the other with 6 CBDC. The 4-CBDC output will be signed over from Alice to Bob and the 6-CBDC output will be retained by Alice.

Token-based CBDC transactions do not require a traditional bank clearing process.[299] The validity of a token-based CBDC transaction is determined by the validity of the payment object itself, that is, the token(s) involved in the transaction. The validity of the token(s) will be verified according to some consensus mechanism on the CBDC network and the change of ownership will be recorded once verified.

Technically speaking, a token-based CBDC transaction can occur anonymously. The transacting parties can both create a number of private/public key pairs as proxies for the transaction. For example, if Alice wants to send 4 CBDC to Bob anonymously, Alice can create two new key pairs (A_1 and A_2) and sign over 2 CBDC to each of A_1 and A_2 from her main key pair (A_0). Similarly, Bob can create two new key pairs (B_1 and B_2). Alice, using the private keys of A_1 and

[296] CONSENSYS, CENTRAL BANKS AND THE FUTURE OF DIGITAL MONEY: AN OVERVIEW AND PROPOSAL FOR CENTRAL BANK DIGITAL CURRENCY ON THE ETHEREUM BLOCKCHAIN 17 (2020), https://pages.consensys.net/central-banks-and-the-future-of-digital-money.
[297] [Need to verify source]
[298] [Need to verify source]
[299] CONSENSYS, *supra* note 296, at 17.

A_2, sign over 2 CBDC to B_1 and B_2 respectively. Bob now owns 4 CBDC, but none is associated with his main key pair (B_0). In practice, a central bank can address the anonymity concern by implementing some basic identification requirement.[300] For example, a central bank can require private/public key pairs to be linked with a commercial bank account, who holds the necessary personal information behind each bank account holder.[301]

Account-based CBDC. An account-based CBDC represents an electronically registered deposit at a central bank. Unlike a token-based CBDC, an account-based CBDC transaction requires a clearing process. The CBDC payment system keeps track of global state account balances.[302] To initiate a transaction, the payor's authority is first verified upon a demonstration of identity.[303] The transaction then commences by adjusting the respective balances of the transacting parties.[304]

An account-based CBDC is commonly understood as requiring a central bank to directly hold and manage accounts for all CBDC holders.[305] Under this approach, CBDC transactions would take place on the central bank ledger. DLT is not required for the CBDC payment network as all the transactions will be processed by a centralized database. On the other hand, an account-based CBDC could use DLT to integrate currently available commercial banking infrastructures where CBDC are indirectly held at commercial bank accounts. [The following needs some further validation]. Each commercial bank serves as a permissioned node on the CBDC network to maintain the global state CBDC balances across all nodes. Each commercial bank maintains CBDC on its own balance sheet, which can then be distributed among its clients.[306] Any CBDC

[300] *See* EUR. CENT. BANK, *supra* note [cite], at 1 (recognizing the possibility to construct a CBDC payment system that provides some degree of anonymity but still maintains some transparency).
[301] This idea resembles the "controllable anonymity" approach adopted for China's digital yuan. *See* Sarah Allen et al., *supra* note 48, at 83–84 (noting that digital yuan transactions can occur at an anonymous level from the central bank's perspective, but commercial banks hold identifying information that can be accessed by the central bank).
[302] Https://medium.com/@sunflora98/utxo-vs-account-balance-model-5e6470f4e0cf.
[303] BANK OF ENGLAND, *supra* note 58, at 47.
[304] *Id*.
[305] CONSENSYS, *supra* note 296, at 17.
[306] Https://blogs.lse.ac.uk/businessreview/2020/05/26/central-bank-digital-currency-the-devil-is-in-the-details/.

transaction would result in (1) a point-to-point reconciliation between two commercial bank nodes, and (2) a global state on the CBDC network that records the transaction. For example, Bank A and Bank B each hold 50 CBDC. Alice, with an account containing 5 CBDC has an account at Bank A, transfers 3 CBDC to Bob. Bank A and Bank B would first reconcile their respective databases regarding the transaction – Bank A would debit Alice so Alice has 2 CBDC left, and Bank B would credit Bob so Bob now has 3 CBDC. The transaction is then recorded on the global-level balances – Bank A would be debited 3 CBDC and Bank B would be credited 3 CBDC, changing their respective balances to 47 and 53 respectively.

Compare an indirect account-based CBDC model. Commercial banks would issue a digital currency to their customers fully backed by the bank's holding of an actual CBDC. This can be viewed as commercial banks holding a "synthetic" CBDC, in the sense that consumers would have an indirect claim against the central bank by holding a direct claim against the commercial bank (which have the direct claim against the central bank). For example, Chase Bank would offer Chase Coins—backed by Chase Bank's holding of CBDC at the Federal Reserve—to its account holders, for retail use.

To some extent, China's prototype digital yuan might resemble an indirect account-based CBDC model. The Chinese central bank will issue digital tokens and distribute them to commercial banks and trusted payment service providers (PSPs) such as WeChat Pay and Alipay.[307] This will create a "permissioned" payment network consisting of the central bank, commercial banks and trusted PSPs, and their respective users.[308] Each user will send or receive digital yuans to each other user's bank account or wallet, resembling current bank-account currency transfers. There will be no need for interbank settlements of digital yuans to go through a centralized process; rather, the payment network will facilitate point-to-point settlement between banks, allowing the payor's bank and the payee's bank to communicate directly with each other for the settlement.[309] Although the central bank will not know the details of all transfers, it will have

[307] [cite]
[308] [cite]
[309] [cite]

oversight over the payments network and can demand information from commercial banks and PSPs regarding suspicious transfers.[310]

[310] [cite]