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SOVEREIGN DIGITAL CURRENCIES: PARACHUTE PANTS OR THE CONTINUING EVOLUTION OF MONEY

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Advances in FinTech resulting in the increase of electronic payments and corresponding decrease in the use of cash, along with the growing interest in cryptocurrencies following the 2008 financial crisis, led central banks to explore the viability of issuing their own sovereign digital currencies (SDC). However, it was Facebook's Libra proposal to create its own cryptocurrency in 2019 that fast-tracked governments around the world to begin test pilots of SDCs over concerns regarding the government's ability to enact monetary policy and retain monetary sovereignty. Although China launched its own SDC in 2020, the U.S. Federal Reserve (the Fed) justified its slower response with the need to get an SDC "right rather than quickly." As money and payment systems keep evolving, and the divergence between money and legal tender becomes greater, it is important to determine not only the effects a potential SDC would have on the financial system, including the possible disintermediation of banks, but also its impact on privacy and data security.

In this Article, we delve into the evolution of money and why the government finds itself at a crossroads with regard to the establishment of an SDC. Although numerous reasons have been given in support of establishing an SDC, the one aspect that must be acknowledged is the potential for a global stablecoin to displace any potential SDC due to the network effect. We explore money alternatives, types of sovereign digital currencies, and the design decisions involved with creating an SDC. Whether direct or indirect, token-based or account-based, there are risks that must first be discovered

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and addressed. After discussing the global impact of SDCs, including the potential first-mover advantage and impact on reserve currency status, we explore the future of money alternatives and conclude that policymakers in the United States have an unbelievably difficult series of decisions to make. This Article endeavors to highlight some of the most pressing issues.

INTRODUCTION

In a recent speech, former Federal Reserve Board Governor Randal K. Quarles talked about parachute pants, an unfor-

tunate fashion craze of the 1980s that is, thankfully, no more.[1] Why? He drew a potential parallel between that craze and the current hype surrounding central bank digital currencies. In retrospect, additional caution regarding the pants was warranted. This Article focuses on sovereign digital currencies (SDCs) and discusses why some are ready to embrace this monetary novelty and others are more hesitant.

Throughout history, a plethora of physical items have served as money: shells, gold nuggets, leather, and strings of beads. Historically, the U.S. dollar was backed by gold (a commodity money), but today it is backed by the reputation of the government (fiat money).[2] Western Union first introduced electronic wire transfers in 1871 that permitted money exchanges between those who were geographically dispersed.[3] Today money can be transferred via mobile apps on a cell phone. Hence, the types and forms of money have evolved over time. SDCs are a next step in this evolution.

The names "cryptocurrency" and "stablecoin" suggest that cryptocurrencies and stablecoins should also be included in this monetary development. However, as this Article explains, while some stablecoins might eventually join the monetary ranks, cryptocurrencies are unlikely to do so (at least anytime soon). Nevertheless, the explosion of both has catalyzed a focus by central banks around the world on developing their own digital currencies.[4] Whether central banks such as the Federal Reserve (Fed) should create their own digital currencies is a timely and tremendously important question. This Article argues that in considering this momentous policy issue, it is important to understand what money is, why this question

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1. Randal K. Quarles, Vice Chair for Supervision, Bd. of Governors of the Fed. Rsrv. Sys., Parachute Pants and Central Bank Money, Remarks at the 113th Annual Utah Bankers Association Convention (June 28, 2021).

2. Maria Hasenstab, *Here's Why the U.S. No Longer Follows a Gold Standard*, FED. RSRV. BANK OF ST. LOUIS: OPEN VAULT BLOG (Nov. 8, 2017), https://www.stlouisfed.org/open-vault/2017/november/why-us-no-longer-follows-gold-standard.

3. Lawrence H. White, *Should the State or the Market Provide Digital Currency?*, 41 CATO J. 237, 239 n.4 (2021).

4. *See* Codruta Boar & Andreas Wehrli, *Ready, Steady, Go? Results of the Third BIS Survey on Central Bank Digital Currency*, 114 BANK FOR INT'L SETTLEMENTS PAPERS 1, 3 (2021), https://www.bis.org/publ/bppdf/bispap114.pdf (noting that over 86% of central banks are exploring the possibility of a digital currency).

has become so urgent, the plethora of design issues and choices surrounding SDCs, and the developing global landscape in this space. Hence, this Article illuminates these areas and concludes with an assessment of how such SDCs are likely to impact concerns such as privacy, security, and the structure of the banking system.

Policymakers at the Fed, understandably, seem to have conflicting viewpoints on how far the government should get involved in regulating cryptocurrencies, stablecoins, or in creating an SDC. While Fed Governor Lael Brainard has pressed for a "digital dollar" backed by the Fed,[5] Fed Chair Jerome Powell has been more hesitant to move forward,[6] though this might be changing.[7] Former Fed Governor Randal K. Quarles has asked, "what problem would an [SDC] solve?"[8] In January 2022, the Federal Reserve released its much anticipated discussion paper on a potential U.S. central bank digital currency.[9]

In this Article, we first delve into the evolution of money and the growing influence of money alternatives, including cryptocurrencies and stablecoins. We then explore the question posed by Quarles as to what problems the establishment of an SDC would address. Although proponents of a U.S. SDC have provided numerous reasons for its creation, we explain

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5. Jeff Cox, *Fed's Lael Brainard Pushes Digital Dollar as Central Bank Currency Race Heats Up*, CNBC (May 24, 2021), https://www.cnbc.com/2021/05/24/feds-lael-brainard-pushes-digital-dollar-as-central-bank-currency-race-heats-up.html.

6. *See* Jeff Cox, *Powell Calls Cryptocurrencies 'Not Really Useful Stores of Value' and Says Fed Will Move Slowly*, CNBC (Mar. 22, 2021), https://www.cnbc.com/2021/03/22/cryptocurrencies-are-not-useful-stores-of-value-says-feds-powell.html.

7. *See* Ann Saphir & Dan Burns, *Fed's Powell 'Legitimately Undecided' on Central Bank Digital Currency*, REUTERS (Jul. 15, 2021), https://www.reuters.com/business/finance/feds-powell-says-hes-undecided-central-bank-digital-currency-2021-07-15/ (noting that Powell is undecided and weighing the pros and cons).

8. Quarles, *supra* note 1.

9. BD. OF GOVERNORS OF THE FED. RSRV. SYS., MONEY AND PAYMENTS: THE U.S. DOLLAR IN THE AGE OF DIGITAL TRANSFORMATION (2022), https://www.federalreserve.gov/publications/files/money-and-payments-20220120.pdf (explaining that an SDC could result in greater financial inclusion and easier cross border payments helping to maintain the U.S. dollar's role as an international reserve currency, and detailing the potential downsides, including risks involving privacy, money laundering, financial stability, cybersecurity and the disintermediation of commercial banks).

why a global stablecoin could potentially displace any prospective SDC that looms large. We then investigate the main types of SDCs, and the primary design decisions involved. After discussing the global impact of SDCs, including the potential first-mover advantage and impact on reserve currency status, we look at the future of money alternatives, concluding that policymakers in the United States have an unbelievably difficult series of decisions to make.

I.
What is Money?

In its most basic form, money is anything that can be used as a medium of exchange. However, the *function of money* goes beyond this definition of money as a medium of exchange; requiring money to serve as a unit of measure and a store of value.[10] While most economists rely on the three functions of money as its definition (i.e., medium of exchange, unit of measure, and store of value), the concept of money is still difficult to grasp. When you consider a dollar bill, it is simply a piece of paper that you trust will be accepted as a medium of exchange. You receive it for your work (primarily in digital form directly deposited into your bank account) or spend it through any number of ways (cash, debit card, or peer-to-peer app). While some argue money only has value because the government says it has value, others are of the view that it has value because the community agrees that it has value and is willing to accept it in exchange for goods or services.[11] In exploring the origin of money in this next section, we shed some light on how money and value are related.

A. *Origin of Money*

Anthropologists and archaeologists have argued that the concept of money began as an idea, not a token—that money

10. *See* The Economic Lowdown Podcast Series, *Functions of Money*, Fed. Rsrv. Bank of St. Louis, https://www.stlouisfed.org/education/economic-lowdown-podcast-series/episode-9-functions-of-money (last visited Feb. 1, 2022).

11. *See* Brendan Greeley, *Let's All Please Stop Calling Dollars 'Fiat Money'*, Fin. Times (July 3, 2021), https://www.ft.com/content/5e5b2afb-c689-4faf-9b47-92c74fc07e66.

was a journal entry before it ever became a tangible thing.[12] Economists, on the other hand, have long suggested that money evolved from the self-interest of people as a way to obtain most efficiently that which they desire, through the use of a token.[13] This theory evolved from historical accounts of ancient Mesopotamia and its bartering system.[14] While initially, people within a community used a bartering system for obtaining goods, they quickly discovered that the "double coincidence" of wants was not sustainable.[15] It works if Kathryn has a cow and wishes to trade milk for eggs and Jamillah has chickens and wishes to trade eggs for milk, but it is incredibly unlikely that everything that Kathryn wants can be exchanged for milk. What was needed was a third token to serve as a medium of exchange. Carl Menger, founder of the Austrian school of economics, described this phenomenon in his work *The Origins of Money*, explaining that using this token eliminated the inefficiency of bartering, made the division of labor desirable, and the satisfaction of wants attainable.[16] These tokens could be anything: nuggets of gold, slabs of salt, or even cowrie shells.[17] It was not required that the token have an intrinsic value, just that the community agreed that it had value in serving as a token.

In exploring the origin of money, Menger sought to answer the question: Why would someone accept an item which they did not need, like a shell, in exchange for something of value that they brought to the marketplace, like a liter of

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12. Bruce Bower, *Money's Murky Origins*, SCIENCE NEWS, Aug. 4, 2018, at 16 ("[M]oney grew out of older systems of credit and debt . . . .").

13. *See id.* At least those economists adhering to the Austrian school of economics like Mises and Hayek.

14. *See id.* at 17 (describing how in Mesopotamia, shekels were used as a basic monetary measure, equivalent to a bushel of barley).

15. *See* W. STANLEY JEVONS, MONEY AND THE MECHANISM OF EXCHANGE 3–4 (New York, D. Appleton & Co. 1875).

16. *See* Douglas E. French, *Foreword* to CARL MENGER, THE ORIGINS OF MONEY 8–9 (C.A. Foley trans., Ludwig von Mises Inst. 2016) (1892). For an alternative view, see Cameron Harwick, *Money and Its Institutional Substitutes: The Role of Exchange Institutions in Human Cooperation*, 14 J. INSTITUTIONAL ECON. 689, 690 (2018), http://dx.doi.org/10.2139/ssrn.2707833 ("This paper offers an alternative approach both evolutionary and historical, unlike the evolutionary-but-ahistorical Mengerian approach and the historical-but-constructivist state money approach.").

17. MENGER, *supra* note 16, at 12.

milk?[18] He posited that it was the acknowledgement that the token, the shell, could be exchanged for something of value contributed by someone else.[19] Menger argued against the idea that the token itself had to be a valuable item, such as a precious metal.[20] He speculated how the barter system most likely evolved.[21] If Kathryn brings her milk to the marketplace and Jamillah does not need milk that day, Kathryn would have to find a third party who wanted milk and could exchange it for something Jamillah would be willing to trade her eggs for. Menger named this a "mediate exchange."[22] Menger described the third party's goods as "more saleable" than Kathryn's goods.[23] Those attending the marketplace each day would eventually learn from their own "economic interest" to barter their less "saleable goods" for the "more saleable" goods to purchase something.[24] Goods that had the quality of "superior saleableness" became tokens, mediums of exchange, over a period of time.[25] Menger speculated that this discovery of money would arise naturally.[26] He concluded that "[i]n its origin [money] is a social, and not a state institution."[27]

Today there is some disagreement on whether cryptocurrencies qualify as money. For example, if Kathryn wants to trade her old car for a new car, but the dealership does not want her old car, she would need a token that the dealership

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18. *See id.* at 12–13.
19. *See id.* at 20.
20. *See id.* at 11–12.
21. *See id.* at 19–21.
22. *Id.* at 34.
23. *Id.* at 34–36.
24. *Id.* at 35. ("These wares would be qualified by their costliness, easy transportability, and fitness for preservation (in connection with the circumstance of their corresponding to a steady and widely distributed demand), to ensure to the possessor a power, not only 'here' and 'now' but as nearly as possible unlimited in space and time generally, over all other market-goods at economic prices.").
25. *Id.* at 35–36.
26. *Id.* at 38. Menger then explains how precious metals became money due not only to their utility, but also because they are scarce, fungible, and divisible. *See id.* at 45–50.
27. *Id.* at 51. Interestingly, some scholars argue that central bank money, discussed *infra*, should be considered "social equity." *See* Michael Kumhof et al., *Central Bank Money: Liability, Asset, or Equity of the Nation?* 1 (Cornell L. Sch. Rsch. Paper, Paper No. 20-46, 2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3730608.

does want. That token could be a bag of cash she physically hands to the salesperson at the dealership, an electronic transfer from her bank account to the dealership's bank account, or the transfer of Bitcoin from her wallet to the car dealership's wallet. The key is what the dealership will accept.[28] The dealership knows that the cash, the electronic transfer, and/or the Bitcoin can be used by it to pay its rent, hire a new employee, or purchase more cars. The dealership can also choose to hold onto the cash, the electronic transfer (a ledger entry in the dealership's bank account), or the Bitcoin. However, unlike the cash and the journal entry showing a credit in the dealership's bank account, both of which maintain their value over time absent inflation, the Bitcoin does not serve as a store of value. The generally accepted definition of money relies on its three functions—that it is a medium of exchange, store of value, and unit of measure[29]—can be used as a test to see whether Bitcoin qualifies as such. Although Bitcoin can be used as a medium of exchange to purchase a car, it does not work as a unit of measure. First, Kathryn would have difficulty comparing the price of one car to another in terms of how many Bitcoins it would require, because the car would be priced differently from moment to moment due to Bitcoin's fluctuation in value.[30] It also does not function well as a store of value because its volatility puts it at risk of being worth less in the future, making it undesirable as a "super saleable" token.

Chicago School economists Milton Friedman and Anna Jacobson Schwartz define money as "the sum of currency held by the public plus adjusted deposits of commercial banks, both

28. There are a number of dealerships that do accept Bitcoin. *See* Clifford Atiyeh, *Tesla Backtracked on Accepting Bitcoin, but There Are Car Dealers That Take It*, CAR & DRIVER (May 16, 2021), https://www.caranddriver.com/news/a36434628/tesla-bitcoin-wont-accept/.

29. The Economic Lowdown Podcast Series, *supra* note 10.

30. On May 22, 2010, Lazlo Hanyecz purchased two pizzas for 10,000 Bitcoins (approximately $41). On May 22, 2021, those 10,000 Bitcoins were worth $380 million. Mark DeCambre, *Bitcoin Pizza Day? Laszlo Hanyecz Spent $3.8 Billion on Pizzas in the Summer of 2010 Using the Novel Crypto*, MKT. WATCH (May 22, 2021), https://www.marketwatch.com/story/bitcoin-pizza-day-laszlo-hanyecz-spent-3-8-billion-on-pizzas-in-the-summer-of-2010-using-the-novel-crypto-11621714395.

demand and time [deposits]."[31] By contrast, behavioral economists such as Richard Thaler, focus on how the subjective value of money impacts financial decision making, challenging the classical economic theory that one dollar is the same as any other dollar.[32] However, behavioral economists would argue that the psychology behind how people view money demonstrates that one dollar (in one form or from one source) can be viewed as more or less valuable than another dollar (in a different form or from a different source).[33] This viewpoint suggests that the adoption of a money alternative or SDC may depend on trust *in the issuer* rather than assuming a new digital currency from any source would be widely accepted.

The terms "money" and "currency" are often used interchangeably but are technically distinct. Economists consider currency to be "a tangible aspect of money when in actual use as a medium of exchange, especially in the form of circulating notes and coins."[34] Currency or cash is a bearer instrument, meaning that the possession implies ownership.[35] Cash contains no information about its owner and is anonymous, and its transfer can be anonymous.[36] Anonymity is one of the primary advantages of using cash. A disadvantage of cash is that if it is misplaced, an individual or business cannot recreate it. In addition, it can be very heavy.[37] Currency is also fungible,

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31. MILTON FRIEDMAN & ANNA JACOBSON SCHWARTZ, MONETARY STATISTICS OF THE UNITED STATES: ESTIMATES, SOURCES, METHODS 92 (Nat'l Bureau of Econ. Rsch. 1970), https://www.nber.org/system/files/chapters/c5279/c5279.pdf.

32. *See* Richard H. Thaler, *Mental Accounting Matters*, 12 J. BEHAV. DECISION MAKING 183 (1999) (arguing that due to bias-inducing heuristics, people do not consider money as fungible (that one dollar is the same as any other dollar)). While other economists view people as rational decision makers, Thaler, relying on findings by Daniel Kahneman and Amos Tversky, notes that in fact many decisions regarding money are illogical. *Id.*

33. *Id.* at 196–97.

34. Ferdinando M. Ametrano, Hayek Money: The Cryptocurrency Price Stability Solution 4 (Aug. 13, 2016), https://ssrn.com/abstract=2425270.

35. Mitch Cohen, *CBDC and Privacy Concerns*, eCURRENCY (Sept. 21, 2020), https://www.ecurrency.net/post/cbdc-and-privacy-concerns.

36. *See* Charles M. Kahn, James McAndrews & William Roberds, *Money Is Privacy*, 46 INT'L ECON. REV. 377, 377 (2005) ("Without cash, purely anonymous transactions are not possible.").

37. $1,000,000 in $1 bills would weigh over 900 kilograms or 2,000 pounds and, if stacked, would reach the height of a 30–35 story building. *How Much Does One Million Dollars Weigh?*, REFERENCE (July 23, 2020), https:/

meaning my dollar bill can be exchanged for your dollar bill. There is no difference in value.

Both the U.S. dollar and the euro are sovereign currencies; the Fed issues the U.S. dollar and the European Central bank issues the euro. A sovereign currency is money issued by a government which serves as legal tender within that jurisdiction. Legal tender is money that has been identified by the law of a particular jurisdiction that must be accepted for the payment of debts.[38] In the United States, however, persons, private businesses, and organizations are generally free to decide whether to accept cash or coins as payment for goods or services.[39] Sovereign money can be cash, a coin or bank note, or non-cash reserves held by the central bank. An SDC is a digital form of money which is legal tender in the jurisdiction issuing it and backed by the central bank.

Although cryptocurrencies are not legal tender in the United States, the Financial Crimes Enforcement Network (FinCEN) has stated that cryptocurrency exchanges are legally money transmitters subject to the Bank Secrecy Act (BSA), because cryptocurrency tokens are a type of other "value that substitutes for currency."[40] Interestingly, although the Internal Revenue Service (IRS) indicates that cryptocurrency is "a digital representation of value that functions as a medium of exchange, a unit of account, and/or a store of value," which is the definition of money, the IRS actually classifies cryptocurrencies as property, not money, and is taxing it as such.[41] Even though cryptocurrency is not considered legal tender in the United States, its use has not been prohibited.[42] States, on the

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/www.reference.com/science/much-one-million-dollars-weigh-7ab82498c203efdb.

38. *See generally Legal Tender Status*, U.S. DEP'T OF THE TREASURY, https://www.treasury.gov/resource-center/faqs/currency/pages/legal-tender.aspx (last visited July 12, 2021).

39. *Id.* No federal statute mandates the acceptance of cash or coins by such entities, but a state law conceivably could. *Id.*

40. FIN. CRIMES ENF'T NETWORK, U.S. DEP'T. OF THE TREASURY, FIN-2019-G001, FINCEN GUIDANCE: APPLICATION OF FINCEN'S REGULATIONS TO CERTAIN BUSINESS MODELS INVOLVING CONVERTIBLE VIRTUAL CURRENCIES 7, 12 (May 9, 2019), https://www.fincen.gov/sites/default/files/2019-05/FinCEN%20CVC%20Guidance%20FINAL.pdf.

41. I.R.S. Notice 2014-21, 2014-16 I.R.B. 938.

42. El Salvador, on the other hand, has made Bitcoin legal tender in addition to the U.S. dollar. Nelson Renteria, Tom Wilson & Karin Strohecker,

other hand, have been more active in defining cryptocurrencies. Wyoming, for example, recognizes cryptocurrencies as a "new asset class," exempts them from money transmitter regulations, and permits state banks to hold cryptocurrencies on behalf of their customers.[43]

B. *The U.S. Federal Reserve System*

As discussed, the U.S. dollar is "fiat money," and, therefore, a "fiat currency," meaning that rather than being backed by a valuable asset, such as a precious metal like gold, it is backed by the reputation of the federal government. Commodity money has an intrinsic value derived from the material from which it is made, such as with a gold coin. Most fiat currencies have a floating value, although some, such as the Chinese yuan, do not. Fiat money provides the Fed and other central banks with control over the money supply, which impacts interest rates and the availability of credit.[44]

Although the United States Constitution dates back to 1789, the Fed's birth occurred only in 1913 with the Federal Reserve Act of 1913.[45] One reason why the United States did not create a central bank until 1913 was a wariness by some,

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In a World First, El Salvador Makes Bitcoin Legal Tender, REUTERS (June 9, 2021), https://www.reuters.com/world/americas/el-salvador-approves-first-law-bitcoin-legal-tender-2021-06-09/. Some speculate that El Salvador's decision "may change global finance." Stuart Russell, *Coercion and Coexistence: How El Salvador's Bitcoin Law May Change Global Finance*, COINTELEGRAPH MAG. (July 20, 2021), https://cointelegraph.com/magazine/2021/07/20/how-el-salvadors-bitcoin-law-change-global-finance?.

43. Tho Bishop, *Wyoming Is Challenging the Fed, Can It Become America's "Crypto Valley"?*, MISES INST. (Mar. 27, 2018), https://mises.org/power-market/wyoming-challenging-fed-can-it-become-americas-crypto-valley. The Wyoming Money Transmitters Act provides an exemption for virtual currency. WYO. STAT. ANN. § 40-22-104(a) (2018) (amended 2021).

44. *See* Laurence H. Meyer, Member of the Bd. of Governors of the Fed. Rsrv. Sys., The Future of Money and of Monetary Policy, Remarks at the Distinguished Lecture Program (Dec. 5, 2001), https://www.federalreserve.gov/boarddocs/speeches/2001/20011205/. In the United States, monetary policy consists of "the Federal Reserve's actions and communications to promote maximum employment, stable prices, and moderate long-term interest rates—the economic goals the Congress has instructed the Federal Reserve to pursue." *Monetary Policy*, FED. RSRV., https://www.federalreserve.gov/monetarypolicy.htm (last visited July 21, 2021).

45. Federal Reserve Act, Pub. L. No. 63-43, 38 Stat. 251 (1913) (codified as amended in scattered sections of 12 U.S.C.).

that continues to this day, about such a significant centralization of government power.[46] The Fed primarily consists of the Board of Governors, an independent federal administrative agency, twelve regional Federal Reserve banks, and the Federal Open Market Committee (FOMC), which is responsible for monetary policy.[47] Each Reserve Bank encompasses a specific geographic region, operates independently, and is overseen by the Board of Governors.[48] The Fed has five primary responsibilities: monetary policy, financial market stability, supervision of certain financial institutions, specific payment and settlement systems, and "consumer protection and community development."[49]

Most countries have a central bank or a "bankers' bank." A core function of a central bank, such as the Fed, is to act as a lender of last resort; that is, to lend to banks in need of emergency funding.[50] To be a bank in the United States, an institution must apply for and be granted a charter by the Office of the Comptroller of Currency (national banks) or by a state government (state banks).[51] In the United States, only institutions that have been granted a federal or state banking charter are legally "banks." Central banks generally play additional roles in the financial system, such as in the payments, regulatory, or financial stability arenas. However, individual central

46. *See* Colleen Baker, *The Federal Reserve as Last Resort*, 46 U. MICH. J.L. REFORM 69, 80–82 (2012) (providing a brief history of the Federal Reserve System).

47. For a detailed discussion of the Federal Reserve System, see FED. RSRV. SYS., THE FEDERAL RESERVE SYSTEM PURPOSES & FUNCTIONS 2–3, 15 (10th ed. 2016), https://fraser.stlouisfed.org/title/federal-reserve-system-5298 [hereinafter PURPOSES & FUNCTIONS].

48. *Id.* at 3 fig.1.3. These Reserve Banks are in Boston, New York, Philadelphia, Cleveland, Richmond, Chicago, Atlanta, Kansas City, Dallas, Minneapolis, St. Louis, and San Francisco. *Federal Reserve Banks*, BD. OF GOVERNORS OF THE FED. RSRV. SYS., https://www.federalreserve.gov/aboutthefed/federal-reserve-system.htm (last modified Apr. 24, 2017).

49. *See About of the Federal Reserve System*, BD. OF GOVERNORS OF THE FED. RSRV. SYS., https://www.federalreserve.gov/aboutthefed/structure-federal-reserve-system.htm (last modified Sep. 10, 2021).

50. Baker, *supra* note 46, at 84–86.

51. *How Can I Start a Bank?*, BD. OF GOVERNORS OF THE FED. RSRV. SYS., https://www.federalreserve.gov/faqs/banking_12779.htm (last modified Aug. 2, 2013).

bank mandates, which provide for the extent of their powers, vary.[52]

A global bank for central banks also exists: the Bank for International Settlements (BIS).[53] Unlike national central banks, the BIS does not act as a lender of last resort. Instead, its "mission is to support central banks' pursuit of monetary and financial stability through international cooperation, and to act as a bank for central banks."[54]

The Fed provides accounts and services, primarily to banks (also termed "depository institutions"), and oversees certain payment systems. To facilitate payments, the Fed creates money, distributes paper currency and coins to commercial banks, and provides check clearing, ACH services (an automated electronic clearinghouse payment system for interbank operations), and wholesale payment services through FedWire (a wire transfer mechanism for large transactions on behalf of commercial banks).[55] The Fed's role in the payment system is set to expand with the advent of its FedNow Service, which "will be available to depository institutions in the United States and will enable individuals and businesses to send instant payments through their depository institution accounts."[56] This new payment system is the first innovation by the Fed in more than 40 years.[57] The Fed also acts as banker to the U.S. government.

Legal scholars have referred to the U.S. financial system as a "franchise" arrangement.[58] This is because both the Fed and commercial banks create money. In the United States, money exists in physical form (cash or currency) and digital

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52. *See generally* Christina Parajon Skinner, *Central Banks and Climate Change*, 74 VAND. L. REV. 1301 (2021).

53. *See About BIS - Overview*, BANK FOR INT'L SETTLEMENTS, https://www.bis.org/about/index.htm.

54. *Id.*

55. *See* PURPOSES & FUNCTIONS, *supra* note 47, at 119 fig.6.1.

56. *FedNow℠ Service*, BD. OF GOVERNORS OF THE FED. RSRV. SYS., https://www.federalreserve.gov/paymentsystems/fednow_about.htm (last modified Apr. 28, 2021).

57. *Real-Time Payments: Everything You Need to Know*, PAYMENTSJOURNAL (Mar. 23, 2021), https://www.paymentsjournal.com/real-time-payments-everything-you-need-to-know/.

58. Robert C. Hockett & Saule T. Omarova, *The Finance Franchise*, 102 CORNELL L. REV. 1143, 1147 (2017).

form (central bank money and commercial bank money).[59] The U.S. Mint produces coins, and the Bureau of Engraving and Printing (part of the U.S. Treasury) produces paper cash.[60] The Fed buys the currency at cost and distributes it to banks, exchanging it for worn currency and selling it.[61] It also accepts cash deposits from banks, which increases the bank's reserve account balance at the Fed.[62]

The Fed creates money by making an accounting entry on its balance sheet. To do this, it electronically credits (increases) the balance of an account holder such as a bank and makes a corresponding asset entry such as for a loan or a U.S. Treasury security.[63] For example, if the Fed loaned money to Bank A, it would record a loan on the asset side of its balance sheet and increase Bank A's account balance (a liability[64] for the Fed) by a corresponding amount. Or, if the Fed bought U.S. Treasury securities from Bank A, it would record these securities as an asset and increase Bank A's account balance by a corresponding amount.

Similarly, banks (depository institutions) also create money (commercial bank money) via electronic accounting entries by crediting a customer deposit account (a deposit liability) and recording a corresponding asset (such as a loan). For example, to make a loan, Bank A would record a loan to a borrower on the asset side of its balance sheet and increase the balance in the borrower's account by a corresponding amount. When an account holder deposits/withdraws cash,

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59. Aleksander Berentsen & Fabian Schär, *The Case for Central Bank Electronic Money and the Non-Case for Central Bank Cryptocurrencies*, 100 FED. RSRV. BANK ST. LOUIS REV. 97, 97–98 (2018).

60. *How Currency Gets into Circulation*, FED. RSRV. BANK OF N.Y., https://www.newyorkfed.org/aboutthefed/fedpoint/fed01.html (July 2013).

61. *Id.*

62. *Id.*

63. *See, e.g.*, William J. Luther, *How the Federal Reserve Literally Makes Money*, CATO INST. (June 10, 2020), https://www.cato.org/publications/commentary/how-federal-reserve-literally-makes-money. For a snapshot of the Fed's balance sheet, see FED. RSRV., STATISTICAL RELEASE H.4.1, FACTORS AFFECTING RESERVE BALANCES OF DEPOSITORY INSTITUTIONS AND CONDITION STATEMENT OF FEDERAL RESERVE BANKS (last modified Jan. 27, 2022), https://www.federalreserve.gov/releases/h41/current/h41.htm.

64. *But see* Kumhof et al., *supra* note 27, at 2 (noting that central bank money is generally regarded as a liability of the central bank and challenging this traditional characterization).

Bank A would increase/decrease its cash assets and increase/decrease the account holder's balance. Bank A's deposit balances are only backed by the bank itself. However, almost all banks have Federal Deposit Insurance Corporation (FDIC) deposit insurance, which guarantees that amounts up to $250,000 "are as sound as a central bank liability."[65]

C. *Banks as Payment System Intermediaries*

The rise in the use of electronic transfers of money coincides with the decrease in the use of cash. Over the past decade, developments in FinTech have made it easier and less costly to buy things without leaving your home or by waving your phone in front of a payment terminal. For the most part, these electronic transfers rely on the banking system where users hold accounts. Banks are able to verify users (and the funds available to them), permitting merchants and others to rely on these electronic payments. No longer are people regularly handing over dollar bills to one another.[66] The pandemic saw the increased use of contactless payments.[67] In the United States, in the third quarter of 2020, digital retail sales were 37% higher than in 2019.[68] Cash use over that same period declined from 26% to 19%.[69] These electronic payments work through the banking system using legal tender. In other words, although it is classified as a peer-to-peer (P2P) payment system, there is no currency on your phone. Before you can send anyone money from a P2P account (like Venmo), you would need to link the Venmo account to your bank account and transfer money from your bank account to your Venmo account. It can then be sent to the recipient's Venmo account.

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65. *See* Quarles, *supra* note 1.

66. *See* Laura French, *A Money Evolution*, WORLD FIN. (Feb. 12, 2021), https://www.worldfinance.com/special-reports/a-money-evolution (explaining that the use of cash has been declining since the 1960s).

67. Andrew P. Scott, *Pandemics, Payments, and (Digital) Property*, CONG. RSCH. SERV. (Mar. 10, 2021), https://crsreports.congress.gov/product/pdf/IN/IN11632.

68. Harriet Torry, *Don't Bank on Covid-19 Killing Off Cash Just Yet*, WALL ST. J. (Jan. 31, 2021), https://www.wsj.com/articles/dont-bank-on-covid-19-killing-off-cash-just-yet-11612105200.

69. KELSEY COYLE, LAURA KIM & SHAUN O'BRIEN, 2021 FINDINGS FROM THE DIARY OF CONSUMER PAYMENT CHOICE 6 (2021), https://www.frbsf.org/cash/publications/fed-notes/2021/may/2021-findings-from-the-diary-of-consumer-payment-choice/.

Once the money is in the recipient's Venmo account, it can either be forwarded on to someone else (or, in the case of college students, back and forth between two roommates in a never-ending loop) or transferred into the recipient's bank account. Although some do not see any difference between a P2P payment system and a cryptocurrency transfer, there is a significant difference. The P2P payment system works through the banking system, and a cryptocurrency transfer does not. A P2P cryptocurrency transaction requires no intermediary. The next Part examines the evolution of money in terms of money alternatives and potential forms of sovereign digital currencies in the United States.

II.
The Continuing Evolution of Money

As discussed, money continues to evolve. Each time a new form appears, governments worry how it will impact monetary policy and monetary sovereignty. For example, in a 2001 speech, Fed Governor Meyer describes how an increase in e-money (electronic money),[70] such as "stored-value cards" like a Barnes & Noble gift card, could result in a decline in demand for currency which could reduce reserve balances and the interest earnings received by the Fed, and increase the volatility of the funds rate.[71] We hear these same arguments today regarding newer money alternatives.

Unlike the emergence of gift cards, cryptocurrencies came about to address a specific concern with the current monetary system. The financial crisis of 2007–2008[72] cost the U.S. economy over $22 trillion.[73] Not only did this crisis result in a massive loss of trust in banks and in the Fed, it also brought into question the legitimacy of the U.S. monetary sys-

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70. At the time, in 2001, electronic money referred to stored-value cards, but Governor Meyer also included automated clearing house (ACH), debit cards, and ATM machines. *See* Meyer, *supra* note 44.

71. *See id.* (concluding that none of the worries discussed were likely to happen and the ability to control monetary policy would not be impacted by the potential use of gift cards).

72. For an overview of the financial crisis and its causes, see generally Anjan V. Thakor, *The Financial Crisis of 2007–2009: Why Did It Happen and What Did We Learn?*, 4 Rev. Corp. Fin. Stud. 155 (2015).

73. John Taskinsoy, *Bitcoin Mania: An End to the US Dollar's Hegemony or Another Cryptocurrency Experiment Destined to Fail?*, Rsch. Gate, Dec. 2018, at 2.

tem itself.[74] As individuals lost their retirement savings, large financial institutions were being "bailed out," and their executives were awarding themselves multimillion-dollar bonuses paid for with taxpayer-provided funds despite nearly collapsing the U.S. economy.[75] As a result, many felt disillusioned with the financial system and an intense dissatisfaction with the status quo. The development of Bitcoin was perhaps one of the most consequential examples of this ethos.

> "The theoretical roots of Bitcoin can be found in the Austrian school of economics and its criticism of the current fiat money system and interventions undertaken by governments and other agencies (. . .)." It is close to the concept of ideal money advocated by the right libertarians, namely Friedrich von Hayek, who argued in favor of ending the monopoly of central banks in producing, distributing, and managing money.[76]

In his 2009 blog post, Satoshi Nakamoto (pseudonym), the creator of Bitcoin, states:

> The root problem with conventional currency is all the trust that's required to make it work. The central bank must be trusted not to debase the currency, but the history of fiat currencies is full of breaches of that trust. Banks must be trusted to hold our money and transfer it electronically, but they lend it out in waves of credit bubbles with barely a fraction in reserve. We have to trust them with our privacy, trust them not to let identity thieves drain our accounts. Their massive overhead costs make micropayments impossible. . . . With e-currency based on cryptographic proof, with-

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74. Beat Weber, *Bitcoin and the Legitimacy Crisis of Money*, 40 CAMBRIDGE J. ECON. 17, 18 (2016).

75. Phillip Inman, *Wall Street Bonuses Under Fire*, GUARDIAN (July 30, 2009), https://www.theguardian.com/business/2009/jul/31/wall-street-bonuses-bailout (describing how, after receiving bailout money, Citigroup paid out $5.3 billion in bonuses, Goldman Sachs paid out $4.8 billion in bonuses, and JP Morgan Chase paid 1,626 employees million-dollar bonuses).

76. Paulo Rupino Cunha, Paulo Melo & Helder Sebastião, *From Bitcoin to Central Bank Digital Currencies: Making Sense of the Digital Money Revolution*, 13 FUTURE INTERNET 165, 169 (2021) (alteration in original) (footnote omitted) (quoting EUR. CENT. BANK, VIRTUAL CURRENCY SCHEMES 22 (2012), https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf).

> out the need to trust a third party middleman, money can be secure and transactions effortless.[77]

Although Bitcoin first became available in 2009, few people outside of the tech industry knew what it was when it was valued at less than a penny. It did not see a major price jump until 2017 when it went from $939.70 on March 23rd to $19,345.49 on December 15th,[78] invoking massive interest in cryptocurrencies generally, and distributed ledger technology specifically. In 2020, because the pandemic led to the substantial increase of electronic payments as people for the most part stayed home and transacted their purchases online, interest in cryptocurrencies also blossomed.[79] In this Part, we first explore the money alternative of cryptocurrencies and the later emergence of stablecoins. We conclude this Part with a discussion of the potential forms that a new SDC issued by the Fed could take.

A. *Money Alternatives*

Using the term "money alternative" to discuss cryptocurrencies and stablecoins is meant to examine this concept in terms of its viability as a form of money. As indicated earlier, cryptocurrencies are not legal tender in the United States, but several federal agencies appear to consider them to be money. A major obstacle to cryptocurrencies ever becoming legal tender is their extreme volatility. Stablecoins were created to address this problem.

1. *Cryptocurrencies*

"At its simplest, a cryptocurrency can be thought of as a digital asset that is constructed to function as a medium of exchange, premised on the technology of cryptography, to se-

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77. Satoshi Nakamoto, *Bitcoin Open Source Implementation of P2P Currency*, P2P FOUND. (Feb. 11, 2009), http://p2pfoundation.ning.com/forum/topics/bitcoin-open-source.

78. *Bitcoin* (BTC), BLOCKCHAIN.COM , https://www.blockchain.com/prices/BTC?from=1483290000&to=1514739600&timeSpan=custom&scale=0&style=line (last visited Feb. 25, 2022).

79. Mastercard, ATMs, and online payment processors like PayPal and Venmo, for example, started to accept cryptocurrencies as payment. Dondi Black, *Digital Currencies Skyrocket During Pandemic*, FIS GLOB. (Jan. 11, 2021), https://www.fisglobal.com/en/insights/what-we-think/2021/january/digital-currencies-skyrocket-during-pandemic.

cure the transactional flow, as well as to control the creation of additional units of the currency."[80] The first digital alternative, Bitcoin, was envisioned in a white paper authored pseudonymously by Satoshi Nakamoto, famously known for creating blockchain technology, a type of distributed ledger technology.[81] A blockchain is a permanent, immutable distributed ledger that records data in blocks that are linked together to form a chain and cryptographically validated.[82] Because each block is linked with the previous block, data cannot be inserted in between them later.[83] Each block contains a unique digital identifier, or hash.[84] Because data cannot be altered or deleted, a blockchain can provide a permanent, immutable record of transactions.[85] Although the terms are sometimes used interchangeably, a blockchain is a type of distributed ledger technology (DLT).[86] Not all DLTs use blocks.[87]

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80. Usman W. Chohan, Cryptocurrencies: A Brief Thematic Review 1 (Aug. 4, 2017) (unpublished manuscript), https://ssrn.com/abstract=3024330.

81. A blockchain is a database or ledger that is distributed among and verified by its users. It is distributed in the sense that there are multiple participants (known as nodes) who, through cryptography and consensus mechanisms, verify transactions to be added to the blockchain, and it is typically decentralized, in the sense that there is no one central authority. With a decentralized distributed ledger, such as with most blockchain configurations, any verified additions are immediately shared across all network members (nodes). Once the shared data on the blockchain is verified by the majority of the nodes, it becomes permanent. The verification process is known as the consensus mechanism.

Kimberly A. Houser & John T. Holden, Navigating the Non-Fungible Token 6–7 (Feb. 25, 2022) (footnotes omitted) (unpublished manuscript) (on file with authors).

82. *See* Colleen Baker & Kevin Werbach, *Blockchain in Financial Services*, *in* FINTECH: LAW AND REGULATION 148, 150 (Jelena Madir ed., 2021).

83. Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, BITCOIN.ORG 1 (last visited July 6, 2021), https://bitcoin.org/bitcoin.pdf.

84. *Id.*

85. *Id.*

86. DLT is a decentralized database which exists across multiple nodes or computing devices where each node in a network has access to an identical copy of the ledger. Bronwyn E. Howell, Petrus H. Potgieter & Bert M. Sadowski, Governance of Blockchain and Distributed Ledger Technology Projects 1 (Feb. 2019) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3365519; *see generally* Baker & Werbach, *supra* note 82, at 150.

87. *See* Baker & Werbach, *supra* note 82, at 150–51.

This type of payment system was designed to permit P2P transactions without the need for a trusted intermediary (such as a bank).[88] When Bitcoin came out in 2009, it was primarily seen as a medium of exchange to be used in place of the dollar to facilitate electronic payments. Later in 2015, the Ethereum blockchain further advanced this technology by creating a way for computer code in addition to transaction data to be stored on the blockchain.[89] Neither Bitcoin nor Ether, the cryptocurrency associated with the Ethereum blockchain, are backed by either a government or an asset such as gold. Hence, they fluctuate in value. As a result, today they serve less as a medium of exchange and more as a potentially appreciable investment vehicle. Typically issued by non-profits or corporations,[90] they are considered digital alternatives to the U.S. dollar, although most do not meet the economic definition of money.

A digital wallet is required to store, receive, and send cryptocurrency.[91] There are two types of wallets: non-custodial and custodial.[92] In July of 2020, the Office of the Comptroller of the Currency (OCC) authorized national banks to provide cryptocurrency custody services to their customers.[93] This would be in the form of a custodial wallet. Although FinTech companies in the United States have jumped at the opportu-

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88. Nakamoto, *supra* note 77, at 1 (explaining the need for "an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party").

89. Vitalik Buterin, A Next Generation Smart Contract & Decentralized Application Platform 13 (Jan. 14, 2014) (unpublished manuscript), http://blockchainlab.com/pdf/Ethereum_white_paper-a_next_generation_smart_contract_and_decentralized_application_platform-vitalik-buterin.pdf.

90. Ether was created by the Ethereum Foundation, a non-profit.

91. Sarah Allen et al., *Design Choices for Central Bank Digital Currency: Policy and Technical Considerations* 9 (Glob. Econ. & Dev. at Brookings, Working Paper No. 140, 2020), https://www.brookings.edu/wp-content/uploads/2020/07/Design-Choices-for-CBDC_Final-for-web.pdf.

92. Iwa Salami, *Decentralised Finance: The Case for a Holistic Approach to Regulating the Crypto Industry,* 35 J. INT'L BANKING & FIN. L. 496, 496 (2020). A wallet connected to the internet, such as an app on your phone, is known as a hot wallet. If the cryptocurrency is stored on a hardware device that is not connected to the internet, this is known as cold storage.

93. Office of the Comptroller of the Currency, Interpretive Letter No. 1170 (July 22, 2020), https://www.occ.treas.gov/topics/charters-and-licensing/interpretations-and-actions/2020/int1170.pdf.

nity, traditional banks have held back.[94] Providers of this service include Kraken, Binance.US, and Coinbase, among others.[95] A non-custodial wallet is one that a user solely controls.[96] The user, alone, has access to the private key, which is needed to access the wallet's contents.[97] If the user forgets or loses the private key, the funds within the wallet are lost and are not retrievable until the key is found again by the user.[98] On the other hand, custodial wallets are those where a trusted third party manages the private key to a user's wallet.[99] Most cryptocurrency wallets are custodial wallets.[100] The benefit of a custodial wallets is that there is less user responsibility and more convenience.[101] Lost passwords can generally be reset and therefore funds are not lost forever.[102]

In determining whether cryptocurrencies qualify as money, we evaluate the three functions of money. First, as a medium of exchange, cryptocurrencies could technically be used to conduct transactions for goods and services,[103] but in practice appear to be purchased primarily for their potential as an appreciating asset. For example, it is estimated that 80% of available Bitcoins are held as an investment.[104] Second, cryptocurrencies do not work as a unit of measure. Even

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94. *See* Ron Shevlin, *The Coming Bank–Bitcoin Boom: Americans Want Cryptocurrency from Their Banks*, FORBES (Apr. 19, 2021), https://www.forbes.com/sites/ronshevlin/2021/04/19/the-coming-bank-bitcoin-boom-americans-want-cryptocurrency-from-their-banks/?sh=716473c94908.

95. *See* Taylor Tepper & John Schmidt, *The Best Crypto Exchanges of 2022*, FORBES (Jan. 2, 2022), https://www.forbes.com/advisor/investing/best-crypto-exchanges/.

96. *Custodial vs. Non-Custodial Wallets*, CRYTOPEDIA (May 6, 2021), https://www.gemini.com/cryptopedia/crypto-wallets-custodial-vs-noncustodial.

97. *Id.*

98. *Id.*

99. *Id.*

100. *Id.*

101. *Id.*

102. *Id.*

103. *See* Cameron Harwick, *Cryptocurrency and the Problem of Intermediation*, 20 INDEP. REV. 569, 573 (2016) (arguing that economist Ludwig von Mises's regression theorem stands for the proposition that "something is money when people *use it* as money—that is, as a medium of indirect exchange. In this sense, cryptocurrency clearly qualifies as money.").

104. Mark DeCambre, *Who Owns Bitcoin? Roughly 80% Are Held by Long-Term Investors: Report*, MARKETWATCH (Feb. 11, 2021), https://www.marketwatch.com/story/who-owns-bitcoin-roughly-80-are-held-by-long-term-investors-report-11612998740.

though some merchants may list prices in a cryptocurrency, the price they charge would have to fluctuate based on changes in the cryptocurrency's price. Third, as a store of value, cryptocurrencies also fall short because of their potential to rapidly decrease in value. The major reason why cryptocurrencies have not been able to function as "money" is volatility. This is due to several factors including uncertainty around its future due to the vague regulatory landscape,[105] supply and demand, as well as the public's reactions to the alternating positive and negative press. While some cryptocurrencies have built in scarcity (due to the limit on the number to be released), others simply are at risk of deflation if too many are released at one time. According to Steve Forbes, Chairman and Editor-in-Chief of Forbes Media:

> For cryptocurrencies to seriously challenge existing currencies, they must be as easy to use as money is today and must have a fixed value, being tied to gold or something like the Swiss franc so that they can be used for contracts. Unless both conditions are met, they won't be genuine alternatives to the dollar and other government-manufactured money.[106]

Given these factors, cryptocurrencies do not qualify as money.

2. *Stablecoins*

Stablecoins were designed to address the extreme volatility of cryptocurrencies.[107] On May 19, 2021, for example, Bitcoin plunged 30% in less than 24 hours.[108] Although tech-

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105. *See, e.g.*, Siddharth Venkataramakrishnan, *Cryptocurrency Markets Slide as Yellen Leads Mounting Regulatory Scrutiny*, FIN. TIMES (July 20, 2021), https://www.ft.com/content/9685a2e0-e8d5-48f5-9c1f-66aea8cb1597.

106. Steve Forbes, *Bitcoin Is Not Money – Yet*, FORBES (Feb. 2, 2021), https://www.forbes.com/sites/steveforbes/2021/02/02/bitcoin-is-not-money-yet/?sh=5452080e971c.

107. For an excellent overview of different stablecoins, their characteristics, and their regulation, see generally Gary B. Gorton & Jeffery Y. Zhang, Taming Wildcat Stablecoins (Sept. 30, 2021) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3888752.

108. Ryan Browne & Arjun Kharpal, *Bitcoin Plunges 30% to $30,000 at One Point in Wild Session, Recovers Somewhat to $38,000*, CNBC (May 19, 2021), https://www.cnbc.com/2021/05/19/bitcoin-btc-price-plunges-but-bottom-could-be-near-.html.

nically a cryptocurrency, stablecoins were designed to mitigate these wild fluctuations by pegging them to stable assets, making them a better choice as a money alternative. According to the Financial Stability Board, a stablecoin is "[a] crypto-asset that aims to maintain a stable value."[109] A stablecoin's value can be moderated in the following ways. First is the depository receipt model where the stablecoin is a direct claim on a single currency.[110] The issuer not only agrees to redeem the stable coin at face value, but they must also keep reserves backing the value of all issued stablecoins.[111] Second, the stablecoin can be tied to a "currency basket."[112] This could include multiple fiat currencies or other stable assets. The four main types of stablecoins are: 1) fiat-backed stablecoins, pegged one-to-one with a fiat currency or basket of fiat currencies, 2) commodity-backed stablecoins pegged to gold or another commodity, 3) crypto-backed stablecoins pegged to a cryptocurrency usually with reserves larger than the value of the outstanding stablecoin, and 4) algo-backed stablecoins which are not pegged to any asset but rather use embedded smart contracts to control the supply to keep the value stable.[113]

Tether (USDT) is a stablecoin with the largest market value.[114] Launched in 2014, it did not initially draw much attention from regulators. The OCC has more recently issued several interpretive letters regarding stablecoins.[115] An October 2020 letter authorizes national banks to hold stablecoin

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109. FIN. STABILITY BD., Addressing the Regulatory, Supervisory and Oversight Challenges Raised by "Global Stablecoin" Arrangements 4 (2020), https://www.fsb.org/wp-content/uploads/P140420-1.pdf.

110. *See* G7 WORKING GROUP ON STABLECOINS, BANK FOR INT'L SETTLEMENTS, INVESTIGATING THE IMPACT OF GLOBAL STABLECOINS 24 (2019) [hereinafter G7 REPORT ON STABLECOINS].

111. *See id.*

112. Garth Baughman & Jean Flemming, *Global Demand for Basket-Based Stablecoins* 1 (Bd. of Governors of the Fed. Rsrv. Sys., Working Paper. No. 2020-48, 2020).

113. *3 Things to Know About Stablecoins*, FINRA (Apr. 17, 2020), https://www.finra.org/investors/insights/3-things-stablecoins.

114. Jamie Crawley, *Tether Passes $50B Market Cap*, COINDESK (Apr. 26, 2021), https://www.coindesk.com/tether-passes-50b-market-cap.

115. *See, e.g.*, Office of the Comptroller of the Currency, Interpretive Letter No. 1174 (Jan. 4, 2021), https://www.occ.gov/news-issuances/news-releases/2021/nr-occ-2021-2a.pdf [hereinafter Interpretive Letter No. 1174].

reserves as a service to their customers.[116] By placing assets in a reserve account with a national bank, a stablecoin issuer is able to provide assurance that it has sufficient assets to back the stablecoin. The OCC issued a January 2021 letter confirming that national banks could additionally serve as independent nodes (a computer connected to a network that can validate transactions) for stablecoin DLT ledgers.[117] Transactions on a DLT are recorded on shared ledgers after the transaction is validated by the nodes using a consensus mechanism.[118]

Although former Fed Vice Chair, Randal K. Quarles, has argued that stablecoins pose no threat to the U.S. financial system, others disagree.[119] Quarles maintains that any risks could be addressed in a way that "might *support* the role of the dollar in the global economy."[120] In fact, Quarles argues that "properly structured stablecoins could well make superfluous any effort to develop [an SDC]."[121] He also argues that a privately issued stablecoin would present *less* of a systemic risk than an SDC.[122] However, were stablecoin holders to redeem their claims en masse, a bank-like run could ensue, triggering financial market instability.[123] Bank-like runs on non-bank financial institutions were at the heart of the 2007–2008 financial crisis.[124] Stablecoin detractors, such as Boston Fed President Eric

116. Office of the Comptroller of the Currency, Interpretive Letter No. 1172 (Sept. 21, 2020), https://www.occ.gov/topics/charters-and-licensing/interpretations-and-actions/2020/int1172.pdf.

117. Interpretive Letter No. 1174, *supra* note 115, at 1.

118. See *infra* Section III.C for a detailed explanation.

119. *See, e.g.*, G7 REPORT ON STABLECOINS, *supra* note 110; Tobias Adrian, Fin. Couns. and Dir. of the Monetary & Cap. Mkts. Dep't of the IMF, Stablecoins, Central Bank Digital Currencies, and Cross-Border Payments: A New Look at the International Monetary System, Remarks at the IMF–Swiss National Bank Conference, Zurich (May 14, 2019) (explaining the threat that stablecoins make to fiat currencies); Gorton & Zhang, *supra* note 107.

120. Quarles, *supra* note 1 (emphasis in original).

121. *Id.*

122. *See id.*

123. *See* Gorton & Zhang, *supra* note 107 (arguing that privately created money is susceptible to bank-like runs); *see also* Usman W. Chohan, Are Stable Coins Stable? 4 (Mar. 29, 2020) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3326823.

124. *See* Gary Gorton & Andrew Metrick, *Securitized Banking and the Run on Repo,* 104 J. FIN. ECON. 425, 425 (2012).

Rosengren, specifically named Tether as a possible challenge to financial stability.[125]

Despite the OCC letters of guidance, it is unclear that the existing regulatory framework is adequate for managing the risk of stablecoins.[126] U.S. Treasury Secretary Janet Yellen is working with the President's Working Group on Financial Markets, OCC, and FDIC to discuss stablecoins and their potential impact on the monetary system.[127] Acknowledging that they are less volatile than cryptocurrencies in general, there is still a concern about the true stability of the assets that back them. It seems likely that a regulatory system similar to that regarding bank deposits will be created for stablecoins.[128] Interestingly, Fed Chair Powell has indicated that the issuance of an SDC would eliminate the need for cryptocurrencies and stablecoins.[129] However, people purchase, mine, and use cryptocurrencies—including stablecoins—for a variety of reasons such as for privacy, a hedge against inflation, and investment purposes; these motives would not necessarily be eliminated by the issuance of an SDC.[130]

In determining whether a stablecoin meets the definition of money, we again explore the three functions of money. First, as a medium of exchange, stablecoins can be used to conduct transactions for goods and services. Second, as a unit of measure, due to their stable value, stablecoins can be used

125. Venkataramakrishnan, *supra* note 105.

126. *See* Isabelle Lee, *Fed Chair Jerome Powell Says Cryptocurrencies and Stablecoins Won't Be Needed Once the US Has a Digital Currency*, BUS. INSIDER (July 14, 2021), https://markets.businessinsider.com/currencies/news/jerome-powell-cryptocurrencies-cbdc-stablecoins-digital-currency-testimony-2021-7 (quoting Chair Powell as stating that "if [stablecoins are] going to be a significant part of the payments universe . . . then we need an appropriate framework, which frankly we don't have") (second alteration in original).

127. *See* Press Release, U.S. Dep't of the Treasury, Readout of the Meeting of the President's Working Group on Financial Markets to Discuss Stablecoins (July 19, 2021), https://home.treasury.gov/news/press-releases/jy0281.

128. For one description of how such a regulatory framework could function, see Gorton & Zhang, *supra* note 107, at 33–35.

129. Jonnelle Marte, *Powell Says a Fed Digital Currency Could Undercut Need for Cryptocurrencies*, REUTERS (July 14, 2021), https://www.reuters.com/business/feds-powell-says-stablecoins-need-appropriate-regulatory-framework-2021-07-14/.

130. *See, e.g.*, *What Are Stablecoins? Research Report*, CB INSIGHTS (Feb. 16, 2021), https://www.cbinsights.com/research/report/what-are-stablecoins/.

to compare the prices of different goods and services. Third, as a store of value, unlike cryptocurrencies, stablecoins can be stored and used at a later time without a huge risk of loss of value. However, some note that stablecoins are not guaranteed by law to be convertible to a currency and that insufficient regulation does create some risk as to value.[131] Boston Fed President Eric Rosengren recently called out Tether due to its breakdown of the collateral backing it, noting that 49% of its reserves were in commercial paper.[132] Although stablecoins may technically be classified as money, they are not widely accepted by merchants nor are there any current regulations regarding the safety of the assets backing them.

It was not until Facebook (now known as Meta) published a white paper on its blueprint for Libra, a potential global stablecoin, in 2019, that a huge (and unfriendly) response from regulators was triggered worldwide.[133] In response to the backlash, Facebook reconfigured their stablecoin and rebranded it Diem. Facebook's 2020 white paper on Diem (Libra 2.0) proposed both single and multicurrency backed stablecoins, and a permissioned system of validation using DLT.[134] In order to provide strong protections for the Diem reserve, it indicated that it would hold at least "80% of its reserves in low-risk short-term government securities . . . . [and the] remaining 20% . . . in cash, with overnight sweeps into MMFs [money market funds] that invest in short-term government securities with the

131. Anton N. Didenko & Ross P. Buckley, *The Evolution of Currency: Cash to Cryptos to Sovereign Digital Currencies*, 42 FORDHAM INT'L L.J. 1041, 1081–82 (2019).

132. Eric S. Rosengren, President, Fed. Rsrv. Bank of Bos., Remarks at the Official Monetary and Financial Institutions Forum Fed Week Financial Stability Session (Jun. 25, 2021), https://www.bostonfed.org/news-and-events/speeches/2021/official-monetary-and-financial-institutions-forum-fed-week-financial-stability-session.aspx.

133. Ross P. Buckley et al., *Sovereign Digital Currencies: Reshaping the Design of Money and Payments Systems*, 15 J. PAYMENTS STRATEGY & SYS. 7, 9 (2021) ("A number of features of Libra—a combination of a crypto-currency, global electronic payment system and framework of accounts and identification—give it the potential to be particularly disruptive for payment systems and particularly sovereign fiat currencies.").

134. LIBRA ASS'N, WHITE PAPER 1–3 (2020), https://www.diem.com/en-us/white-paper/. For an explanation of permissioned systems of validation, see *infra* Section III.C.

same risk and liquidity profiles."[135] In 2021, Diem Networks US contracted with Silvergate Bank, a California-chartered bank to be the exclusive issuer of Diem.[136] What made Diem a bit different, and more concerning than a stablecoin like Tether, was that it was the first proposed digital currency that had the potential to become systemic, facilitating cross-border transactions with Facebook's 3 billion users. It also named very stable pegged assets as the collateral supporting its value.[137]

In addition to regulators' apparent dislike for Facebook, it was the immediate scale of its proposed operation that triggered a number of governments to move more quickly with their own SDC.[138] At a 2020 hearing Fed Chair Powell admitted that "Libra [the initial iteration of Diem] really lit a fire . . . and it was a bit of a wakeup call that this is coming fast, and could come in a way that is quite widespread and systemically important, fairly quickly, if you use one of these big tech [networks] like Libra did."[139] Although stablecoins in and of themselves do not present a material risk to the Fed, a widely adopted *global stablecoin* would affect the Fed's ability to create monetary policy and have the dollar serve as a reserve currency.[140] According to the G7 Report on Stablecoins:

> Stablecoins offered by large existing platforms (such as big techs) could scale rapidly due to their estab-

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135. *Stablecoins Could Pose New Short-Term Credit Market Risks*, FITCHRATINGS (July 1, 2021), https://www.fitchratings.com/research/fund-asset-managers/stablecoins-could-pose-new-short-term-credit-market-risks-01-07-2021.

136. *Diem Announces Partnership with Silvergate and Strategic Shift to the United States,* PR NEWSWIRE (May 12, 2021), https://www.prnewswire.com/news-releases/diem-announces-partnership-with-silvergate-and-strategic-shift-to-the-united-states-301290201.html (Diem Networks US is a subsidiary of the Diem Association).

137. *See generally* Andrew Morse, *Executive Behind Facebook-Backed Novi Crypto Wallet to Leave Company*, CNET (Nov. 30, 2021), https://www.cnet.com/personal-finance/crypto/executive-behind-facebook-backed-novi-crypto-wallet-to-leave-company/.

138. *See* Christian Barontini & Henry Holden, *Proceeding with Caution—A Survey on Central Bank Digital Currency*, 101 BANK FOR INT'L SETTLEMENTS PAPERS (2019), https://www.bis.org/publ/bppdf/bispap101.pdf.

139. *Monetary Policy and the State of the Economy: Hearing Before the H. Comm. on Fin. Servs.*, 116th Cong. 32 (2020) (statement of Jerome Powell, Chairman, Board of Governors of the Federal Reserve System).

140. ALINA IANCU ET AL., IMF, RESERVE CURRENCIES IN AN EVOLVING INTERNATIONAL MONETARY SYSTEM 24 (2020); *see* G7 REPORT ON STABLECOINS, *supra* note 110, at 2.

> lished global customer bases and links to platforms that offer an easily accessible interface. Such arrangements that have the potential to become global pose risks beyond those of small-scale stablecoin arrangements and therefore present additional public policy challenges – including those to the safety and efficiency of the overall payment system, competition policy, financial stability, monetary policy transmission and longer term implications for the international monetary system . . . .[141]

Some of the concerns raised by the IMF, FSB, and the G7 Working Group have also been echoed by the U.S. government.[142] Duke Professor Steven Schwarcz also raises the concern that a global stablecoin could threaten *international* monetary and financial stability.[143]

B. *Sovereign Digital Currencies*

In the United States, the Fed is responsible for setting and implementing monetary policy and, as such, has an interest in monitoring the creation of and understanding the impact of money alternatives. Unlike other countries that have rapidly moved to create an SDC, the U.S. Federal Reserve is taking a more measured approach, stating the focus is on getting the SDC "right rather than [getting it] quickly."[144] Fed Chair Powell has stated that any SDC "needs to coexist with cash and other types of money in a flexible and innovative payment sys-

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141. G7 REPORT ON STABLECOINS, *supra* note 110, at 5.

142. *See* PRESIDENT'S WORKING GRP. ON FIN. MKTS., STATEMENT ON KEY REGULATORY AND SUPERVISORY ISSUES RELEVANT TO CERTAIN STABLECOINS 2, 4 (2020), https://home.treasury.gov/system/files/136/PWG-Stablecoin-Statement-12-23-2020-CLEAN.pdf ("U.S. authorities will continue to engage in cooperative oversight arrangements for effective information sharing and oversight of multi-jurisdictional stablecoin arrangements.").

143. *See* Steven L. Schwarcz, *Regulating Digital Currencies: Towards an Analytical Framework*, 102 B.U. L. REV. (forthcoming 2022), https://ssrn.com/abstract=3775136 (recommending a way for global stablecoins to be supervised and regulated).

144. Greg Thomson, *US Fed: CBDC a 'Very High Priority' to Combat Bad Private Sector Money*, COINTELEGRAPH (Jan. 15, 2021), https://cointelegraph.com/news/us-fed-cbdc-a-very-high-priority-to-combat-bad-private-sector-money.

tem."[145] Fed Governor Lael Brainard has indicated that the Fed has experimented with SDCs, despite the relative quiet about the project.[146] According to MIT's Digital Currency Initiative, the team at MIT has been working with the Federal Reserve Bank of Boston since 2016 to develop a hypothetical SDC, emphasizing that they are starting with a "clean slate" and are "not tied to any particular technology or approach."[147]

Proponents of an SDC answer the question posed by former Fed Governor Quarles, "What problem do SDCs solve?" with the following.[148] First, there are higher costs to managing physical money, thus using technology that is solely digital can reduce costs and fees.[149] Second, having an SDC which can be safely and easily accessed on a phone or computer could bring in customers and users who do not have a bank account, assuming they have a smartphone.[150] Third, financial crime can be more easily detected due to increased levels of transparency.[151] Fourth, in some countries, consumers have shifted away from using physical cash. SDCs, being purely digital, can act as an alternative.[152] Fifth, there is the concern that large tech companies' involvement in payment systems represent a

145. Benjamin Pirus, *CBDCs Won't Entirely Replace Cash if the US Fed Gets Its Way*, COINTELEGRAPH (Mar. 18, 2021), https://cointelegraph.com/news/cbdcs-won-t-entirely-replace-cash-if-the-us-fed-gets-its-way.

146. *See* Joshua Stoner, *U.S. Federal Reserve to Collaborate with MIT in Development of CBDC (Digital Dollar)*, SECURITIES.IO (Aug. 15, 2020), https://www.securities.io/federal-reserve-developing-cbdc-digital-dollar/.

147. *Building a Hypothetical Central Bank Digital Currency*, MIT DIGIT. CURRENCY INITIATIVE, https://dci.mit.edu/building-a-hypothetical-cbdc (last visited Jan. 30, 2022).

148. Quarles, *supra* note 1.

149. *See Building a Hypothetical Central Bank Digital Currency*, *supra* note 147.

150. Approximately 63.7% of unbanked households have smartphones whereas 86.6% of banked households have smartphones. Jesse Leigh Maniff, *Inclusion by Design: Crafting a Central Bank Digital Currency to Reach All Americans*, FED. RSRV. BANK OF KAN. CITY (Dec. 2, 2020), https://www.kansascityfed.org/documents/7583/psrb20maniff1202.pdf.

151. *See* Joe Robinson, *Commentary: Central Banks Are Pondering the Privacy/Transparency Balance of CBDCs*, DIGIT. TRANSACTIONS (Apr. 8, 2021), https://www.digitaltransactions.net/commentary-central-banks-are-pondering-the-privacy-transparency-balance-of-cbdcs/.

152. *See World's Central Banks Moving Toward Digital Currencies*, PYMNTS (Feb. 12, 2021), https://www.pymnts.com/cryptocurrency/2021/worlds-central-banks-moving-toward-digital-currencies/.

threat to a central bank's ability to implement monetary policy.[153]

However, opponents of the issuance of an SDC indicate that the Fed has already begun to improve their payment systems with the development of new methods such as the "'FedNow' initiative" and that SDCs present certain unanticipated risks.[154]

According to the BIS, 86% of central banks were exploring SDCs in 2020.[155] China began exploring its own SDC in 2014 after noting the risks that cryptocurrencies presented: capital leaving the country, tax evasion, financial instability due to fluctuating prices, and the reduced ability for the government to implement monetary policy.[156] The People's Bank of China (PBOC) launched its SDC—the DC/EP (or digital yuan)—for trial use in four cities in 2020.[157] Since that time there have been approximately $5 billion in digital yuan transactions through 20 million wallets.[158] The European Central Bank (ECB), which represents the Eurozone (the monetary union of 19 countries) and which issues and maintains the euro,[159] launched an investigation into the potential creation of a digital euro in October 2021 which is anticipated to take two years to complete.[160] The first phase of this launch would

153. *See* Tobias Adrian & Tommaso Mancini-Griffoli, *Central Bank Digital Currencies: 4 Questions and Answers*, IMF BLOG (Dec. 12, 2019), https://blogs.imf.org/2019/12/12/central-bank-digital-currencies-4-questions-and-answers/. This is the oft cited reason for China's fast implementation of a test SDC.

154. *See id.* For a discussion of these risks, see *infra* Part IV.

155. *See* Boar & Wehrli, *supra* note 4, at 3.

156. *See* Martin Chorzempa, *China, the United States, and Central Bank Digital Currencies: How Important Is It to Be First?*, 14 CHINA ECON. J. 102, 104 (2021).

157. *See id.* at 105.

158. *See* Charlotte Hu, *What Exactly Is a Digital Dollar, and How Would It Work?*, POPULAR SCI. (Sep. 7, 2021), https://www.popsci.com/technology/central-bank-digital-currencies-explained/ ("Since [the rollout of the digital yuan in 2020], more than 20 million digital yuan wallets were created, fielding over £3.6 billion in CBDC transactions.").

159. *See About*, EUR. CENT. BANK, https://www.ecb.europa.eu/ecb/html/index.en.html (last visited Jan. 30, 2022).

160. *See A Digital Euro,* EUR. CENT. BANK, https://www.ecb.europa.eu/paym/digital_euro/html/index.en.html (last visited Jan. 30, 2022). The consultation resulted in more than 8,000 replies (a record high). Fabio Panetta, Member of the Exec. Bd. of the Eur. Cent. Bank, A Digital Euro to Meet the

involve designing and testing the digital euro, but the actual issuance would not take place for several years thereafter.[161]

In the United States, the issuance of any SDC is not a straightforward proposition. Fed Governor Brainard has indicated that it would be important to examine how the Federal Reserve Act's provisions on "currency issuance [would] apply to the [SDC]."[162] Former Fed Governor Quarles is also skeptical that the Fed could expand the electronic dollar provision without legislation.[163] There is no law in the United States that authorizes the issuance of digital currency by central banks.[164] While central banks can issue banknotes, bills, and book money, they generally do not have the express authorization to issue an SDC.[165] However, the lack of an express statutory authority is not necessarily dispositive. For example, the legal authority relied upon by the Fed for its central bank swap lines rests upon a combination of statutory authorities rather than direct congressional authorization.[166] However, Fed Chair Powell has indicated that the Fed will not issue an SDC without Congressional authorization.[167] Those opposed to the adoption of an SDC point to the myriad of legal issues concerning SDCs that must be addressed.[168] As further discussed in Sec-

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Expectations of Europeans: Introductory Remarks (Apr. 14, 2021), https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210414_1~e76b855b5c.en.html.

161. *See* Panetta, *supra* note 160.

162. Lael Brainard, Member of the Bd. of Governors of the Fed. Rsrv. Sys., The Digitization of Payments and Currency: Some Issues for Consideration 12 (Feb. 5, 2020), https://www.federalreserve.gov/newsevents/speech/files/brainard20200205a.pdf.

163. *See* Quarles, *supra* note 1.

164. Paige Pidano Paridon, *Legal Authority to Issue a U.S. Central Bank Digital Currency*, BANK POL'Y INST. (June 9, 2021), https://bpi.com/legal-authority-to-issue-a-u-s-central-bank-digital-currency/; *see also* Wouter Bossu et al., *Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations* (Int'l Monetary Fund, Working Paper No. 2020/254, 2020), 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.

165. *See* Bossu et al., *supra* note 164, at 16.

166. *See* Colleen Baker, *The Federal Reserve's Use of International Swap Lines*, 55 ARIZ. L. REV. 603, 610 (2013).

167. *See* Jeff Cox, *Wall Street Banks Brace for Digital Dollars as the Next Big Disruptive Force*, CNBC (Apr. 21, 2021), https://www.cnbc.com/2021/04/19/central-bank-digital-currency-is-the-next-major-financial-disruptor.html.

168. *See, e.g.*, Berentsen & Schär, *supra* note 59.

tion IV.C, one of the biggest opponents is the banking industry, which is concerned about disintermediation. SDCs can take any number of forms, but the two discussed here are the fiat central bank digital currency (CBDC) and the synthetic CBDC (sCBDC).

1. *Fiat CBDC*

A fiat CBDC refers to the potential for the United States to issue its own SDC as a digital form of its fiat currency.[169] Using the definition provided by an IMF 2020 Working Paper on CBDCs, a "CBDC [is] a digital representation of a sovereign currency issued by and as a liability of a jurisdiction's central bank or other monetary authority."[170] The Fed is in the exploratory phase regarding the issuance of a CBDC. In 2021, the Federal Reserve released a FEDS Notes bulletin detailing five preconditions needed for any type of CBDC.[171] Essentially, before issuing a CBDC, there must be clear policy objectives, noting that most interests center around addressing specific present-day challenges or exploring future capabilities.[172] For example, the paper highlights the inefficiencies of the current payment market in light of COVID-19, such as the slow and inconsistent distribution of stimulus funds, and how CBDC could compliment or help solve these types of issues.[173] The goal is that the objectives should align with the Fed's aim of safety, efficiency, and monetary stability.[174]

Only recently, the Fed released a comprehensive discussion paper on the topic.[175] Hence, the design and operational

169. *See Central Bank Digital Currency Tracker*, ATLANTIC COUNCIL, https://www.atlanticcouncil.org/blogs/econographics/the-rise-of-central-bank-digital-currencies/ (last visited Jan. 30, 2022).

170. John Kiff et al., *A Survey of Research on Retail Central Bank Digital Currency* 9 (Int'l Monetary Fund, Working Paper No. 20/104, 2020), https://www.imf.org/en/Publications/WP/Issues/2020/06/26/A-Survey-of-Research-on-Retail-Central-Bank-Digital-Currency-49517.

171. *See* Jess Cheng, Angela N. Lawson & Paul Wong, *Preconditions for a General-Purpose Central Bank Digital Currency*, FED. RSRV.: FEDS NOTES (Feb. 24, 2021), https://www.federalreserve.gov/econres/notes/feds-notes/preconditions-for-a-general-purpose-central-bank-digital-currency-20210224.htm.

172. *See id.*

173. *See id.*

174. *See id.*

175. *See* BD. OF GOVERNORS OF THE FED. RSRV. SYS., *supra* note 9.

features of a Fed-issued CBDC, were one to be issued, are unknown. Crawford, Menand, and Ricks comment that:

> Most proposals portray CBDC as a sort of disembodied physical currency—a digital "token" that retains physical currency's properties of anonymity and direct peer-to-peer transfer. These proposals typically envision a closed system of digital "wallets" that is segregated from the existing system of money and payments and based on distributed ledger technology . . . .[176]

Yet they question whether central banks would want to promote fully anonymous digital tokens that could be used to facilitate illicit activity or to use a segregated payment system.[177] Fed researchers have presented preconditions for[178] and a case against[179] a central bank cryptocurrency. There is no current official push for a specific blueprint for a Fed-issued CBDC at this time.[180] An almost unlimited number of

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176. John Crawford, Lev Menand & Morgan Ricks, *FedAccounts: Digital Dollars*, 89 GEO. WASH. L. REV. 113, 117–18 (2021) (footnote omitted).

177. *See id.* at 118.

178. *See* Cheng, Lawson & Wong, *supra* note 171.

179. *See* Berentsen & Schär, *supra* note 59.

180. However, as discussed *infra*, it is unlikely that the U.S. government could develop and issue its own CBDC. The age of the computer systems used by the federal government and the lack of technological expertise could make any transition to a CBDC very difficult, time-consuming, and expensive. Some of these systems are over 50 years old. Others run on COBOL which is no longer even taught at universities. Not only is this inefficient, it also makes the data stored on these systems incredibly insecure. *See* AJ Dellinger, *The U.S. Government Spends Hundreds of Millions of Your Tax Dollars on Outdated Tech*, MIC (June 17, 2019), https://www.mic.com/impact/out-of-date-computer-systems-cost-the-us-government-over-300-million-per-year-to-maintain-18007754. Lack of skilled workers and tight budgets are preventing the modernization of technology in the federal government. Angus Loten, *Federal IT Experts Cite Host of Roadblocks to Tech Modernization*, WALL ST. J. (Apr. 27, 2021), https://www.wsj.com/articles/federal-it-experts-cite-host-of-roadblocks-to-tech-modernization-11619561479; *see also* Avi Selk, *'There's so Many Different Things!': How Technology Baffled an Elderly Congress in 2018*, WASH. POST (Jan. 2, 2019), https://www.washingtonpost.com/lifestyle/style/theres-so-many-different-things-how-technology-baffled-an-elderly-congress-in-2018/2019/01/02/f583f368-ffe0-11e8-83c0-b06139e540e5_story.html; Max de Haldevang, *The US Desperately Needs Tech-Savvy Lawmakers but the Midterms Are Unlikely to Deliver*, QUARTZ (Nov. 4, 2018), https://qz.com/1449521/us-needs-tech-savvy-lawmakers-midterms-unlikely-to-deliver/.

design choices with different costs, benefits, and policy implications are theoretically possible.[181] Some of these design features are discussed *infra* Part III.

2. *Synthetic CBDC*

As envisioned by Adrian and Mancini-Griffoli of the IMF, an sCBDC is a stablecoin created by a private entity, but backed by a central bank.[182] An sCBDC is considered an alternative to the CBDC described in the previous subsection in that instead of the Fed issuing its own CBDC, a stablecoin issued by a private entity could be designated legal tender with the Fed holding reserves for the issuing private entity.[183] Currently, only commercial banks, and a limited number of additional institutions such as certain clearinghouses (financial market infrastructures),[184] can have accounts and access to services at the Fed. Although not currently permitted by law, widespread access to Fed accounts has long been theoretically and technically possible. As discussed in Part III, an SDC could be provided in account or token form and on a wholesale or retail basis. Hence, debate about a Fed SDC ultimately encompasses both the potential expansion of the existing digital money provision via Fed accounts to certain counterparties (primarily banks) to additional counterparties and also the potential issuance of the U.S. dollar in a digital token form.

The distribution of the sCBDC could be provided by the private entity or through commercial banks and/or non-bank financial institutions (NBFIs).[185] If the sCBDC is issued by a

181. Design choices would be based on the policy objectives of the Fed as well as the technology, time, and cost of such implementation.

182. *See* Tobias Adrian & Tommaso Mancini-Griffoli, *The Rise of Digital Money*, INT'L MONETARY FUND: FINTECH NOTES, July 2019, at 14–15. The sCBDC is also known as an "indirect CBDC."

183. *See id.* (explaining how e-Money could serve as an sCBDC). Some refer to an sCBDC as a Private DC-CB. *See* EZECHIEL COPIC, SHAPING THE FUTURE OF DIGITAL CURRENCIES, CLABS, INC. (2021), https://celo.org/papers/future-of-digital-currencies.

184. *See generally* Baker, *supra* note 46 (explaining Dodd–Frank's Title VIII, which grants the Federal Reserve authority to issue accounts and services to clearinghouses that are designated as systemically important by the Financial Stability Oversight Council).

185. There are several issues with the sCBDC, including potential antitrust issues and interoperability. Marianne Ojo Delaney, *Balancing Public–Private Partnerships in a Digital Age: CBDCs, Central Banks and Technology Firms*, CISD

private entity but is to be backed by an account at the central bank, the private entity would need to follow strict guidelines to protect the reserve accounts from the issuer's creditors or bankruptcy.[186] An sCBDC would be an indirect form of SDC discussed *infra* Section III.A. The sCBDC would be a claim on the private entity who, like banks, would be legally required to perform certain background checks on potential customers, referred to as "know your customer" (KYC) requirements,[187] and to assist with government anti-money laundering (AML)/combating of financing terrorism (CFT) efforts.[188]

One of the advantages of the sCBDC is that the Fed could avoid the incredible development costs and the time involved with creating an entirely new banking system.[189] This also permits the Fed to focus on its core purposes such as financial stability, leaving innovation and technology to the private sector which has a much better track record in this area honoring each's comparative advantage.[190] In the sCBDC scenario, such as the one offered by Adrian and Mancini-Griffoli, the central bank would simply offer settlement services to the private sCBDC providers, leaving the retail side to these private enti-

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ECON. REV., May 2021, at 6, https://ssrn.com/abstract=3821789. This would require a uniform token standard. If the token is built on the Ethereum blockchain, for example, it could only be held in an Ethereum-enabled wallet. This could be an even more complicated issue if, as EU scholars suggest, there were multiple issuers of sCBDCs to address diverse needs. ALEXANDER BECHTEL ET AL., THE FUTURE OF PAYMENTS IN A DLT-BASED EUROPEAN ECONOMY: A ROADMAP 3 (2020), https://www.blockchain4europe.eu/wp-content/uploads/2020/12/BC4EU-The-Future-of-Payments-in-a-DLT-based-European-Economy-A-Roadmap_v5.1.pdf.

186. *See* Kiff et al., *supra* note 170, at 25. Although not considered an sCBDC, the PBOC requires both Alipay and WeChat Pay to maintain reserves at the central bank. *See* Adrian & Mancini-Griffoli, *supra* note 182, at 12.

187. *See* Dan Ryan, *FinCEN: Know Your Customer Requirements*, HARV. L. SCH. F. ON CORP. GOVERNANCE (Feb. 7, 2016), https://corpgov.law.harvard.edu/2016/02/07/fincen-know-your-customer-requirements/.

188. *See generally* Colleen Baker, *Entrepreneurial Regulatory Legal Strategy: The Case of Cannabis*, 57 AM. BUS. L. J. 913, 922 (2020) (discussing anti-money laundering laws in the banking context).

189. See discussion *supra* notes 162–68 and accompanying text regarding the federal government's ability to create an SDC.

190. "The responsibilities [of the private sector] include technology choice, data management, and regulatory compliance as well as customer onboarding, management, screening, and monitoring (including KYC and AML/CFT)." BECHTEL ET AL., *supra* note 185, at 14.

ties (and/or banks and NBFIs), such as KYC, AML, and CFT obligations.[191] A report on sCBDCs prepared by the Policy Department for Economic, Scientific and Quality of Life Policies Directorate-General for Internal Policies for the European Parliament's Committee on Economic and Monetary Affairs describes three advantages to the sCBDC.[192] These include (i) lower initial and maintenance costs, (ii) the ability to regulate private tech companies, and (iii) decreased reputational risk for central banks.[193] Some of the issues involved with a private entity creating an sCBDC are discussed *infra* Part IV. The following Part discusses some of the major design decisions which the Fed would need to make with respect to a potential SDC.

III.
Design Issues with SDCs

As previous articles have discussed, there are many design considerations for an SDC. Some of these decisions will depend on policy objectives, while others will be limited by former design decisions and current technology. Due to the complexity of these decisions, despite the efforts of other researchers, it is difficult to do a one-to-one comparison between types of SDCs.[194] We will focus on the two most significant decisions: how they interact with one another and how they impact the risks involved in issuing an SDC. The first design decision involves whether and how the central bank would interact with the public: directly or indirectly (one-tier system vs. two-tier system). The second design decision is whether the SDC would be account- or token-based. We will also endeavor to clear up some of the inconsistent terminology used in prior literature that also makes comparisons among the different forms and designs of SDCs difficult.

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191. *See* Adrian & Mancini-Griffoli, *supra* note 182, at 14.

192. *See* Alexander Kriwoluzky & Chi Hyun Kim, *Public or Private? The Future of Money*, Monetary Dialogue Papers 18 (Dec. 2019), https://www.europarl.europa.eu/cmsdata/207653/13.%20PE%20642.356%20DIW%20final%20publication-original.pdf.

193. *See id.*

194. We also do not include "hybrid systems" as a distinct category due to the unlimited combinations that could comprise such a system.

A. *Direct or Indirect Relationship*

Currently, individuals and businesses (the "customers") keep their accounts at commercial banks. These commercial banks have accounts at the Fed.[195] This is known as a two-tier system. A direct relationship between the central bank and customers would be considered a one-tier system. While some refer to the one-tier vs. two-tier system decision as an "architecture decision" others refer to it as an "access decision."[196] To avoid this confusion, we will just refer to this system design choice as "direct or indirect relationship."

With a direct *one-tier system*,[197] the customers would access the SDC either by holding accounts at the central bank (account-based) or through a wallet provided by the Fed on a computer or, more likely, a mobile device (token-based). The choice between an account-based system and a token-based system is discussed in the next section. A one-tier SDC system would be the most expensive and time-consuming choice for the Fed. It would also upend the current regulatory scheme of the banking system, which relies heavily on commercial banks' relationships with their customers to carry out the legal requirements under the BSA.[198] Fed Governor Brainard has warned that the issuance of a "digital currency directly to con-

195. Note that there are also some NBFIs with accounts at the central bank, but for the most part we will use the term commercial banks for ease of reading.

196. Note that many papers conflict with one another in their use of the terms architecture, infrastructure, and access. *Compare* Raphael Auer & Rainer Böhme, *The Technology of Retail Central Bank Digital Currency*, BIS Q. Rev., 2020, at 85 (describing the architecture as whether it is a direct or indirect system, infrastructure as whether it is conventional or DLT-based, and access as to whether it is account- or token-based), *with* Kiff et al., *supra* note 170, at 21 (describing the architecture as to whether it is a centralized, decentralized, or hybrid system, infrastructure as to whether it would involve on-premise servers or a cloud-based system, and access as to whom would be able to access the central bank reserves).

197. Numerous labels have been given this arrangement: one-tier CBDC, general purpose CBDC, and direct CBDC. We will refer to direct access of the public to CBDC as direct or one-tier CBDC.

198. *See Bank Secrecy Act*, Off. of the Comptroller of Currency, https://www.ots.treas.gov/topics/supervision-and-examination/bsa/index-bsa.html (last visited Feb. 25, 2022).

sumer accounts for general-purpose use would raise profound legal, policy, and operational questions."[199]

An indirect *two-tier system*[200] most closely aligns with the current banking system. Only commercial banks or authorized NBFIs would have accounts at the central bank and the customers would access the SDC through the commercial banking system. With the two-tier system, the commercial banks and/or NBFIs would handle payments and regulatory requirements, such as KYC and AML/CFT.[201]

199. Lael Brainard, Member of the Bd. of Governors of the Fed. Rsrv. Sys., Update on Digital Currencies, Stablecoins, and the Challenges Ahead 8 (Dec. 18, 2019), https://www.federalreserve.gov/newsevents/speech/files/brainard20191218a.pdf.

200. This two-tier system is also known as the indirect or intermediary system.

201. China plans on using the two-tier model, distributing the CBDC to commercial banks and non-bank financial institutions (which would include WeChat and Alipay). The PBOC would manage the back-end creation of the CBDC (DC/EP). Commercial banks would serve as CBDC exchange services and users would hold their digital yuan in digital wallets provided by financial firms. *See* YAYA J. FANUSIE & EMILY JIN, CTR. FOR A NEW AM. SEC., CHINA'S DIGITAL CURRENCY: ADDING FINANCIAL DATA TO DIGITAL AUTHORITARIANISM 8 (2021), https://s3.us-east-1.amazonaws.com/files.cnas.org/documents/CNAS-Report-Chinas-Digital-Currency-Jan-2021-final.pdf?mtime=20210125173901&focal=none.

TABLE 1: DIFFERENCES BETWEEN A ONE-TIER AND TWO-TIER CBDC SYSTEM

	One-Tier System	**Two-Tier System**
What is the relationship between the central bank and banking customers?	Direct	Indirect
How is the SDC issued to customers?	Central bank issues SDC to customers	Central bank issues SDC to commercial banks or NBFIs who then distribute the SDC to their customers
Who do customers have claim on?	Customers have a claim on the central bank	Customers have a claim on the commercial banks or NBFIs
Who conducts retail services for customers?	Central bank conducts retail banking services & AML/KYC	Commercial banks or NBFIs conducts retail banking services & AML/KYC
What form does the CBDC take?	Account or Token	Account or Token

An sCBDC would also be configured as an indirect two-tier system with the customer having an indirect relationship with the central bank and the sCBDC issued by the private stablecoin issuer.[202] The customers would have a claim on the private issuer, but it would be backed by the central bank. Retail services would be conducted by the private issuer, commercial banks, and/or NBFIs.

202. Note that it is also possible that the private stablecoin issuer could distribute the sCBDC directly to customers, it could also provide the sCBDC to commercial banks and/or NBFIs.

B. *Token- or Account-Based*

The second decision involves the form of the SDC itself. The two main options are a token or an account.[203]

1. *Token-Based*

A token-based SDC is a digital form of currency. The token would be created using DLT, such as blockchain. The primary analogy as to how a token-based system would work is the current use of a physical currency. When a purchaser provides a dollar bill to a merchant, the merchant only needs to confirm that the dollar bill is not a counterfeit.[204] The merchant does not verify who the purchaser is or where the dollar bill originated. Similarly, in a token-based SDC system, it is the token itself that is validated as authentic.[205] Although a token-based SDC might seem like a cryptocurrency, these SDCs would be the liability of the central bank, while cryptocurrencies are not backed by either central banks or other assets.[206] The tokens would not be held at the central bank, but rather accessed on the DLT through the customer's wallet.

In a *one-tier token-based* system, the SDC would be created and issued by the Fed directly to a customer's wallet. The customer would store the SDC in its wallet and transactions would occur wallet-to-wallet (or P2P). In a *two-tier token-based* system, the SDC would be created and issued by the Fed to be distributed by commercial banks or NBFIs. The commercial banks or NBFIs would then transfer the tokens to the customer's wallet

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203. With respect to a hybrid option, see *supra* note 194. *Digitizing the Dollar: Hearing Before the H. Comm. on Fin. Servs.*, 117th Cong. (2021) [hereinafter *Digitizing the Dollar*] (statement of Dr. Neha Narula, Director of the Digital Currency Initiative, MIT Media Lab) (speaking in support of a hybrid system for a proposed SDC in which institutions outside of commercial banks are allowed to provide users with digital wallets and other applications), https://financialservices.house.gov/events/eventsingle.aspx?EventID=407953#LiveStream.

204. *See* Rod Garratt et. al, *Token- or Account-Based? A Digital Currency Can Be Both*, FED. RSRV. BANK OF N.Y.: LIBERTY ST. ECON. (Aug. 12, 2020), https://libertystreeteconomics.newyorkfed.org/2020/08/token-or-account-based-a-digital-currency-can-be-both.html.

205. For discussion of the validation process, see *infra* Section III.C.

206. Stablecoins are backed by assets, see G7 REPORT ON STABLECOINS, *supra* note 110, and an sCBDC is ultimately backed by a central bank, see Adrian & Mancini-Griffoli, *supra* note 182.

who could then transfer the tokens wallet-to-wallet (or P2P). An sCBDC would be a two-tier token-based system.

2. *Account-Based*

In an account-based system, the central bank itself would hold accounts on behalf of the customers (rather than just holding the accounts of commercial banks). The primary analogy as to how an account-based system would function is the current use of a bank account. When a customer desires to use a bank card at a merchant, the merchant must verify that the card holder is the owner of the bank account associated with it. Likewise, with an account-based SDC system, it is the account holder that must be verified through identification. In another example, Fedwire Funds acts as an account-based system.[207] When one party initiates a transfer to another party, the Fedwire Funds Service must authenticate the initiator's identity in order to prevent fraud.[208]

In a *one-tier account-based* system, the SDC would be recorded in the customer's account at the Fed and transfers would occur through updating the Fed's account register (or ledger).[209] In terms of who would conduct retail banking services and AML/KYC, although some have suggested it would be the Fed,[210] it is more likely that these duties would be outsourced to commercial banks and NBFIs.[211] This would still be considered a one-tier system as the SDC would be held in accounts at the central bank, not at the commercial bank or

207. *See* PURPOSES & FUNCTIONS, *supra* note 47, at 131.

208. Bank deposits are another type of account-based system. *See id.*

209. Some papers hesitate to use the term ledger for account-based systems for fear that it would be confused with blockchain or DTL ledgers. A ledger is simply a running account of transactions.

210. *See, e.g.*, Charles Kahn, Francisco Rivadeneyra & Tsz-Nga Wong, *Should the Central Bank Issue E-Money?* (Fed. Rsrv. Bank of St. Louis, Working Paper No. 2019-003A, 2019), https://s3.amazonaws.com/real.stlouisfed.org/wp/2019/2019-003.pdf.

211. Megan Greene, *Central Banks Need to Go Slow on Digital Currencies*, FIN. TIMES (Aug. 26, 2021), https://www.ft.com/content/21e3affe-8c57-4bacb9c5-21b645e93d7c ("[A direct CBDC] would also require a central bank to take on new operational tasks such as credit risk and know your customer (KYC) analysis. More likely, a system would have to be designed so that customers will hold CBDC accounts at a bank or other intermediary, which will provide the services.").

NBFI.[212] In a *two-tier account-based* system, the SDC would be recorded in the customer's account at the commercial bank or NBFI and transfers would occur through updating the commercial bank or NBFI's account register (or ledger). The commercial bank's or NBFI's accounts are then updated at the central bank. The commercial bank or NBFI would conduct retail banking services and AML/KYC.

Regardless of whether the system is a one-tier or two-tier design, the decision between a token-based system and account-based system is not only drastically different from a technology standpoint, but it also impacts the risks associated with various SDC systems. One of the biggest differences between these two forms relates to individual privacy. In an account-based system, there is a lower degree of privacy as the identity of the user must be verified.[213] In a token-based system, it is the transaction itself that is validated in the sense that, because it is a data file on a DLT, the validator must assure that the token itself is authentic.[214] The user's identity is not required.[215]

212. *See* Saule T. Omarova, *The People's Ledger: How to Democratize Money and Finance the Economy*, 74 VAND. L. REV. 1231, 1258 (2021) (describing a one-tier system in which deposit accounts are transitioned from commercial banks to the Fed).

213. *See* Kahn, Rivadeneyra & Wong, *supra* note 210, at 3 (noting that account-based systems rely on identification of the account holder for transaction validation).

214. *See* COMMITTEE ON PAYMENTS AND MARKET INFRASTRUCTURES, BANK FOR INT'L SETTLEMENTS, CENTRAL BANK DIGITAL CURRENCIES 4 (2018).

215. Although verification and validation are often used interchangeably, verification usually relates to identity and validity to the authenticity of the token. For example, when you write a check to pay for an item, the merchant verifies that you are the owner of the account. If you pay with cash, the merchant validates the currency making sure it is not counterfeit. The merchant does not check your identity. The validation procedure for tokens is discussed *infra* Section III.C.2.

TABLE 2: DIFFERENCES BETWEEN A TOKEN-BASED AND ACCOUNT-BASED SYSTEM

	Token-Based	**Account-Based**
One-tier	Issued by central bank to customer's wallet	Customer holds an account at the central bank, updates to account are made by the central bank
Two-tier	Issued by central bank to commercial banks and NBFIs and transferred to customer's wallet by commercial banks and NBFIs	Customer holds an account at a commercial bank or NBFI, updates to customer's account are made by commercial bank or NBFI. The commercial bank or NBFI's account is then updated at the central bank.
Authentication for either one-tier or two-tier	Transaction (token) must be validated—no customer ID required	Account holder must be verified—customer ID required

C. *Technology Design Issues*

Based on previous design decisions and the Fed's objectives, there are multiple infrastructure decisions that would have to be made. Infrastructure can refer to hardware, software, storage, and access. For example, infrastructure decisions in an account-based system could include the software used to manage the updating of the account's ledger (either at the central bank level, commercial bank level, or both). It could also include the hardware and storage used (additional servers or cloud storage).[216] However, because some scholars

216. Note that other discussions of SDC infrastructure use the term to describe different aspects of an SDC design, such as one-tier or two-tier distinc-

have used the term infrastructure to describe other aspects of design issues,[217] we use the term "technology design issues."

1. *Updating the Ledger*

In general, the current financial system works with the commercial banks updating the transaction ledger. For example, in the case of clearing a check (or the more common electronic image of a check), when the transfer is between two different banks the Fed does not update a transaction ledger, although it will receive the electronic image.[218] The Fed only updates the ledger with respect to the commercial banks' accounts (debiting one bank's account and crediting the other). If the check (or electronic image of a check) is being processed from one account holder to another at a single bank, that financial institution updates the transaction ledger and maintains copies of the check.[219] Central banks do not generally collect records of retail payment transactions.[220] Commercial banks report suspicious activity under their AML/BSA obligations.[221] Balance sheet information, however, is available to banking regulators such as the Fed through the bank supervision process.[222] With a one-tier account-based system, the Fed would begin maintaining a ledger of all customer transactions presenting the privacy issues many have noted. With a two-tier account-based system, not much would be different with respect to updating transactions' ledgers from the current system.

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tion, Auer & Böhme, *supra* note 196, at 88, such as whether a DLT is centralized or decentralized, Allen et al., *supra* note 91, at 14, whether a blockchain or centralized data base should be used, *Digitizing the Dollar*, *supra* note 203, the web-portal or mobile app needed, Crawford, Menand & Ricks, *supra* note 176, at 161, or core technology, G7 REPORT ON STABLECOINS, *supra* note 110, at 3, among others.

217. *See* Kiff et al., *supra* note 170, at 13 (describing *infrastructure* as whether it would involve on-premises servers or a cloud-based system).

218. *See Check Processing*, FED. RSRV. BANK OF N.Y., https://www.newyorkfed.org/aboutthefed/fedpoint/fed03.html (last visited Jan. 30, 2022).

219. *See id.*

220. Rachael King, *The Untapped Potential of Transaction Data*, CENT. BANKING (Mar. 3, 2021), https://www.centralbanking.com/central-banks/economics/data/7804061/the-untapped-potential-of-transaction-data.

221. *See* Baker, *supra* note 188, at 924.

222. *See generally id.*

A more complex issue is presented with a token-based system. With DLT, such as blockchain, the ledger is distributed among many nodes.[223] These nodes are computers operated by validators (miners) who, through cryptography and consensus mechanisms, validate transactions that are then added to the ledger.[224] Not all distributed ledgers involve blockchain.[225] A DLT can be either centralized or decentralized.[226] A token-based SDC would most likely involve a politically centralized permissioned DLT. Politically centralized means that the Fed would set policy and rules for the system. It would also be permissioned in that only the validators approved by the Fed could validate transactions, as discussed in the next section.[227] It would not, however, be structurally centralized where only one node could add transactions to the ledger. Similarly, it would not be politically decentralized, as the Fed would not be sharing authority with respect to an SDC. It would, however, be structurally decentralized in the sense that many nodes would be needed to validate the high number of transactions.

2. *Validating Transactions*

The way that transactions are validated under the current financial system is at the commercial banking level. A number of methods are used by banks and financial institutions—the institutions primarily saddled with the risk for fraud losses—for payment authentication.[228] Payment authentication requires establishing that a party both has the right to act and determining the actions the party is allowed to take.[229] The "payment authentication issue" can be divided into three

223. *See* Yannis Bakos & Hanna Halaburda, Tradeoffs in Permissioned vs Permissionless Blockchains: Trust and Performance 2 (Nov. 30, 2021) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3789425#.

224. *Id.* at 3.

225. While many cryptocurrencies reside on blockchains, it is not a requirement. For an explanation of blockchain see Nakamoto, *supra* note 77.

226. These terms can refer to different aspects of a DLT. *See* Kevin Werbach, *Trust, But Verify: Why the Blockchain Needs the Law*, 33 BERKELEY TECH. L.J. 489, 502 (2018).

227. *See* Bakos & Halaburda, *supra* note 223, at 2–3.

228. David Lott, Improving Customer Authentication (April 2015) (unpublished manuscript), https://www.atlantafed.org/-/media/Documents/rprf/rprf_pubs/improving-customer-authentication.pdf.

229. *Id.*

phases: "1) authentication of the customer/device to access an account and the ability to perform transactions, 2) authentication of the transaction during processing, and 3) secure storage of the authentic transaction record after the transaction has been completed."[230] Authentication can occur both in person and electronically, and potential methods have evolved over time from basic visual authentication to the use of biometric data for authentication.[231]

In 2005, the Federal Financial Institutions Examination Council (FFIEC)[232] issued initial guidance on *Authentication in an Internet Banking Environment* and a *Supplement* to this document in 2011 (together, FFIEC Guidance).[233] The FFIEC Guidance provides banks with a risk management framework for such transactions, supervisors' minimum expectations, requirements for "periodic risk assessments and adjust[ments to] their control mechanisms as appropriate," and "identifies certain minimum elements that should be part of an institution's customer awareness and education program."[234] An overall theme is that banks' authentication processes in online environments should be proportional to the risks of the transactions involved and the prudent safeguarding of customer information.[235] The FFIEC Guidance states that "[s]ince virtually every authentication technique can be compromised, financial institutions should not rely solely on any single control for authorizing high risk transactions, but rather institute a system of layered security. . . ."[236]

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230. *Id.* at 3.

231. *See id.*

232. The Federal Financial Institutions Examination Council is a council of financial regulators consisting of the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation, National Credit Union Administration, Office of the Comptroller of the Currency, and the Consumer Financial Protection Bureau. *See About the FFIEC*, FED. FIN. INSTS. EXAMINATION COUNCIL, https://www.ffiec.gov/about.htm (last visited Feb. 1, 2022).

233. FED. FIN. INSTS. EXAMINATION COUNCIL, AUTHENTICATION IN AN INTERNET BANKING ENVIRONMENT (2011), https://www.ffiec.gov/pdf/authentication_guidance.pdf; FED. FIN. INSTS. EXAMINATION COUNCIL, SUPPLEMENT TO AUTHENTICATION IN AN INTERNET BANKING ENVIRONMENT (2011), https://ithandbook.ffiec.gov/media/153051/04-27-12_fdic_combined_fil-6-28-11-auth.pdf [hereinafter FFIEC SUPPLEMENT].

234. FFIEC SUPPLEMENT, *supra* note 233.

235. *Id.*

236. *Id.*

As discussed in Section III.B.2 *supra*, in an account-based SDC system, it is the verification of the identity of the customer that permits the completion of a transaction. With a token-based SDC system, it is the transaction itself that must be validated. With a typical blockchain configuration, there are two main options: proof-of-work and proof-of-stake.[237] These consensus methods serve to enable what is known as a "trustless system" in the sense that two parties do not need to know each other to trust that the transaction is not fraudulent nor is an intermediary needed such as with a P2P transaction on a blockchain. It is this mechanism which has the potential to disintermediate commercial banks.[238] The possibility of a permissionless distributed blockchain as a part of an SDC is virtually zero. A permissionless distributed system would permit anyone anywhere (even in other countries) to validate U.S. banking transactions.[239] The most likely combination is centralized control/governance (in the central bank), permissioned access (validators are approved by the central bank), with a decentralized validation system (multiple nodes—those with permissioned access) spread across connected computers.

IV.
Impact of Design Choices

As much research has already disclosed, there are many legal risks and other potential issues with respect to both choosing to issue an SDC and within the choice of the SDC design itself.[240] This Part examines some of these risks, including privacy, security, and bank disintermediation.

A. *User Privacy*

Economists have argued that cash is the "classic solution to the problem of transaction privacy."[241] Cash allows for anonymous exchange. In a non-anonymous exchange, such as

237. Fahad Saleh, *Blockchain Without Waste: Proof-of-Stake*, 34 Rev. Fin. Stud. 1156, 1157 (2020). New validation and consensus mechanisms are created frequently. Thibault Schrepel, *Collusion by Blockchain And Smart Contracts*, 33 Harv. J.L. & Tech. 117, 120 (2019).

238. *See infra* Section IV.C.

239. Bakos & Halaburda, *supra* note 223, at 2 (provided the validator can "satisfy the requirements of the applicable protocol").

240. *See Central Bank Digital Currency Tracker*, *supra* note 169.

241. Kahn, McAndrews & Roberds, *supra* note 36, at 399.

with a check or credit card, information is made apparent to transacting counterparties who could make opportunistic use of such information in the future.[242] SDCs require a tradeoff to be made between privacy (to protect the user) and transparency (which would permit the government to identify money laundering or terrorist funding). Currently, user privacy is not guaranteed with respect to the banking system. The third-party doctrine established in *United States v. Miller* provides that it is not protected by the Fourth Amendment because customers voluntarily provide transaction and payee information to their banks.[243] The statutory limitation found in the Right to Financial Privacy Act simply outlines the procedures that must be followed to subpoena such records but does not shield this information from discovery.[244]

Despite worries that a token-based system would provide anonymity for users, such as with cash, it is more accurate to say that a token-based system provides more privacy than an account-based system, because the account-based system requires that customers be identified to process transactions and the token-based system does not.[245] However, because all transactions in a token-based system are recorded permanently, technically, they can be tracked. While some use pseudonyms when conducting P2P transactions using DLT, all devices that access the internet have an IP address that can be identified using various methods, including with a subpoena to the internet service provider.[246]

The main privacy concern with a direct one-tier system is that the central bank will maintain a ledger of all transactions. In addition to knowing your identity (in an account-based system), the central bank would have a record of each transaction (in either the account-based or token-based system), allowing central banks to know what you buy, where you buy it,

242. *Id.* at 378.

243. United States v. Miller, 425 U.S. 435, 444 (1976).

244. 12 U.S.C. §§ 3401–3423.

245. *See supra* Section III.B.

246. Note that it is beyond the scope of this paper to discuss virtual private networks and TOR (browser that enables anonymous browsing) and their use to avoid identification. For an explanation on how this can be accomplished and why it is not so easy, see Siddharth Arora, Anupama Pankaj & Prasenjit Banerjee, *Anonymity and Anonymous Connections Using TOR*, 3 INT'L J. ADVANCED STUD. SCI. RSCH. 165 (2018).

and from whom you bought it.[247] This could potentially violate a user's privacy rights, permit sharing information that was obtained without a warrant with other agencies (such as the IRS or ICE), and would seem to be unwarranted surveillance.[248] With a user's purchase information, the government could track a user's every expenditure, including political activity, which could be problematic if central bank policymakers had a different or opposing political ideology.[249] Overall, one of the biggest privacy concerns is that central banks would have a newfound ability to control, store, and track a citizen's information.[250]

One additional concern relates to the potential for foreign citizens located in the United States using their own country's SDC. The extent of the foreign government's access to this transaction information would be unknown.[251] Because of the large number of transactions between U.S. citizens and Chinese citizens, for example, it is possible that the use of China's SDC in the United States would provide the Chinese government access to real time data on these transfers.[252] As such, it is important that governments and private tech companies assess whether another country's SDC system should be blocked for use within their countries or if there is another alternative to protect U.S. citizen data.[253] If physical cash is still available, and the government does not adequately address the privacy issues involved with using an SDC, people might not widely adopt the SDC and stick to cash transactions due to a lack of trust. Were this to be the case, an SDC could have the unintended effect of creating a pricing disparity between physical cash and a token-based SDC. Some might see cash as more valuable than an equivalent amount of SDC because of its anonymity and be willing to pay more for it. This could be problematic as a central bank would need to be "willing to buy and

247. Vincent Tabora, *Two Sides to Central Bank Digital Currency (CBDC)*, MEDIUM (Mar. 29, 2020), https://medium.datadriveninvestor.com/two-sides-to-central-bank-digital-currency-cbdc-38035036c013.

248. *Id.*

249. *Id.*

250. Alyssa Hertig, *What is a CBDC?*, COINDESK (Dec. 4, 2020), https://www.coindesk.com/what-is-a-cbdc.

251. *Id.*

252. *Id.*

253. *Id.*

sell any number of these tokens at par."[254] Relatedly, if the privacy protections of one SDC were less than those provided by that of another SDC, this difference could increase the attractiveness of the latter and have competitive consequences.

A possible solution to addressing one aspect of the privacy issue would be for the Fed to provide "controllable anonymity," where users' transactions would be private to each other, but would still be visible to the central bank.[255] In the European Union, which has robust privacy protections, another possible solution would be to adopt the ECB proposed "anonymity voucher" which would allow users to conduct transactions up to a certain monetary amount that would not be viewable by the central bank or other intermediaries.[256] An alternative option is the use of privacy-enhancing technologies which limit access to transaction data either through segregating, hiding, or unlinking the data—or a combination thereof.[257] An additional option proposed by Goodell, Al-Nakib, and Tasca of the Centre for Blockchain Technologies at the University College London would be to incorporate non-custodial wallets that rely on a privacy enhancing technology such as blind signatures or zero-knowledge proofs.[258]

With the involvement of a private partner in the creation of an SDC or sCBDC, there is the added risk of the potential of the private firm to monetize data collected.[259] For example, PayPal requires its users to provide personal information such as names, addresses, phone numbers, emails, and bank infor-

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254. Berentsen & Schär, *supra* note 59, at 103.

255. *See Digital Yuan: What Is it and How Does it Work?*, DEUTSCHE BANK (July 14, 2021), https://www.db.com/news/detail/20210714-digital-yuan-what-is-it-and-how-does-it-work (discussing the concept of "controllable anonymity").

256. EUROPEAN CENT. BANK, EXPLORING ANONYMITY IN CENTRAL BANK DIGITAL CURRENCIES 6 (Dec. 2019).

257. *See* BANK OF JAPAN & EUROPEAN CENT. BANK, BALANCING CONFIDENTIALITY AND AUDITABILITY IN A DISTRIBUTED LEDGER ENVIRONMENT 5–14 (Feb. 12, 2020).

258. Geoffrey Goodell et al., *A Digital Currency Architecture for Privacy and Owner-Custodianship*, FUTURE INTERNET, May 14, 2021, at 1.

259. *See* Danielle Keats Citron & Daniel J. Solove, *Privacy Harms*, 102 B.U. L. Rev. (forthcoming 2022), https://ssrn.com/abstract=3782222 (explaining privacy harms resulting from the lack of privacy regulation in the United States).

mation in order to use its services.[260] Further, other personal information that may be collected just by using PayPal includes a user's social security number, financial information, personal characteristics (age, national origin, disability, etc.), purchase and shopping history, GPS information and IP location, voice identification (when used as a biometric authentication), tax IDs, and many more.[261]

Although PayPal's privacy policy states that they do not sell personal data, they do admit that such information may be shared across their services and with other members of the corporate family.[262] Categories included in this list are service providers, financial institutions, collection agencies, governments, and any other third parties required to comply with laws, investigate violations, and prevent physical harm or illegal activity.[263] In 2018, PayPal shared a list of over 600 third parties that a user's information may be shared with.[264] This list includes tech giants like Google, Facebook, and Twitter.[265] Relatedly, responsibility for privacy breaches would need to be addressed as well.

Finally, attention should also be given to the purposes for which the government intends to use data collected by either the central bank (one-tier) or commercial banks (two-tier) relating to SDC transactions. For example, in addition to being used to combat money laundering, tax evasion, and terrorist financing, data collected by the U.S. government could enable it to block a user from making any transactions if it desired to

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260. *What Information is Required to Open a Personal PayPal Account?*, https://www.paypal.com/us/smarthelp/article/what-information-is-required-to-open-a-personal-paypal-account-faq2080 (last visited on Feb. 1, 2022).

261. *PayPal Privacy Statement*, https://www.paypal.com/us/webapps/mpp/ua/privacy-full (last visited on Feb. 1, 2022).

262. *Id.*

263. *Id.*

264. *The 600+ Companies PayPal Shares Your Data With*, SCHNEIER ON SEC. (Mar. 14, 2018), https://www.schneier.com/blog/archives/2018/03/the_600_compani.html; *see also List of Third Parties (Other than PayPal Customers) with Whom Personal Information May be Shared*, https://www.paypal.com/ie/webapps/mpp/ua/third-parties-list (last visited on Feb. 2, 2022) (revealing the list of third-party entities with whom PayPal shares your data as of January 1, 2022).

265. Sara Harrison, *How Private Is My Pay App?*, CNN (Nov. 12, 2020), https://www.cnn.com/2020/11/12/cnn-underscored/payment-app-privacy.

do so, allowing the SDC to be a "financial watchdog" tool.[266] This is of particular concern in the United States as the main privacy protection statute with respect to the government's use of citizen data, the Privacy Act of 1974, was enacted well before the public use of the internet and does not provide the protection anticipated at that time by those who wrote it.[267] In addition, the lack of omnibus privacy protection for U.S. citizens with respect to data collected by private entities is also a concern. If a two-tier system involved private payment processors, an sCBDC, or private contractors who work on behalf of the Fed in the running of the SDC system, there is a real risk in such data being shared and sold, resulting in real life harms.[268] As such, privacy law must be updated prior to the issuance of any type of SDC.

Another serious related risk is that with the potential use of smart contracts in a token-based system; payments, payors, or payees could be blocked, transactions could be invalidated, or payments could be reversed, all of which do not generally occur in the current cryptocurrency realm where transactions recorded on the ledger are immutable.[269] Programmable money, as could be created with smart contracts embedded in an SDC or the DLT on which it operates in a token-based system, could be used to boost the economy by setting expiration dates. Unless spent by a date determined by the government, the SDC would be no longer useable, in other words, kept in a "savings account."[270] Another use of programmable SDCs with an expiration date is that users could be required to pay a fee to extend the date (an effective demurrage cost).[271]

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266. Will Bartlett, *CBDCs and Privacy Concerns*, TIMESTAMP MAG. (Dec. 9, 2020), https://timestampmag.com/2020/12/09/cbdcs-and-privacy-concerns/.

267. *See* S. Rep. No. 93-1183 (1974), *reprinted in* LEGISLATIVE HISTORY OF THE PRIVACY ACT OF 1974, at 154–55 (1976).

268. *See* Citron & Solove, *supra* note 259.

269. *See* Martin Chorzempa, *Promise and Peril of Digital Money in China*, 41 CATO J. 295, 304 (2021).

270. Peter C. Earle, *Make No Mistake: Programmable Digital Currencies Are Weaponizable Money*, THE AMERICAN INSTITUTE FOR ECON. RSCH. (Apr. 24, 2021), https://www.aier.org/article/make-no-mistake-programmable-digital-currencies-are-weaponizable-money/.

271. For a detailed discussion of programmable SDC, see Tobias Tenner & Siegfried Utzig, *German Banks Say: The Economy Needs a Programmable Digital*

B. *Security Risks*

A one-tier SDC system imposes serious security risks due to the concentration of the monetary system in the Fed with the reduced involvement of commercial banks. While some governments might be less likely to exploit user privacy in comparison to private entities,[272] they might not excel in protecting such data from unauthorized third parties. The U.S. government does not have a very good track record in data protection.[273] There have been significant data breaches in the past decade.[274] Additionally, depending on the design choices, a security breach impacting a single or a small group of validators in a one-tier token-based system or a denial of service (DoS) attack in a one-tier account-based system would impact every SDC customer.[275] This risk could be mitigated by either retaining the current infrastructure of commercial banks, or by using a decentralized system with many more nodes. In this way, a breach would be more contained and less capable of affecting another bank or node.[276]

With a centralized system, an attack on the central node would impact every other node (computer). Although a fully distributed system provides the most security in terms of an attack, it is an unlikely choice for an SDC structure. The benefit of the decentralized system is that an attack could be limited to the branch where the attack hit. If one "regional" node

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Euro!, BANKEN VERBAND (Oct. 30, 2019), https://en.bankenverband.de/newsroom/comments/programmable-digital-euro/.

272. Steven L. Schwarcz, *Central Bank Digital Currencies and Law*, *in* THE (NEAR) FUTURE OF CENTRAL BANK DIGITAL CURRENCIES (Nicola Bilotta & Fabrizio Botti eds., 2021).

273. Kimberly A. Houser & Debra Sanders, *The Use of Big Data Analytics by the IRS: Efficient Solution or the End of Privacy as We Know it?*, 19 VAND. J. ENT. & TECH. L. 817, 866–68 (2017).

274. *See, e.g.*, Joseph Johnson, *U.S. Government and Cyber Crime - Statistics & Facts*, STATISTA (Apr. 29, 2021), https://www.statista.com/topics/3387/us-government-and-cyber-crime/.

275. *Centralized, Decentralized, & Distributed Networks*, CRYPTOPEDIA (July 12, 2021), https://www.gemini.com/cryptopedia/blockchain-network-decentralized-distributed-centralized (explaining that because centralized networks have a single point of failure, a security breach or denial of service attack could shut down the entire network).

276. *Id.* (explaining that with a decentralized network, because there is no single point of failure, an attack or security breach would not shut down the system as the remaining nodes would continue to operate).

is brought offline, the remaining nodes could take over which makes this system more tolerant to faults.[277] If, instead of a decentralized system with multiple nodes and the use of commercial banks as intermediaries, the government chose to rely on existing FinTech businesses to encourage innovation, there is an additional risk of these private entities failing to secure data.[278]

PayPal has had multiple data breaches and security issues. In December 2017, PayPal's subsidiary, TIO Networks Inc., was hacked, resulting in the compromise of 1.6 million users' private data.[279] However, PayPal notes that the breach did not affect the PayPal platform and that PayPal customers were not at risk from the breach.[280] In November 2019, a white hat hacker/security analyst found that PayPal's authentication tools could be bypassed by attackers that obtained password information by taking advantage of a high severity bug on the login page.[281] The same process could also be used to obtain plain text credit card data.[282] The hacker noted that PayPal released a patch fixing the bug within five days of becoming aware of the issue.[283] In February 2020, six more vulnerabilities were found, including: a two-factor authentication bypass, being able to confirm a new phone without a one-time password (OTP), bypassing security for sending money, being able to change the user's account name, the self-help chat being vulnerable to executing malicious code, and vulnerability with security questions.[284]

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277. Manfred Touron, *Centralized vs Decentralized vs Distributed Systems*, BERTY (June 20, 2019), https://berty.tech/blog/decentralized-distributed-centralized/.

278. *See* Citron & Solove, *supra* note 259.

279. Bojana Dobran, *1.6 Million PayPal Customer Details Stolen in Major Data Breach*, PHOENIXNAP (Dec. 5, 2017), https://phoenixnap.com/blog/paypal-customer-details-stolen.

280. *Id.*

281. Alex Birsan, *The Bug That Exposed Your PayPal Password*, MEDIUM (Jan. 8, 2020), https://medium.com/@alex.birsan/the-bug-that-exposed-your-paypal-password-539fc2896da9.

282. *Id.*

283. *Id.*

284. Bernard Meyer, *We Found PayPal Vulnerabilities – But PayPal Called them Trivial*, CYBERNEWS (Feb. 17, 2020), https://cybernews.com/security/we-found-6-critical-paypal-vulnerabilities-and-paypal-punished-us/.

Successful data breaches and phishing campaigns result in large amounts of stolen personal information. PayPal is one of the most popular targets.[285] In fact, PayPal accounts may be purchased on the dark web for as low as a couple dollars and up to over $400 per account.[286] It should be noted that PayPal is not the only FinTech company to suffer data breaches but, given the lack of federal protections for users' personal data, this presents an especially significant issue with respect to the collection of data by either private organizations or the U.S. government. For example, in December 2020, the Pentagon, the Treasury Department, the Department of Homeland Security, and nuclear labs were hacked through a cybersecurity firm, Solar Winds, with whom the United States contracts.[287] Malicious code was added to the company's software, Orion, which was then sent out to 33,000 companies and government agencies in the form of a software update which unknowingly contained the spyware.[288] Although the full extent of the breach is unknown, this could be one of the most significant data breaches in the history of the United States.[289] By moving to any type of centralized system, creating a single point of failure would have devastating effects on the U.S. economy.

One of the biggest policy decisions involved in a move to an SDC is how liability will be assessed for the inevitable harms resulting from breach of privacy and data security that accompany any online technology. The United States does not have a great record of protecting data and the public generally has no right of recourse against the government. Moving the en-

285. Paul Bischoff, *Dark Web Prices for Stolen PayPal Accounts Up, Credit Cards Down*, COMPARITECH (Sept. 8, 2021), https://www.comparitech.com/blog/vpn-privacy/dark-web-prices/.

286. *Id.*

287. David E. Sanger et al., *Scope of Russian Hacking Becomes Clear: Multiple U.S. Agencies Were Hit*, N.Y. TIMES (Dec. 14, 2020), https://www.nytimes.com/2020/12/14/us/politics/russia-hack-nsa-homeland-security-pentagon.html.

288. Isabella Jibilian & Katie Canales, *The US is Readying Sanctions Against Russia Over the SolarWinds Cyber Attack*, BUS. INSIDER (Apr. 15, 2021), https://www.businessinsider.com/solarwinds-hack-explained-government-agencies-cyber-security-2020-12.

289. Kimberly A. Houser, *Artificial Intelligence and the Struggle Between Good and Evil*, 60 WASHBURN L.J. 475, 479–80 (2021). See Houser & Sanders, *supra* note 273, for more information on the risks related to the U.S. government's lack of technical knowledge and ability to secure data.

tire banking system to the digital sphere is not a decision that should be made lightly.

C. *Risk of Bank Disintermediation and Runs*

One of the most discussed concerns about the creation of an SDC is the potential for the disintermediation of banks and the creation of a new source of bank runs. Both possibilities could have a catastrophic impact on the economy. Multiple issues arise with respect to whether a central bank becomes a direct issuer of an SDC, relies on the current network of commercial banks, or moves to the use of FinTech companies who can facilitate electronic transfers. First, what would the relationship be between the central bank and a private intermediary?[290] Would a FinTech intermediary act as an agent for the central bank? What liability would the central bank have for a private intermediary's actions?[291]

A report published by several central banks, including the Bank of Canada, European Central Bank, Bank of Japan, Bank of England, and others, which outlined the foundational principles and desired features of an SDC, also addressed the potential for the disintermediation of banks.[292] Banks rely heavily on customer deposits to fund their current business model. An SDC would be a competitive alternative to commercial bank money. Indeed, it could crowd it out completely. As the central bank is a risk-free counterparty, commercial banks would likely need to offer higher interest rates for commercial deposits to compensate customers for the increased risk as commercial banks are not risk-free counterparties.[293] As a result, banks could reduce the amount of credit extended and charge higher interest rates.[294] Another risk would be that when financial markets were calm, customers might choose to hold

290. *Japan Explores Central Bank Digital Currency Legal Issues*, LEDGER INSIGHTS (Nov. 29, 2019), https://www.ledgerinsights.com/japan-central-bank-digital-currency-legal-issues/.

291. *Id.*

292. BANK FOR INT'L SETTLEMENTS, CENTRAL BANK DIGITAL CURRENCIES: FOUNDATIONAL PRINCIPLES AND CORE FEATURES 1 (2020), https://www.bis.org/publ/othp33.pdf.

293. *Id.* at 8 (stating that if users move their money from bank accounts into SDCs, banks may respond by raising deposit rates to attract more money).

294. *Id.*

their money as commercial bank deposits to receive a higher interest rate, but quickly convert their funds into the SDC at the first sign of financial market stress.

Were enough customers to move their deposits to the SDC, there would be a run on the bank. This dynamic would likely occur across the economy, risking a systemic collapse of the banking system. Even a small movement of deposits from commercial banks to central banks could pose risks to financial stability.[295] For example, certain estimates suggest that 8% of bank deposits in the European Union—perhaps a cautious estimate—might move to a digital euro and 20% of bank deposits in the United Kingdom to a digital pound.[296]

Some have suggested that to replace lost deposits, banks could borrow money from the Fed's discount window (a lending facility).[297] There has long been a stigma with borrowing from the discount window as it should be unnecessary for financially healthy banks.[298] Hence, routine borrowing would be a new banking business model. In this model, what would be the rationale for allowing banks to routinely borrow from the Fed's discount window to lend money into the economy? Why not other institutions, and perhaps even individuals?

Additionally, if banks were to routinely borrow from the Fed's discount window, it is foreseeable that the Fed would assume a greater role in credit allocation in the economy. Indeed, the Fed has increasingly taken on this role, especially with its significant emergency assistance to the economy in the COVID-19 pandemic.[299] The Fed has traditionally been tasked with providing last resort liquidity assistance, not credit alloca-

295. *Id.*

296. Marc Jones, *Digital Euro Might Suck Away 8% of Banks' Deposits - Morgan Stanley*, REUTERS (June 15, 2021), https://www.reuters.com/news/picture/digital-euro-might-suck-away-8-of-banks-idUSKCN2DR2NO (providing estimates from Morgan Stanley and the Bank of England, respectively).

297. Crawford, Menand & Ricks, *supra* note 176, at 143.

298. David Henry, *U.S. Banks Borrow at Discount Window After Fed Offers Stigma Relief*, REUTERS (Mar. 26, 2020), https://www.reuters.com/article/us-health-coronavirus-fed-banks/u-s-banks-borrow-at-discount-window-after-fed-offers-stigma-relief-idUSKBN21D3JA.

299. *See* Lev Menand, *The Federal Reserve and the 2020 Economic and Financial Crisis*, 24 STAN. J.L. BUS. & FIN. 101, 104 (forthcoming 2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3602740.

tion.[300] Hence, how expansive of a role (if any) in credit allocation that the Fed should have is an important policy issue. A significant increase in discount window lending would increase the risk of the Fed's balance sheet.[301] Like any prudent lender, the Fed would likely then increase its scrutiny of bank loan assets.[302] To minimize its risk, it could increase conditions on its lending, requiring anything from greater diversification of banks' loans to decreased lending to economic sectors it judged as having more risk.

As SDCs can be issued directly by the federal government, there would be no need for an intermediary bank, thus potentially cutting commercial banks out of the equation entirely.[303] It is highly foreseeable that an SDC would have a fundamental impact on the current structure of the banking system. With a direct one-tier system, banks would be unnecessary. Yet even with an indirect two-tier system, the banking business model would almost certainly change radically. Banks would likely become more like service providers or agents of the Fed. In search of profits greater than those likely to be achieved with such a model, some banks might exit banking for alternative financial business models with greater profit potential. As Saule Omarova discusses in *The People's Ledger: How to Democratize Money and Finance the Economy*, there is widespread discussion of SDCs and the impact this would have on the liability side of the Fed's balance sheet.[304] However, there is scant con-

300. *See generally* Colleen M. Baker, *The Federal Reserve as Collateral's Last Resort*, 96 NOTRE DAME L. REV. 1381, 1382 (2021).

301. Borrowers from the Fed's discount window, such as banks, are not risk-free counterparties. Therefore, discount window loans to banks are not essentially risk-free assets as in the case of U.S. Treasury securities or agency mortgage-backed securities, assets that the Fed also holds on its balance sheet. Therefore, as the amount of discount window loans increased on the Fed's balance sheet, the risk to its balance sheet would also increase.

302. The Fed is one of the banking supervisors in the United States. Banking supervisors examine the composition of banks' balance sheets. In making a secured loan, a generally accepted practice is for lenders to examine the quality of the borrower's assets. Hence, if the Fed were to increase its discount window lending to banks, it seems likely that it would increase its focus on the quality of the borrower's assets.

303. Carolynn Look et al., *Central Banks Edge Toward Money's Next Frontier in Digital World*, BLOOMBERG (Feb. 5, 2021), https://www.bloomberg.com/news/articles/2021-02-05/central-banks-edge-toward-money-s-next-frontier-in-digital-world.

304. Omarova, *supra* note 212, at 1236.

versation about the corresponding implications for the asset side of its balance sheet and a holistic perspective taken.[305] Omarova states:

> [T]he discourse on [SDCs], however, is preoccupied mainly with operationalizing potential changes in central bank liabilities, rather than situating them within the broader institutional critique. Framed as a matter of "fast payments" and/or "access to banking," it is not grounded in a coherent vision of how the financial system operates—and, more importantly, how it should operate. Without such a unifying vision, the true transformative potential of changing central banks' mode of interaction with the broader public remains unexplored and underappreciated.[306]

As Omarova highlights in her article, debates about SDCs have focused on the important goals of faster payment systems and increased financial inclusion; however, the critical but often overlooked, question is: What would, or *should*, happen on the *asset side* of the central bank balance sheet, in order to accommodate the proposed expansion of central bank liabilities?[307] The choice to issue an SDC, especially if it involves moving to a direct one-tier system, would fundamentally transform the financial system and potentially result in the disintermediation of banks.

V.
Global Impact of SDCs

Because the monetary system is essentially international, each country's decision regarding the issuance of an SDC impacts other jurisdictions. Additionally, while the reasons may vary, some aspects stand out as primary motivators. First, financial transaction fees are very expensive. Bank fees in the United States alone during three months in 2020 totaled $11.6 billion.[308] Second, those who do not have bank accounts (the "unbanked")—estimated at 7.1 million households in the

305. *Id.*
306. *Id.* at 1235.
307. *Id.* at 1256.
308. Jennifer Taylor, *These Fees Have Cost Americans $11.6B During the Pandemic – Here's How To Avoid Them*, GOBankingRates (Jan. 21, 2021), https://www.gobankingrates.com/banking/banks/how-much-bank-fees-cost/.

United States alone[309]—could more fully participate in commerce just by using their phones. Third, cryptocurrencies such as Bitcoin and Ether have become mainstream as institutional investors and publicly held corporations have started to invest in them. A recent survey of 100 hedge funds indicated that within 5 years, on average, cryptocurrencies are likely to constitute 7.2% of their assets.[310] Finally, governments are concerned about their control over monetary policy if a global stablecoin were to be adopted broadly.[311]

As discussed *supra*, the Fed released an SDC white paper to encourage discussion of "issues related to payments, financial inclusion, data privacy, and information security."[312] However, in addition to the important discussion regarding objectives and designs, it must also consider the potential impact of the evolving SDC global landscape, including the possible geopolitical and regulatory implications. This Part addresses some of these concerns. Although the United States is not as close as others to issuing an SDC,[313] it is among the most important players in the international financial system. Retaining this leadership role will require successfully grappling with the emerging international SDC order and related regulatory developments. While developing countries may be concerned with bringing financial stability to their countries' currencies

309. Megan Leonhardt, *7.1 Million American Households Didn't Have a Bank Account Last Year—The Lowest Rate Since 2009*, CNBC (Oct. 19, 2020), https://www.cnbc.com/2020/10/19/7point1-million-american-households-didnt-have-a-bank-account-last-year.html.

310. Laurence Fletcher, *Hedge Funds Expect to Hold 7% of Assets in Crypto Within Five Years*, FIN. TIMES (June 15, 2021), https://www.ft.com/content/4f8044bf-8f0f-46b4-9fb7-6d0eba723017.

311. *See generally* Dong He, *Monetary Effects of Global Stablecoins*, 41 CATO J. 353 (2021), https://www.cato.org/cato-journal/spring/summer-2021/monetary-effects-global-stablecoins#adoption-use-scenarios; *see also* Schwarcz, *supra* note 143 (manuscript at 1) ("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.").

312. Lee, *supra* note 126.

313. *See, e.g.*, Dinesh Unnikrishnan, *Explained: India Inches Closer to Launching a Digital Currency; 5 Key Points*, MONEY CONTROL (Feb. 24, 2021), https://www.moneycontrol.com/news/business/explained-india-inches-closer-to-launching-a-digital-currency-5-key-points-6568201.html.

and providing access to the unbanked,[314] developed countries, especially ones with large populations, may be more concerned about scalability and security, preferring an indirect two-tier system to prevent the disintermediation of banks.[315] This Part first analyzes whether there is a geopolitical first mover advantage in SDC issuance. It then discusses potential threats to the United States' status as a reserve currency for international transactions. Finally, it addresses the future of money alternatives.

A. *Potential First-Mover Advantage*

The first-mover advantage is the theory that the first to enter a market will obtain a competitive advantage over later entrants into the market.[316] However, there are many complex factors that play into a firm's ability to maintain this advantage, if any, over time.[317] Although many jurisdictions are actively exploring their own SDCs, the Fed does not consider this to be a race.[318] Some have noted, nonetheless, that as a first-mover, China could have the ability to influence international token standards and DLT platform choices, increasing its influence in the global financial system.[319]

In fact, China has already begun working with the BIS, and the central banks of Hong Kong, Thailand and the United Arab Emirates on developing standards for the international

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314. *See id.* ("RBI is working on procedural issues to launch its digital currency. . . ."); *see also Reserve Bank of India Cautions on Central Bank Digital Currencies*, PYMNTS (Mar. 3, 2021), https://www.pymnts.com/digital-payments/2021/reserve-bank-of-india-cautions-on-cbdc/ (reporting that the attractiveness of CBDC comes from both "its digital features and its sovereign liability," the latter of which is one of the concerns RBI has with cryptocurrencies, and stating that a digital rupee could "foster financial inclusion" since the use of physical cash decreases).

315. FANUSIE & JIN, *supra* note 201, at 8 (stating that China's CBDC structure is intended to be a two-tier system permitting banks to remain intermediaries).

316. Marvin B. Lieberman & David B. Montgomery, *First-Mover Advantages*, 9 STRATEGIC MGMT. J. 41, 41 (1988).

317. Roger A. Kerin et al., *First-Mover Advantage: A Synthesis, Conceptual Framework, and Research Propositions*, 56 J. MKTG. 33, 33 (1992).

318. Emily Parker, *U.S. Dollar at Risk as China Races Ahead on Digital Yuan*, POLITICO (Apr. 1, 2021), https://www.politico.com/newsletters/politico-china-watcher/2021/04/01/us-dollar-at-risk-as-china-moves-on-digital-yuan-492315.

319. FANUSIE & JIN, *supra* note 201, at 5, 8 & 14.

use of digital currencies.[320] One concern, noted by VoxEU, is that the issuance of an SDC by a domestic economy can threaten the monetary policy autonomy of a foreign economy because the latter will be forced to be "twice as. . . reactive to inflation and output by the presence of [the foreign SDC]."[321] Although China currently appears to be motivated more by domestic matters in issuing its SDC,[322] with time, the digital yuan could eventually reach foreign systems and possibly serve as an alternative to the U.S. dollar.[323] Factors that could help internationalize the digital yuan include the 39 million overseas Chinese that could use the SDC, as well as the integration of the digital yuan into apps like TikTok and other platforms or video games.[324] On the other hand, Agustín Carstens, the General Manager for the BIS, states that any "first-mover advantage" in issuing an SDC is overblown, arguing that SDC's digital nature alone would not be enough to give an advantage in a geopolitical reserve conflict.[325] In fact, there could actually be a "second mover" advantage as later entrants would be able to learn from the first mover's faults and difficulties.[326]

However, scholars in the first-mover advantage debate may be getting the players wrong. The issue might not involve which *country* issues an SDC, but rather which *digital currency* is the first to become the most widely embraced internationally.

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320. James T. Areddy, *China Creates Its Own Digital Currency, a First for a Major Economy*, WALL ST. J. (Apr. 5, 2021), https://www.wsj.com/articles/china-creates-its-own-digital-currency-a-first-for-major-economy-11617634118.

321. Massimo Ferrari et al., *The International Dimension of a Central Bank Digital Currency*, VOXEU (Oct. 12, 2020), https://voxeu.org/article/international-dimension-central-bank-digital-currency.

322. Chorzempa, *supra* note 156, at 111.

323. *See* Dirk A. Zetzsche et al., *Sovereign Digital Currencies: The Future of Money and Payments?* (Univ. of H.K. Fac. of L. Rsch., Paper No. 2020/053, 2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3714386.

324. Gordon Chang, *Will China's Digital Yuan Replace the Dollar?*, NEWSWEEK OP. (Oct. 29, 2020), https://www.newsweek.com/will-chinas-digital-yuan-replace-dollar-opinion-1543071#:~:text=China%20will%20almost%20certainly%20be,as%20the%20world's%20reserve%20currency.&text=%22They%20can%20make%20DCEP%20become,international%20currency%2C%22%20Guo%20says.

325. Danny Nelson, *Digital Yuan Won't Give China 'First-Mover Advantage' With CBDCs, BIS Chief Says*, COINDESK (Mar. 31, 2021), https://www.coindesk.com/cbdc-first-mover-agustin-carstens.

326. *See id.*

If, for example, Silvergate Capital, the international payment services company that purchased the Diem Association's assets and technology,[327] were to issue its own stablecoin (as they intend to do)[328] that becomes widely used around the world, this could result in a network effect crowding out later digital currencies, including a potential U.S. SDC.[329] It is well-established that currency is particularly vulnerable to the network effect. Silvergate "is the banking partner of the majority of the world's digital asset exchanges."[330] Although they are not a household name (like Facebook—now known as Meta), they are well-known in the crypto industry due to their early entry into the crypto banking market, providing them with a first mover advantages in this area.[331] If they become the "first real, FDIC-insured bank" to issue a stablecoin, they can distinguish themselves from other stablecoins issued by private organizations.[332] It is too early to say, however, whether their potential stablecoin will "become an instant 'medium of exchange' in large parts of the world," as the Diem was expected to due to the high number of individual active Facebook users.[333]

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327. *Diem*, SILVERGATE, https://www.silvergate.com/solutions/digital-currency/diem.html (last visited Feb. 25, 2022). Note that Silvergate Capital is the parent company of Silvergate Bank.

328. Penny Crossman, *The Road Ahead for Meta's Diem under Silvergate Bank's Ownership*, AM. BANKER (Feb. 7, 2022), https://www.americanbanker.com/news/the-road-ahead-for-metas-diem-under-silvergate-banks-ownership.

329. The network effect states that the benefit derived from a good increases as the number of consumers adopting the good increases. This increase in the network of users creates a positive feedback loop, bringing in even more users. Switching to a different product is costly. Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 AM. ECON. REV. 424, 424 (1985).

330. Sam Reynolds, *Silvergate Beats Earnings, SEN Volume Up Nearly 1,000% On-Year*, BLOCKWORKS (July 20, 2021), https://blockworks.co/silvergate-beats-earnings-sen-volume-up-nearly-1000-on-year/.

331. Because Silvergate already provides banking to more than 1,300 cryptocurrency and blockchain clients, it could scale up fairly quickly. *In Buying Diem's Stablecoin, Silvergate Bank Makes Itself a Contender*, PYMNTS.COM (Feb. 2, 2022), https://www.pymnts.com/cryptocurrency/2022/in-buying-diems-stablecoin-silvergate-bank-makes-itself-a-contender/.

332. *Id.*

333. Dmitry Tokarev, *Facebook's Diem Stablecoin is an Existential Threat to Traditional Banking*, COINTELEGRAPH (Dec. 5, 2020), https://cointelegraph.com/news/facebook-s-diem-stablecoin-is-an-existential-threat-to-traditional-banking.

Regardless of who issues the first global digital currency, be it a governmental entity or a private entity, the network effect is a significant concern. The greater the number of people who use a specific digital currency, the number of merchants who will accept that digital currency increases, leading to a strong network of users of that digital currency crowding out later entrants.[334]

B. *Impact on Reserve Currency*

Like its long-term plan to be a leader in artificial intelligence, China is also pursuing a path to become a global leader in FinTech.[335] There are a number of reasons why China moved quickly to be the first major economy to issue an SDC. First, private mobile payment systems in China have an oversized impact on retail commerce.[336] The digital yuan could serve as a counter against payment services like Alipay in an effort to reassert the supremacy of China's currency.[337] Second, a digital yuan also could provide great insight into the spending habits of Chinese citizens.[338] Third, a digital yuan could allow for easier cross-border trade.[339] Fourth, and perhaps, most importantly, the digital yuan is part of China's strategy to become more influential on the world stage.[340] Given the inconsistency in leadership in the United States, and previ-

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334. Scholar Mikael Stenkula states,

> What Menger actually is saying is that the more people who use and demand a specific asset, the more marketable it will be. The more marketable it is, the better this good will work in indirect exchange and ultimately as money, i.e. the higher utility this asset will have when working as a means of payment. And this is the core idea behind the network concept of money.

Mikael Stenkula, *Carl Menger and the Network Theory of Money*, 10 THE EUROPEAN J. HIST. ECON. THOUGHT 587, 593 (2003).

335. FANUSIE & JIN, *supra* note 201, at 11.

336. *Id.* at 1.

337. *See id.* at 4 & 9; *see also* Zennon Kapron, *China's Central Bank Digital Currency Will Strengthen Alipay And WeChat Pay, Not Replace Them*, FORBES (May 24, 2020), https://www.forbes.com/sites/zennonkapron/2020/05/24/chinas-central-bank-digital-currency-will-strengthen-alipay-and-wechat-pay-not-replace-them/?sh=2ecda5646b69 (however, some have suggested that WeChat Pay and Alipay will serve to facilitate CBDC transactions).

338. FANUSIE & JIN, *supra* note 201, at 3.

339. *Id.* at 13.

340. *Id.* at 3.

ous efforts by the U.S. government to thwart China's growing international relationships as part of its Belts and Roads Initiative,[341] China may be seeking to hedge against potential U.S. efforts to ban China from SWIFT, which provides most international banking transfers.[342] Because the U.S. dollar is used by more than 21,000 banks worldwide, the United States has the ability to penalize countries by blocking U.S. banks from doing business with them.[343] These sanctions would have less of an impact if these countries could conduct international transactions outside of the United States' influence by using the digital yuan.[344]

Others have argued that China is pursuing a strategy to reduce the influence of the U.S. dollar as the currency of international trade. According to the BIS, the U.S. dollar accounts for 88% of all transactions in contrast to China's 4% yuan.[345] Since the yuan became a reserve currency in 2015, China's exports have become more competitive against dollar prices around the world, allowing China's share of international trade and GDP to grow to 10%.[346] In addition, trading yuan on foreign markets has become easier since China has backed the Renminbi Trading Hub for the Americas, Singapore, and London.[347] These hubs allow lower costs for companies trading with China.[348] Consequently, the digital yuan could deny the United States the privileges it receives from being the world's global reserve currency (such as borrowing

341. Kimberly A. Houser, *The Innovation Winter Is Coming: How the U.S.-China Trade War Endangers the World*, 57 SAN DIEGO L. REV. 549, 560–61 (2020).

342. Rajesh Bansal & Somya Singh, *China's Digital Yuan: An Alternative to the Dollar-Dominated Financial System*, CARNEGIE INDIA (Aug. 31, 2021), https://carnegieindia.org/2021/08/31/china-s-digital-yuan-alternative-to-dollar-dominated-financial-system-pub-85203.

343. Areddy, *supra* note 320 (for example, the United States has imposed sanctions on North Korea, Iran, and Myanmar).

344. *Id.*

345. Laura He, *China Wants to Weaponize its Currency. A Digital Version Could Help*, CNN (Dec. 5, 2020), https://edition.cnn.com/2020/12/04/economy/china-digital-yuan-currency-intl-hnk.

346. Kimberly Amadeo, *How the Yuan Could Become a Global Currency*, THE BALANCE, https://www.thebalance.com/yuan-reserve-currency-to-global-currency-3970465 (last modified May 29, 2021).

347. *Id.*

348. *Id.*

at lower interest rates and greater buying power),[349] as well as reduce the United States' ability to impose financial sanctions.[350] In fact, once the digital yuan can be used in foreign transactions, it is possible that the digital yuan could denominate all trade with China, thereby increasing the importance of China's currency in the world economy.[351]

With the U.S. debt level currently at 127% of gross domestic product (and projected to be 277% by 2029)[352] there is some speculation that the dollar's reign as the world's reserve currency may come to an end if confidence dwindles that this debt will be paid.[353] However, it is not clear how the further digitization of a currency—"all of which are already highly digitized in our current international banking system in the same way the dollar is and yet which do not pose a significant challenge to the international role of the dollar"[354]—would impact the dollar's reserve status.[355] Its reserve currency status primarily rests upon considerations such as economic strength, trade relationships, the rule of law, robust financial markets, monetary power, currency stability, and ease of conversion.[356] Further, although China is ahead in development, it has also prioritized domestic financial stability over making a digital yuan usable abroad, which would seem to question reports that they are trying to replace the U.S. dollar as the world's reserve cur-

349. Jacob Eigner, *Policy Brief: How Digitizing the Dollar Can Help Keep the US Reserve Currency Status*, GEO. L. (Mar. 1, 2021), https://www.law.georgetown.edu/iiel/research/iiel-blog/how-digitizing-the-dollar-can-help-keep-the-u-s-status-quo/.

350. Zetzsche et al., *supra* note 323, at 6.

351. *Id.* at 7.

352. Mike Patton, *U.S. National Debt Expected to Approach $89 Trillion by 2029*, FORBES (May 3, 2021), https://www.forbes.com/sites/mikepatton/2021/05/03/us-national-debt-expected-to-approach-89-trillion-by-2029/?sh=3117dca25f13.

353. Ruchir Sharma, *The Dollar has had a 100-year Run as the World's Reserve Currency. But a new Class of Contenders is Emerging*, FIN. POST, https://financialpost.com/financial-times/the-dollar-has-had-a-100-year-run-as-the-worlds-reserve-currency-but-a-new-class-of-contenders-is-emerging (last updated Apr. 7, 2021).

354. *See* Quarles, *supra* note 1.

355. *Id.*

356. *See id.*

rency.[357] Before the yuan could become the world's leading reserve currency, it must have more than the trade benefits mentioned above.[358] First, the People's Bank of China must allow free trade of the yuan and must become more transparent with its monetary policies.[359] Second, the yuan needs to acquire the reputation of stability akin to the dollar, which is backed by the enormity of the U.S. Treasury.[360] Third, central banks around the world must also increase their reserves of yuan to about $700 billion.[361] Economist Eswar Prasad argues that China lacks the institutional environment, including an independent central bank, the rule of law, and checks and balances, to overtake the United States as an international reserve currency.[362]

Martin Chorzempa with the Peterson Institute for International Economics argues that while China has sufficient economic weight to have a global reserve currency, the country may lack an openness and depth of financial markets.[363] In other words, China's priority of domestic financial stability could slow down the internationalization of the digital yuan.[364] Second, the digital yuan is a direct CBDC rather than an indirect CBDC, thus losing the advantage of being able to function as infrastructure for global payments and large-scale transactions.[365] Last, Chorzempa argues that even if the digital yuan expands outside the mainland, other countries may be less willing to use it if China is able to track and see every digital yuan transaction, a security and surveillance concern.[366]

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357. Arjun Kharpal, *China has Given Away Millions in its Digital Yuan Trials. This is How it Works*, CNBC (Mar. 4, 2021), https://www.cnbc.com/2021/03/05/chinas-digital-yuan-what-is-it-and-how-does-it-work.html.

358. Chorzempa, *supra* note 156, at 112.

359. Amadeo, *supra* note 346.

360. *Id.*

361. *Id.*

362. *See* ESWAR S. PRASAD, THE FUTURE OF MONEY: HOW THE DIGITAL REVOLUTION IS TRANSFORMING CURRENCIES AND FINANCE 299 (Harvard Univ. Press 2021).

363. Chorzempa, *supra* note 156, at 111.

364. *See id.*

365. *Id.*

366. *Id.*, at 112.

Of course, the digital yuan is not the only contender to become the world's reserve currency.[367] The euro amounts to almost 20% of the world's currency reserves, and the Japanese yen and the United Kingdom sterling together make up another 20%.[368] Cryptocurrencies were once thought to pose a threat to the United States' status as a global reserve currency as having the advantage of being operated on P2P networks that are not governed by any state,[369] but this is unlikely due to cryptocurrencies' high volatility.[370]

C. *Future of Money Alternatives*

Although SDCs can coexist with other forms of money, they could also be designed to actually replace private digital payment systems, physical money, or even the need for a bank account. Some countries have already outlawed cryptocurrencies in anticipation of issuing their own SDCs, indicating that these cryptocurrencies are not scalable, secure, or anonymous because of the use of digital wallets.[371] Indeed, China's central bank is encouraging banks to "crack down" on cryptocurrency.[372] The Reserve Bank of India has also taken similar steps—simultaneously moving forward with develop-

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367. Jacob Eigner, *Policy Brief: How Digitizing the Dollar Can Help Keep the US Reserve Currency Status*, GEO. L (Mar. 1, 2021), https://www.law.georgetown.edu/iiel/research/iiel-blog/how-digitizing-the-dollar-can-help-keep-the-u-s-status-quo/.

368. *Id.*

369. *See* Sharma, *supra* note 353.

370. Sayuri Shirai, *Money and Central Bank Digital Currency* 1 (Asian Dev. Bank Inst., Working Paper No. 922, 2019), https://www.adb.org/publications/money-and-central-bank-digital-currency. Central banks in developing countries are the ones most at risk from cryptocurrencies, especially stablecoins. INT'L MONETARY FUND, COVID-19, CRYPTO, AND CLIMATE: NAVIGATING CHALLENGING TRANSITIONS 44 (2021), https://www.elibrary.imf.org/view/books/082/465808-9781513595603-en/ch002.xml.

371. Leila Stein, *These Countries Banned Cryptocurrencies, Here's Why*, BEINCRYPTO (Apr. 22, 2021), https://beincrypto.com/these-countries-banned-crypto-heres-why/.

372. Ryan Browne, *China's Central Bank Urges Alipay and Banks to Crack down on Crypto Speculation*, CNBC (June 21, 2021), https://www.cnbc.com/2021/06/21/china-central-bank-urges-alipay-banks-to-crack-down-on-crypto.html.

ment and issuance of a digital rupee while proposing laws that will outlaw Bitcoin and other cryptocurrencies.[373]

In the United States, however, a ban of cryptocurrencies is unlikely,[374] but there has been a call for increased regulation.[375] Janet Yellen, U.S. Secretary of the Treasury, stated that she intends to work with the Federal Reserve on a legal framework in response to the risks of cryptocurrencies, such as financing terrorism, money laundering, and the threat to the "integrity of the U.S. and international financial systems."[376] The same call for regulation has been made by the ECB, noting that cryptocurrencies like Bitcoin need to be regulated at an international level.[377] Of course, the ECB also aims to issue its own SDC within five years.[378]

However, the real threat does not come from cryptocurrencies, but rather stablecoins as discussed *supra*. The idea of competing currencies is important here. The main ingredient to a dominant currency is trust.[379] The U.S. dollar serves as a reserve currency because of the trust in its backing by the U.S. government. The reason a global stablecoin is the real threat to sovereign currencies is that the network effect could multiply its influence. If trust in the government's ability to manage

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373. Manu Joseph, *Governments Will Eventually Defeat* Cryptocurrencies, MINT (Feb. 15, 2021), https://www.livemint.com/opinion/columns/governments-will-eventually-defeat-cryptocurrencies-11613317872625.html.

374. However, Chair Powell has stated that were the United States to have a CBDC, cryptocurrencies and stablecoins would be unnecessary. Lee, *supra* note 126. Yet it is also possible that a U.S. CBDC would increase the popularity of cryptocurrencies, especially were cash to be phased out, as distrust of government monetary regimes has been one motivation behind the development of cryptocurrencies.

375. Scott Reeves, *India Drafts Bill to Create Government Cryptocurrency, Ban Private Cryptocurrencies, with Exceptions*, NEWSWEEK (Feb. 3, 2021), https://www.newsweek.com/india-drafts-bill-create-government-cryptocurrency-ban-private-cryptocurrencies-exceptions-1566558.

376. Scott Reeves, *Treasury Secretary Nominee Janet Yellen Touts Crypto 'Benefits,' with Regulation*, NEWSWEEK (Jan. 25, 2021), https://www.newsweek.com/treasury-secretary-nominee-janet-yellen-touts-crypto-benefits-regulation-1564197.

377. Tanzeel Akhtar, *ECB's Christine Lagarde Says 'Speculative' Bitcoin Needs Global Regulation*, COINDESK (Jan. 13, 2021), https://www.coindesk.com/policy/2021/01/13/ecbs-christine-lagarde-says-speculative-bitcoin-needs-global-regulation/.

378. *Id.*

379. *See* F.A. HAYEK, DENATIONALISATION OF MONEY 85 (Inst. of Econ. Affairs 1976).

inflation decreases and the value of the U.S. dollar in terms of foreign exchange decreases, the public could begin to trust a global stablecoin more. A number of economists have advocated for an unregulated banking framework[380] and competing currencies[381] for this very reason.[382] However, this issue is not clear cut. As behavioral economists explain, a digital dollar may not equal a paper currency dollar in terms of *perception*. With respect to a stablecoin issued by a large tech company, the trust needed for widespread adoption may not be present. Similarly, there are many who currently do not trust digital money and may be reluctant to adopt an SDC preferring the use of cash or their bank account.[383] For any form of money to be successful, it must serve as a medium of exchange, a unit of measure and a store of value. If a new form of digital currency is not widely accepted, be it an SDC or a global stablecoin, it cannot meet the functional requirements of money.

CONCLUSION

As technology advances and money continues to evolve there will always be concerns regarding its impact on the U.S. monetary system. Due to their volatility, non-asset backed cryptocurrencies do not make for good money. As such, the worries about cryptocurrencies replacing the dollar are overblown. However, stablecoins present a different issue. Even if not legal tender, they can be tied to a specific asset or basket of assets and function as money. Regulators have come to realize

380. "Larry [White], George [Selgin], and I [Jeffrey Rogers Hummel] line up on one side, concluding that fractional-reserve banking, if unregulated and unsubsidized, provides important monetary and economic benefits that far outweigh any potential downside." *The Conversation*, ONLINE LIBR. OF LIBERTY, https://oll.libertyfund.org/page/liberty-matters-lawrence-white-mises-theory-of-money-credit#conversation1 (last visited Feb. 25, 2022).

381. Ametrano, *supra* note 34, at 23–24.

382. *See generally* Vasundhara Sharma et al., In Cryptocurrencies We Trust: An Empirical Analysis of Bitcoin Demand and Price (Apr. 19, 2019) (unpublished manuscript), https://ssrn.com/abstract=3381067 (analyzing the cryptocurrency market in connection with unregulated banking and competing currencies).

383. A Pew survey notes that nearly 30% of Americans avoid mobile payments due to a fear of loss of funds, preferring credit and debit cards. *Are Americans Embracing Mobile Payments?*, PEW (Oct. 3, 2019), https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2019/10/are-americans-embracing-mobile-payments.

that they must adopt a legal framework to not only protect the public against the risks presented by insufficiently backed stablecoins, but to also hold the issuers of stablecoins to the same standards as other regulated entities.

The greatest risk to the establishment of an SDC to serve as money, however, would be the rise of a global stablecoin. Due to network effects, if a global stablecoin were to become widely used prior to the issuance of an SDC by the United States, this could have real repercussions for the ability of the Fed to implement monetary policy and maintain financial stability. The decision to issue an SDC and what form and design it should take is incredibly complicated. Were one to be issued, the most likely choice would be a sCBDC as it would offer the easiest transition and permit the Fed and private industry to leverage their competitive advantages, monetary policy, and technical innovation.

As Menger first discovered, to constitute money the token must have super saleability.[384] People have to be willing to accept it in exchange for goods or services. There has to be trust in it, regardless of form. If the Fed were to provide stablecoin issuers access to central bank reserves, this type of public–private partnership might create the type of trust and adoption that could reduce the potential for a private global stablecoin to upset the international banking system. While parachute pants may have come and gone in a split second, it is likely that the debate around SDCs will continue for many years to come.

384. MENGER, *supra* note 16, at 35.