

United States House of Representatives
Committee on Financial Services
2129 Rayburn House Office Building
Washington, D.C. 20515

June 10, 2021

Memorandum

To: Members, Committee on Financial Services
From: FSC Majority Staff
Subject: June 15, 2021, “Digitizing the Dollar: Investigating the Technological Infrastructure, Privacy, and Financial Inclusion Implications of Central Bank Digital Currencies.”

The Task Force on Financial Technology will hold a hearing entitled, “Digitizing the Dollar: Investigating the Technological Infrastructure, Privacy, and Financial Inclusion Implications of Central Bank Digital Currencies” on June 15, 2021 at 10:00 a.m. ET, on the virtual meeting platform Cisco Webex. The single-panel hearing will have following witnesses:

- **Mrs. Carmelle Cadet**, Founder and CEO, EMTECH
- **Mr. Jonathan Dharmapalan**, Founder and CEO, eCurrency
- **Mr. Rohan Grey**, Assistant Professor of Law, Willamette University
- **Dr. Neha Narula**, Director of the Digital Currency Initiative, MIT Media Lab
- **Dr. Jenny Gesley**, Foreign Law Specialist, Library of Congress

Overview

Traditional electronic payment systems are electronic representations of fiat currency and require a network of financial intermediaries who maintain accurate ledgers. Since 2008, a new digital asset class that uses cryptography and distributed ledger technology (DLT) has gained prominence and value in the global economy.¹ These digital assets, often called cryptocurrencies, usually require no centralized intermediary to buy, sell, or exchange since the ledgers are public, mathematically verified, and stored on a distributed network of computers.² However, the rise of decentralized cryptocurrencies and private digital currencies has helped spur debate around the concept of a central bank digital currency (CBDC), which would be issued by a government’s central bank – such as the Federal Reserve System (Fed) – and would replicate some features of cryptocurrencies. A CBDC is generally considered a digital payment instrument that is a direct liability of a central bank, but since implementation is, by definition, left to each sovereign state, CBDC designs will inevitably vary.³

In response to rapid innovation in digital assets across the globe, the Fed, the central banking system of the U.S., has shown greater involvement and interest over the past several years, as demonstrated by the launch of a multi-year collaboration between the Boston Fed and MIT to

¹ See CRS, [Financial Innovation: "Cryptocurrencies"](#) (Feb. 7, 2018).

² Congressional Research Service (CRS), [Cryptocurrency: The Economics of Money and Selected Policy Issues](#) (Apr. 9, 2020).

³ The Bank for International Settlements (BIS), [Central bank digital currencies](#) (Mar. 2018). BIS is an international financial institution founded in 1930 and composed of 62 central banks, including the U.S. Federal Reserve.

code and test a hypothetical CBDC.⁴ This hearing will explore CBDC’s potential design trade-offs of various technological infrastructures and examine consumer privacy implications and the potential for increased financial inclusion.

Current State of CBDCs in the U.S.

The Fed has played a lead role in the research of a potential U.S.-issued CBDC. Fed Governor Lael Brainard credits four growing developments with CBDCs: “the growing role of digital private money, the migration to digital payments, plans for the use of foreign CBDCs in cross-border payments, and concerns about financial exclusion.”⁵ Although in late 2019, the Fed stated that it was not developing a CBDC but would be analyzing potential benefits and costs as well as legal issues,⁶ by August 2020, the Fed announced two initiatives to explore the technical challenges of supporting a CBDC.⁷

Project Hamilton, announced in 2020, is a multi-year collaboration between the Federal Reserve Bank of Boston and the Massachusetts Institute of Technology to code and test new technologies that could support the speed, security, privacy, and resiliency required of a hypothetical CBDC.⁸ Project Hamilton plans to release a white paper update in the third quarter of 2021 on any hypothetical digital currency platform, with any computer code utilized in the research to be released under an open source license.⁹ This open source license will allow the public to engage, review, and modify the experimental research software used in creating a possible CBDC. This research will also include a comparative analysis of existing and developmental private-sector and open source platforms.¹⁰

The second initiative directs the Fed’s Technology Lab, a multidisciplinary team who are experts in payments, economics, law, information technology, and computer science, to explore CBDC policy issues.¹¹ Additionally, Fed Chair Jerome Powell announced in May 2021 that the Fed plans to publish a discussion paper for public comment in summer 2021 focused on CBDC benefits and risks.¹² In his announcement, Chair Powell made clear that “any potential CBDC could serve as a complement to, and not a replacement of, cash and current private-sector digital forms of the dollar, such as deposits at commercial banks.”¹³

⁴ See CoinDesk, [Jerome Powell on CBDCs: ‘We Don’t Feel a Need to Be First’](#) (Jan. 14, 2021).

⁵ Federal Reserve Governor Lael Brainard’s Speech at the Consensus by CoinDesk 2021 Conference, [Private Money and Central Bank Money as Payments Go Digital: an Update on CBDCs](#) (May 24, 2021).

⁶ Wall Street Journal, [Powell Says Fed Has No Plans to Create Digital Currency](#), (Nov. 21, 2019).

⁷ Federal Reserve Bank of Boston, [The Federal Reserve Bank of Boston announces collaboration with MIT to research digital currency](#) (Aug. 13, 2020).

⁸ Federal Reserve Bank of Boston, [Boston Fed’s digital dollar research project honors 2 Hamiltons, Alexander and Margaret](#) (Feb. 25, 2021).

⁹ Eric S. Rosengren’s Remarks, [Central Bank Perspectives on Central Bank Digital Currencies](#) (May 12, 2021).

¹⁰ *Id.*

¹¹ Federal Reserve, [Federal Reserve highlights research and experimentation undertaken to enhance its understanding of the opportunities and risks associated with central bank digital currencies](#) (Aug. 13, 2020).

¹² Federal Reserve, [Federal Reserve Chair Jerome H. Powell outlines the Federal Reserve’s response to technological advances driving rapid change in the global payments landscape](#) (May 20, 2021). Also see Federal Reserve, [Preconditions for a general-purpose central bank digital currency](#), (Feb. 24, 2021).

¹³ *Id.*

Current State of CBDCs in the Global Context

Many governments are researching, testing, preparing to launch, or have launched pilot CBDCs.¹⁴ While China was one of the first large markets to formally start investigating CBDCs in 2014, after private companies such as Facebook proposed their own stablecoins (a type of cryptocurrency pegged to fiat currencies),¹⁵ several central banks have taken action.¹⁶ In December 2020, a group of central banks published a joint report that offered common foundational principles and core features of a CBDC.¹⁷ In 2020, 86 percent of central banks surveyed by the Bank for International Settlements (BIS) were engaging in research, experiments, or development work related to the development and use of CBDC.¹⁸ However, 60 percent replied that they were unlikely to issue a CBDC in the next six years.¹⁹

The first nationwide CBDC in use is the Sand Dollar, issued by the Central Bank of the Bahamas in October 2020.²⁰ The Sand Dollar is a smartphone-based solution that is backed 1:1 to the Bahamian dollar, which, in turn is pegged to the U.S. dollar.²¹ China's digital yuan has been in development for seven years and is currently being tested in four cities.²² Examples of other markets that have announced or are currently conducting CBDC tests include the Eastern Caribbean Currency Union,²³ Hong Kong, Sweden, and Japan.²⁴

CBDC Custody and Payment Infrastructure

Digital and electronic payments of dollars are already ubiquitous in the U.S. financial system. Real-time payments (i.e., instantaneous settlement) are not widespread, but may eventually become more widespread after the Fed introduces FedNow, which is a new, real-time payment service with an expected launch date of 2023.²⁵ As the Fed continues its development of FedNow, it remains to be seen how it will involve CBDCs into its ecosystem. Fed Governor Lael Brainard has stated, “[o]ne expected benefit is that a CBDC would reduce or even eliminate operational and financial inefficiencies, or other frictions, in payments, clearing, and settlement...Most immediately, we are taking a critical step to build a strong foundation with the introduction of the FedNow.”²⁶

¹⁴ See Atlantic Council, [The Rise of Central Bank Digital Currencies](#) (Apr. 20, 2021).

¹⁵ See Financial Services Committee hearing, [Examining Facebook's Proposed Cryptocurrency and Its Impact on Consumers, Investors, and the American Financial System](#) (Jul. 17, 2019); and Financial Services Committee hearing, [An Examination of Facebook and Its Impact on the Financial Services and Housing Sectors](#) (Oct. 23, 2019).

¹⁶ See e.g. Politico, [Fear of Facebook spurs momentum for Fed to build its own digital currency](#) (Nov. 15, 2019). See also TechCrunch, [Facebook announces Libra cryptocurrency: All you need to know](#) (Jun. 18, 2019).

¹⁷ The Bank for International Settlements (BIS), Bank of Canada, European Central Bank, Bank of Japan, Sveriges Riksbank, Swiss National Bank, Bank of England, and Board of Governors of the Federal Reserve, [Central bank digital currencies: foundational principles and core features](#) (Oct. 9, 2020).

¹⁸ BIS, [Ready, steady, go? – Results of the third BIS survey on central bank digital currency](#) (Jan. 2020).

¹⁹ *Id.*

²⁰ Forbes, [Central Bank Digital Currency: The First Nationwide CBDC In The World Has Been Launched By The Bahamas](#) (Oct. 21, 2020).

²¹ *Id.*

²² Reuters, [China to expand digital yuan experiments - central bank vice governor](#) (Apr. 18, 2021).

²³ Eastern Caribbean Central Bank, [What You Should Know](#) (last accessed June 5, 2021).

²⁴ American Banker, [A tour of 10 nations' digital currency projects](#) (Jun. 3, 2021).

²⁵ See Federal Reserve, [Federal Reserve updates FedNow Service launch to 2023](#) (Feb. 2, 2021). See also CRS, [U.S. Payment System Policy Issues: Faster Payments and Innovation](#) (Sep. 23, 2019), and Financial Services Committee, [The Future of Real-Time Payments](#) (Sep. 26, 2019).

²⁶ Governor Lael Brainard's Speech at the Consensus by CoinDesk 2021 Conference, [Private Money and Central Bank Money as Payments Go Digital: an Update on CBDCs](#) (May 24, 2021).

The custody infrastructure of a CBDC – how users will store and transfer digital assets – will largely depend on the chosen end user. Three distinct scenarios have been discussed by technologists at length: 1) a CBDC used only by banks and similar financial institutions that currently clear and settle digital payments through accounts held at the Fed; 2) a CBDC held and exchanged by both financial institutions but also other nonbank financial intermediaries; and, 3) a CBDC held and used by retail consumers. In the first and second scenarios, a CBDC used exclusively by banks and nonbank financial firms may result in little change for consumers.²⁷ In the third scenario, a CBDC accessible by retail consumers may deviate substantially from the status quo, depending on the institutions chosen to store the CBDC. However, a CBDC design could integrate other proposals related to “FedAccounts,” potentially expanding financial inclusion to more consumers.²⁸ Researchers at BIS have mapped what they consider needs for a CBDC adoption by retail consumers to CBDC design choices in Figure 1 of the [Appendix](#).

Some CBDC proponents have asserted that a payment system that integrates CBDCs would be more efficient, less costly, and allow for faster payments.²⁹ However, if governments developing CBDCs choose to mimic the technology of private digital currencies, this could result in new payments systems that are structurally very different than how current systems work. Proposals vary to the extent that a CBDC would use existing cryptocurrency technologies in its architecture. One of the key technological decisions to be made for implementing a CBDC is the choice between conventional centralized ledgers, the backbone of the current financial system, or distributed ledger technology (DLT), potentially with vetted validators, often associated with cryptocurrencies.³⁰ While cryptographic confirmation of transactions on DLT is often touted for its pseudonymity³¹ and potential to make systems more efficient and lower costs,³² a CBDC system where all financial transactions run through a single DLT system may be infeasible.³³ Should the designers of a CBDC opt for a distributed ledger approach, potential climate impact and stress on energy grids should be considered during implementation. Bitcoin, the most widely used cryptocurrency,³⁴ has been criticized for using “more energy than Argentina.”³⁵

The method of authentication for users is an additional design choice for CBDC developers. Currently, access to the traditional financial system relies on consumers verifying their identity with a driver’s license or similar forms of identification. However, access to cryptocurrencies has no such identification component and is available to anyone with general computing resources.³⁶ A CBDC could use either of these methods or a novel combination of the two. A depiction of various ledger and access technology combinations can be seen in Figure 2 of the [Appendix](#).

²⁷ Federal Reserve, [Tokens And Accounts In The Context Of Digital Currencies](#) (Dec. 23, 2020).

²⁸ Financial Services Committee, [Inclusive Banking During a Pandemic: Using FedAccounts and Digital Tools to Improve Delivery of Stimulus Payments](#) (Jun. 11, 2020).

²⁹ Time Magazine, [Cryptocurrency Will Replace National Currencies By 2030 According to This Futurist](#) (Mar. 1, 2018).

³⁰ BIS, [The technology of retail central bank digital currency](#) (Mar. 1, 2020).

³¹ Bloomberg Opinion, [Bitcoin and the Value of Financial Freedom](#) (Dec. 20, 2017).

³² BIS, [The technology of retail central bank digital currency](#) (Mar. 1, 2020).

³³ *Id.*

³⁴ CoinMarketCap, <https://coinmarketcap.com/currencies/bitcoin/> (Accessed June 9, 2021).

³⁵ BBC, [Bitcoin consumes 'more electricity than Argentina'](#) (Feb. 10, 2021)

³⁶ Coinbase, [What is a Private Key?](#) (last accessed Jun. 5, 2021).

Consumer Privacy Implications of CBDCs

Cash and some cryptocurrencies can provide users with the ability to make transactions and store wealth anonymously or pseudonymously, aiding in consumer privacy but possibly allowing greater illicit financial activity. As CBDCs may be used as a substitute for cash, cryptocurrency, and digital payments, CBDC developers would have to consider the appropriate privacy settings for transactions, including cross-border payments. Were individuals allowed to have accounts or digital wallets directly with the Fed to access CBDC, anonymity (as offered by cash) would be unlikely. But total anonymity is not a feature of traditional payment systems either—financial institutions must comply with anti-money laundering and bank secrecy laws. In April 2021, Chair Powell stated that a CBDC similar to that planned in China, which is not anonymous, would not work in the United States because of privacy concerns.³⁷

Financial Inclusion and CBDCs

Proponents of CBDCs have also argued that CBDCs have the potential to increase financial inclusion for underserved segments of society.³⁸ In 2019, approximately 5.4% of all households in the United States, totaling 7.1 million households were “unbanked,” meaning they did not have an account with a bank or credit union, though that number may have risen during the pandemic.³⁹ Financial inclusion proponents have argued that more Americans could be brought into the banking system if lower-cost, more convenient banking services were available, potentially with CBDCs integrated in the system.⁴⁰ Other critics have noted that the introduction of a CBDC could accelerate the declining use of physical cash, which may have negative implications for financial inclusion.⁴¹ Technology design choices will also factor into whether a CBDC expands financial inclusion, and how equitable any expansion could be. With 85% of U.S. adults owning a smartphone and mobile payments becoming more common, one could expect smartphones to play a critical role in a retail CBDC system.⁴² However, smartphone ownership declines with the older population and those with lower levels of education and income, which may create challenges to the use of CBDCs in increasing financial inclusion.⁴³

Relatedly, while certain financial institutions and government entities maintain accounts at the Fed, some have suggested that the Fed offer a basic bank account to consumers at no cost, such as a “FedAccount.”⁴⁴ Opening up access to consumers may facilitate access to basic banking services, like a checking account with a debit card without overdraft fees, as well as expeditious delivery of funds in a crisis, such as economic impact payments (EIP) offered during the COVID-19 crisis.⁴⁵

³⁷ Federal Reserve, [Transcript of Chair Powell’s Press Conference](#), (Apr. 28, 2021), and Wired, [As Digital Currency’s Popularity Rises, So Do Privacy Fears](#) (Mar. 16, 2021).

³⁸ Federal Reserve Bank of Kansas City, [Inclusion by Design: Crafting a Central Bank Digital Currency to Reach All Americans](#) (Dec. 2, 2020).

³⁹ FDIC, [How America Banks: Household Use of Banking and Financial Services, 2019 FDIC Survey](#) (Oct. 2020).

⁴⁰ See CRS, [Financial Inclusion and Credit Access Policy Issues](#) (Oct. 24, 2019).

⁴¹ CRS, [The Potential Decline of Cash Usage and Related Implications](#) (May 10, 2019).

⁴² Pew Research Center, [Mobile Fact Sheet](#) (Apr. 7, 2021).

⁴³ *Id.*

⁴⁴ Financial Services Committee, [Inclusive Banking During a Pandemic: Using FedAccounts and Digital Tools to Improve Delivery of Stimulus Payments](#) (Jun. 11, 2020).

⁴⁵ *Id.*

Appendix

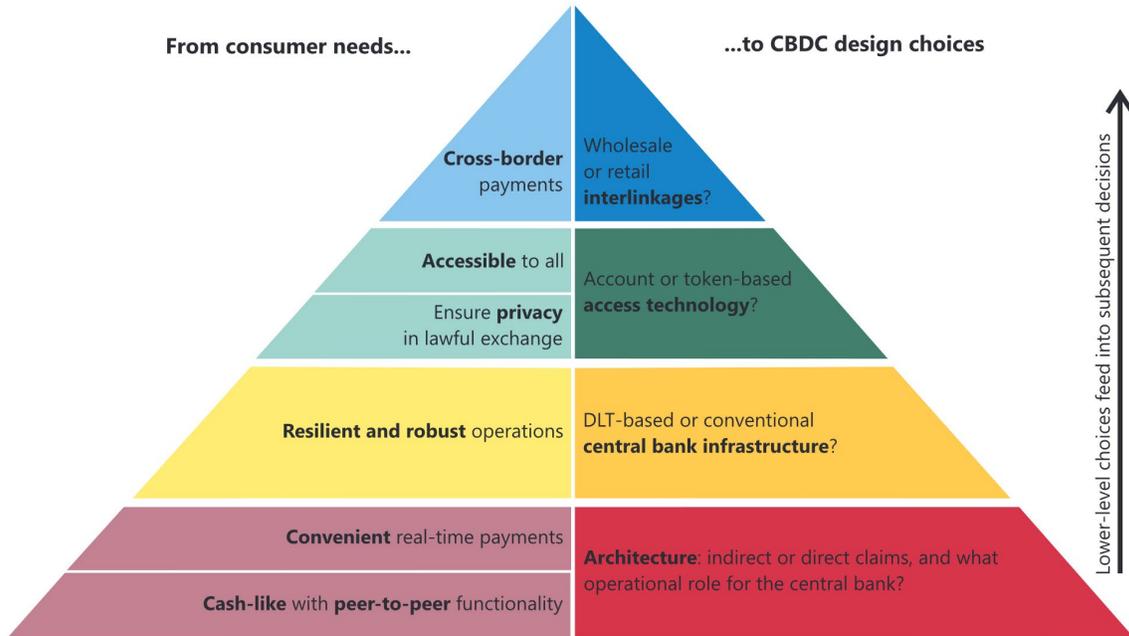


Figure 1. From BIS research: “The CBDC pyramid maps consumer needs (left-hand side) onto the associated design choices for the central bank (right-hand side). The four layers of the right-hand side form a hierarchy in which the lower layers represent design choices that feed into subsequent, higher-level decisions.”⁴⁶

Elements of decentralisation: DLT and token-based access

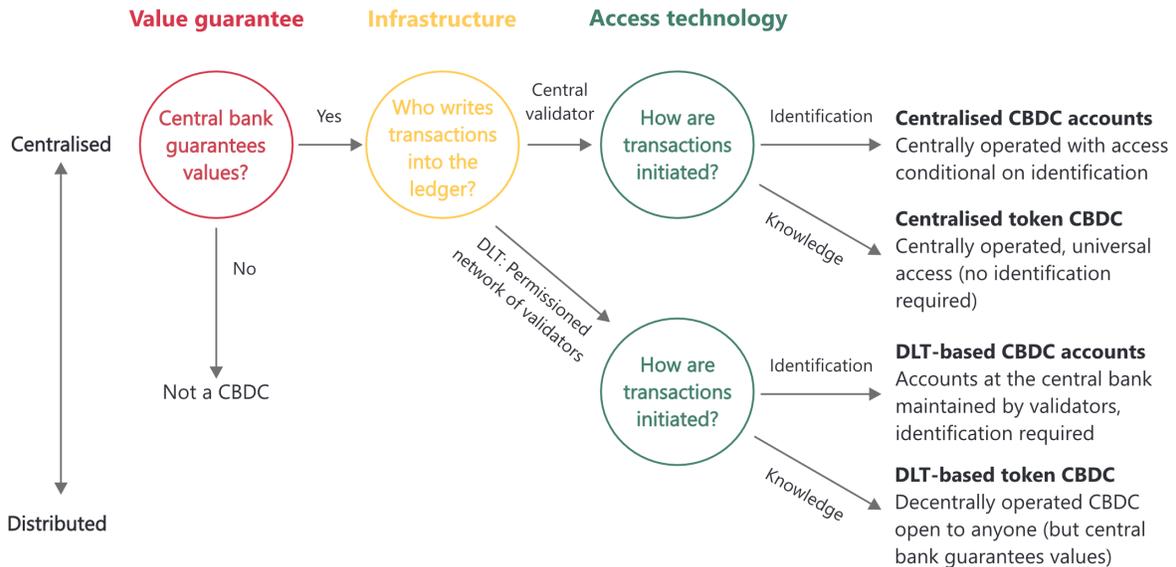


Figure 2. This graph maps out the four possible combinations of whether a CBDC infrastructure is distributed or centralized and whether access is based on identification or cryptographic knowledge.⁴⁷

⁴⁶ BIS, [The technology of retail central bank digital currency](#) (Mar. 1, 2020).

⁴⁷ *Id.*