U.S. Department of the Treasury Report

# The Future of Money and Payments

## Report Pursuant to Section 4(b) of Executive Order 14067

September 2022

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# I. Introduction

On March 9, 2022, President Biden signed an Executive Order on Ensuring Responsible Development of Digital Assets (Executive Order).[1] Section 4(b) of the Executive Order directs the Secretary of the Treasury, in consultation with the Secretary of State, the Attorney General, the Secretary of Commerce, the Secretary of Homeland Security, the Director of the Office of Management and Budget, the Director of National Intelligence, and the heads of other relevant agencies, to submit to the President a report on the future of money and payment systems.

This report reviews the current U.S. system of money and payments, including developments in instant payments and stablecoins. It also describes design choices for a potential U.S. Central Bank Digital Currency (CBDC) in the context of public policy considerations related to building the future of money and payments, supporting U.S. global financial leadership, advancing financial inclusion and equity, and minimizing risks.

Money serves three core functions: a unit of account, a medium of exchange, and a store of value. It can be public money—primarily a liability of the central bank—or private money—a liability of a private intermediary. Payment systems transfer money. Consumers and businesses use retail payment systems for transactions that typically involve smaller dollar amounts; banks and other financial institutions use wholesale payment systems that generally involve larger dollar amounts.

The central bank is at the center of the monetary system. Reflecting this position, central bank money tends to underpin interbank payments and serve as the backbone of the broader payment system.[2] In addition, the Federal Reserve provides currency and reserve balances, operates payment systems, and supervises certain intermediaries that issue private money and make payments. Even as the money and payment system evolves, the central bank's role in final settlement must be preserved to promote economic growth, efficiency, and other public interests.

The current U.S. system of money and payments has substantial strengths. The system has supported over a century of U.S. economic and financial leadership. It is also capable of processing an enormous volume of transactions in an efficient and reliable manner, and users of the payment system enjoy privacy protections. On the other hand, certain legacy payment systems can be slow, difficult to adapt, and challenging for some consumers or businesses to access. In addition, the United States has a significant population that is underserved

1 Exec. Order No. 14067, 87 Fed. Reg. 14143 (March 9, 2022).

2 *See generally* Board of Governors of the Federal Reserve System, The Fed Explained: What the Central Bank Does Ch. 6 (11th ed. 2021), https://www.federalreserve.gov/aboutthefed/files/the-fed-explained.pdf.

by existing systems, indicating there remain substantial opportunities to promote broader financial inclusion.[3]

Recent innovations in money and payments, including instant payment systems and stablecoins, could have far-reaching implications. Instant payment systems generally preserve the core features of existing money and payment systems, while offering faster, more efficient, and potentially more inclusive ways to pay. Stablecoins aspire to be a new type of money supported by a novel payments technology, with implications for the payment system that are more difficult to predict.

Against this backdrop, this report makes recommendations designed to improve the U.S. system of money and payments so that it best achieves a range of policy goals. The recommendations are for the U.S. government to:

- **Recommendation 1:** Advance work on a possible U.S. CBDC, in case one is determined to be in the national interest.
- **Recommendation 2:** Encourage use of instant payment systems to support a more competitive, efficient, and inclusive U.S. payment landscape.
- **Recommendation 3:** Establish a federal framework for payments regulation to protect users and the financial system, while supporting responsible innovations in payments.
- **Recommendation 4:** Prioritize efforts to improve cross-border payments, both to enhance payment system efficiency and protect national security.

3 *See* Section II, *infra* (citing and discussing, in the consumers and payments box, statistics regarding the use of financial services in the United States, including that the percentage of those who are unbanked in the United States is higher than in all other G-7 countries).

# II. Money and payments

## Money, payments, and the current payment system

### Money

Money serves three core functions.[4] First, money must serve as a unit of account, which means that it can be used to price goods and services. Second, money must serve as a medium of exchange in commerce to buy and sell goods and services. Third, money must serve as a store of value. That means the value of money is generally preserved over time.

Money comes in two forms: public and private. Today, U.S. public money primarily consists of central bank money, which is a liability issued by the Federal Reserve.[5] The general public uses public money in the form of paper currency, or Federal Reserve notes, for everyday transactions. Banks and certain other institutions can access central bank reserve balances.[6] Coin is also considered public money and is issued by the Treasury. There are $2.2 trillion in Federal Reserve notes, $3.3 trillion in reserve balances, and $50 billion in coin outstanding.[7]

Private money includes "commercial bank money"—dollar-denominated balances in commercial bank accounts.[8] Certain other liabilities of nonbanks, such as balances held with financial technology (fintech) firms, other nonbank financial institutions, or other payments providers to effect transfers, can also be viewed as private money.[9] There is currently at least $19.4 trillion in private money in the United States.[10]

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4 A historical source for this taxonomy (along with a fourth function, standard of value) is W. Stanley Jevons, Money and the Mechanism of Exchange (1875). U.S. coins and currency, including Federal Reserve notes, are "legal tender," meaning that these instruments are valid payment for debts, taxes, and other dues. *See* 31 U.S.C. § 5103. *See also* Jess Cheng & Joseph Torregrossa, *A Lawyer's Perspective on U.S. Payment System Evolution and Money in the Digital Age*, FEDS Notes (Feb. 4, 2022), https://www.federalreserve.gov/econres/notes/feds-notes/a-lawyers-perspective-on-us-payment-system-evolution-and-money-in-the-digital-age-20220204.htm.

5 Treasury securities are often considered another form of public money, although generally not used for payment. Consequently, the definition abstracts from Treasury securities, although the substitutability of money with Treasury securities should be considered. *See* Arvind Krishnamurthy & Annette Vissing-Jorgensen, *The Aggregate Demand for Treasury Debt*, 120 J. Pol. Econ. 233 (2012); Stefan Nagel, *The Liquidity Premium of Near-Money Assets*, 131 Q. J. Econ. 1927 (2016).

6 *See* Board of Governors of the Federal Reserve System, Money & Payments: The U.S. Dollar in the Age of Digital Transformation 25 (Jan. 2022), https://www.federalreserve.gov/publications/files/money-and-payments-20220120.pdf [hereinafter "FRB Money & Payments"]. In this context, the term "bank" refers to state and federally chartered depository institutions. Transactions within the same institution (e.g., between two customers of the same bank) settle in the liabilities of that institution.

7 Board of Governors of the Federal Reserve System, *Federal Reserve Statistical Release H.4.1* (August 18, 2022), https://www.federalreserve.gov/releases/h41/20220818/; U.S. Treasury Department, *Treasury Bulletin*, (as of June 30, 2022), https://www.fiscal.treasury.gov/reports-statements/treasury-bulletin/.

8 *See* FRB Money & Payments, *supra* note 6, at 25.

9 *See id.* at 26.

10 This estimate is calculated as M2 less currency in circulation. Board of Governors of the Federal Reserve System, *Money Stock Measures–H.6 Release* (August 23, 2022), https://www.federalreserve.gov/releases/h6/default.htm.

Public and private money have coexisted throughout U.S. history. Because public money is currently only accessible to the general public as paper currency or coins, private money can be more convenient for the public to use to make payments. And while public and private money may often be interchangeable in their use—a consumer may pay for the same goods and services using cash or bank deposits with equal ease—the safety and liquidity of public and private money differ. Central bank money presents no credit or liquidity risk. Because of this, settlement in central bank money eliminates uncertainty in transactions, supporting economic activity and financial stability. By contrast, private money may present credit or liquidity risk, depending on the solvency and liquidity of the issuer, as well as the availability of a government backstop (e.g., a central bank lender of last resort or deposit insurance).

Private money usually promises conversion on a one-for-one basis into public money, on demand. Because of this feature, private money is susceptible to runs. Runs can happen when the solvency or the liquidity of the assets or liabilities of the private money issuer come into question, and holders of private money seek to convert to public money. The risk of runs at federally and state-chartered insured depository institutions is mitigated substantially through prudential supervision and regulation, eligibility to access the discount window, and federal deposit insurance.[11] But not all private money enjoys similar safeguards and therefore some issuers of private money may be more susceptible to runs.[12]

## Payment systems

Payment systems facilitate the exchange of goods and services for money and, as such, enable the economy to function. A payment system is a set of rules and processes for transferring money. A payment involves sharing and verifying instructions (e.g., How much? To whom?), in a process referred to as "clearing," and the transfer of funds to discharge the obligation, referred to as "settlement."[13] Clearing and settlement in payment systems require (1) parties to the transaction and a network of participants – a sender, a receiver, and often one or more financial institutions; (2) an asset or set of assets that are transferred among those participants; and (3) a transfer process that defines the procedures and obligations associated with the transaction.

In general, consumers and businesses use "retail" payment systems, while banks and other financial institutions access "wholesale" payment systems. Retail payment systems process high volumes of lower-value transactions on behalf of consumers and businesses, and may

11 *See* FRB Money & Payments, *supra* note 6, at 26. *See generally* Douglas W. Diamond & Philip H. Dybvig, *Bank Runs, Deposit Insurance, and Liquidity*, 91 J. POL. ECON. 401 (1983).

12 *See* FRB Money & Payments, *supra* note 6, at 27.

13 *See* Bank for International Settlements Committee on Payments and Market Infrastructures, Correspondent banking, *Glossary,* https://www.bis.org/cpmi/publ/d00b.htm?m=2266; Board of Governors of the Federal Reserve System, Federal Reserve Policy on Payment System Risk (March 19, 2021), https://www.federalreserve.gov/paymentsystems/files/psr_policy.pdf; Board of Governors of the Federal Reserve System, *supra* note 2.

not settle instantly (i.e., in real time). Wholesale payment systems support larger-value transactions for financial institutions and government agencies and may use some form of real time or continuous settlement. A single form of money can use more than one payment system; for example, private bank money (i.e., deposits) can be transferred using checks, automated clearing house (ACH) systems or debit cards.

Physical currency is the simplest form of payment and embodies many essential features that noncash payment systems seek to emulate. A payment in cash settles immediately, does not rely on an extension of credit by a third party, and enables recipients to access the proceeds of a transaction immediately. Cash is also nearly universally accepted, does not carry an additional charge or fee per transaction, and typically protects users' privacy, which may be valuable for a wide array of consumers including vulnerable populations.

At the same time, cash is inconvenient for large transactions, is vulnerable to being lost or destroyed, and cannot be sent or requested automatically; in addition, many cash transactions[14] cannot be audited. The risk of counterfeit, theft, or error is largely borne by the direct participants to the transaction. As financial institutions have strengthened anti-money laundering controls, terrorists and other criminals have increasingly turned to cash to transfer funds – capitalizing on its anonymity, portability, and liquidity.[15]

By definition, noncash payment systems transfer money in a form other than physical currency. Noncash payment systems include, but are not limited to, large-value funds transfer systems, ACH operators, and credit and debit card systems. Together, these systems offer features that cash cannot: They are capable of moving large sums of money across geographic distances, are traceable, and permit some automation of payments or requests for payment. Like cash, some noncash payment systems process transactions in real time and on a transaction-by-transaction basis (referred to as "gross" settlement).[16] Other noncash payment systems settle batches of transactions at predetermined times (referred to as "net" settlement) or with deferred settlement of obligations. Regardless of gross or net settlement, final settlement for noncash payment systems generally involves central bank money, minimizing the risk that transactions would not be completed at the end of a business day. Noncash payment systems are generally centrally administered, governed by mutually agreed

14 Under the Bank Secrecy Act (BSA) and implementing regulations, financial institutions and any nonfinancial trade or business must file a report concerning a transaction, or series of related transactions, in excess of $10,000 in currency. 31 U.S.C. § 5313 & 5331; 31 C.F.R. §§ 1010.310-330.

15 Department of the Treasury, 2022 National Terrorist Financing Risk Assessment 20 (February 2022), https://home.treasury.gov/system/files/136/2022-National-Terrorist-Financing-Risk-Assessment.pdf.

16 For example, the Fedwire Funds Service is "a real-time gross settlement system that enables participants to initiate funds transfer that are immediate, final, and irrevocable once processed . . . and is generally used to make large-value, time-critical payments." Board of Governors of the Federal Reserve System, *Fedwire Funds Services*, https://www.federalreserve.gov/paymentsystems/fedfunds_about.htm.

upon network rules, and have defined processes in place for resolving disputes, errors, or fraudulent transactions.

Because net settlement may not occur instantly, noncash payment system can expose participants to credit risk and liquidity risk. Noncash payment systems that settle on a net basis establish rules, procedures and controls for managing these risks. Noncash payment systems often charge a fee for processing transactions, either per transaction or in a flat rate based on volume.

*Cross-border payment systems*

Cross-border payments occur when persons or businesses in one jurisdiction send or receive money from other persons or businesses in another. Consumers in the United States typically make cross-border payments from the United States using cash, debit and credit cards, or wire or ACH transfers. For remittance transfers, cross-border payments from one person or household to another, money transfer operators allow consumers to use bank accounts, credit and debit cards, and cash in-store to fund transfers, making funds available to a recipient at a foreign branch or local agent, typically paid out in the form of cash but sometimes also available via check or transfers to a bank account. For retail purchases from foreign merchants, either while traveling abroad or shopping online, consumers and businesses can generally use credit and debit cards issued by a domestic bank for purchases. Consumers or businesses can also send money abroad via ACH or wire transfer. Depending on the region, cross-border retail payments can take up to multiple days to clear, and remittance payments carry fees of 6.4 percent on average, while non-remittance cross-border retail payments carry fees of up to 10 percent.[17]

Cross-border payments typically settle through correspondent banking networks,[18] often on a per transaction basis for wholesale payments and a netted basis for a batch of retail payments.[19] Card networks rely on the correspondent banking system to settle cross-border payments with each transaction relying on the issuing bank of the payer and the acquiring bank of the payee. Remittance service providers can also rely on correspondent banking networks to send remittances to their destination, especially when the payment destination is an affiliated entity. Other remittance providers with operations at both the origin and destination of a payment may settle transactions on their own books, in a closed-loop system. For

17 Financial Stability Board, Targets for Addressing the Four Challenges of Cross-Border Payments 9-10 (Oct. 13, 2021), https://www.fsb.org/wp-content/uploads/P131021-2.pdf.

18 Correspondent banking can be defined as arrangements where one bank (correspondent) holds deposits owned by other banks (respondents) and provides payment and other services to those respondent banks. *See* Bank For International Settlements Committee on Payments and Market Infrastructures, Correspondent banking 9 (July 2016), https://www.bis.org/cpmi/publ/d147.pdf.

19 Financial Stability Board, Enhancing Cross-Border Payments (April 9, 2020) 3 n. 11, https://www.fsb.org/wp-content/uploads/P090420-2.pdf.

wholesale payments, large private cross-border payments platforms provide cross-border and foreign exchange mechanisms for financial institutions on their own platform, but local central bank-operated payment infrastructure, such as Fedwire in the United States, underpins final settlement.[20]

Central banks, legacy financial service providers, and new entrants to financial services are creating new ways for payments to cross borders. The Federal Reserve has linked the U.S. ACH system with local settlement systems in Canada, the Eurozone, the United Kingdom, Mexico, and Panama, allowing consumers and businesses to transfer funds directly from U.S. bank accounts to bank accounts in those countries.[21] Financial technology companies are increasingly entering the cross-border payments space, particularly for peer-to-peer payments. For example, financial technology companies are entering the remittance market, allowing consumers to fund "mobile wallets" online with their bank accounts and credit or debit cards and to send money directly to foreign mobile wallets.[22] However, these providers often must still rely on correspondent banks for settlement or provide "on us" settlement, in which both legs of a foreign exchange transaction are settled on the books of a single bank. Incumbent money transfer operators also provide similar online services.[23] Finally, even when available, not all commercial banks offer these services on competitive terms, or at all, to retail consumers. In addition, the total number of active correspondent banking relationships and active corridors has declined over the past decade.[24]

## Intermediaries

Money and payments often involve intermediaries. Intermediaries, like banks and some nonbanks, issue private forms of money and provide access to payment services.

Banks illustrate each of these roles. Banks issue insured deposits, uninsured deposits, and other liabilities used by customers, businesses, and nonbank financial intermediaries as money. Banks hold money balances for depositors, some of which are available on demand. Banks enable the transfer of money through payment services, which allow their customers to make payments to, or receive payments from, customers of the same or other banks. Banks also facilitate the distribution of cash from the Federal Reserve to bank customers by allowing customers to convert their deposit balances into paper currency on a one-for-one basis.[25]

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20 *See generally* Robert Lindley, Reducing Foreign Exchange Settlement Risk, BIS Quarterly Review (Sept. 2008), https://www.bis.org/publ/qtrpdf/r_qt0809g.pdf.

21 Federal Reserve, FedGlobal ACH Payments, https://www.frbservices.org/financial-services/ach/fedglobal.

22 *See generally* Florian Seeh, *How New Entrants Are Redefining Cross-Border Payments*, EY (Feb. 23, 2021), https://www.ey.com/en_us/banking-capital-markets/how-new-entrants-are-redefining-cross-border-payments.

23 *See, e.g.*, WesternUnion, *Send Money to a Mobile Wallet*, https://www.westernunion.com/fr/en/mobile-wallet.html.

24 Bank for International Settlements, *New Correspondent Banking Data – The Decline Continues*, https://www.bis.org/cpmi/paysysinfo/corr_bank_data/corr_bank_data_commentary_1905.htm.

25 For example, bank customers often obtain cash using a debit card attached to an ATM network. When a customer

Nonbank intermediaries are involved in the issuance, transfer, and custody of money or money-like assets. Some offer complementary financial services and are integrated with e-commerce and social media platforms. Internationally, telecoms have likewise developed payments services linked to mobile phone numbers. These services typically allow users to manage nonbank balances at a network of authorized agents, often small retailers, which they can use for payments and transfers via SMS messaging.[26]

Financial intermediaries are subject to regulatory frameworks at the state level, the federal level, or both, but applicable regulatory frameworks vary by the type of institution and its activities. Depending on their application, these frameworks may address a range of risks, including protection of customers, the safety and soundness of the intermediary, financial stability, and the smooth functioning of the payment system.

Under U.S. laws and regulations, financial intermediaries also play an important role in mitigating the risk of money laundering and terrorist financing.[27] To protect user privacy, regulated U.S. financial institutions are generally required to maintain the security and confidentiality of customer information and prevent unauthorized disclosure of customer financial information.[28] If the U.S. government wants to obtain financial information, authorities must generally follow specific procedures, providing a level of protection against unwarranted government scrutiny and surveillance.[29]

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makes an ATM withdrawal, a bank converts a portion of the customer's deposit balance into cash on a one-for-one basis. In turn, banks order cash from their Federal Reserve Bank, which consists of a request for reserve balances to be converted into paper currency.

26 Of note, while nonbank intermediaries clear payments, final settlement usually occurs in central bank money using a bank sponsor.

27 Under the BSA framework, U.S. financial institutions, including banks and money services businesses (MSB), are generally required to fulfill a number of core obligations, including record-keeping, reporting suspicious activity, monitoring transactions, establishing and executing customer identification programs, verifying customer identities, and maintaining anti-money laundering/countering the financing of terrorism (AML/CFT) programs. *See generally* Financial Crimes Enforcement Network, *The Bank Secrecy Act*, https://www.fincen.gov/resources/statutes-and-regulations/bank-secrecy-act#:~:text=The%20Currency%20and%20Foreign%20Transactions,detect%20and%20prevent%20money%20laundering.

28 Financial institutions are also required to inform customers how their information could be shared. *See* Financial Modernization Act of 1999 or the Gramm-Leach-Bliley Financial Services Modernization Act, 15 U.S.C. §§ 6801 *et seq.*

29 *See generally* 1978 Right to Financial Privacy Act, 12 U.S.C. §§ 3401 *et seq.*

## Table 1: Major noncash payment systems[30]

| System & Type | Operator | Participants | Function & Features | Volume[31] |
|---|---|---|---|---|
| Fedwire (Large-value, Wholesale) | Federal Reserve | Banks and other Federal Reserve account holders | Large-value, time-critical payments. Real-time gross settlement, transactions final and irrevocable once processed. | In 2021:<br>Transactions: 204.5M<br>Total value: $991.8T. |
| CHIPS (Large-value, Wholesale) | The Clearing House | Large banks (43 total) | Large-value interbank payments. Continuous net settlement system that matches, nets, and settles transactions. | In 2021:<br>Transactions: 127.9B<br>Total value: $448.7T |
| FedACH | Federal Reserve | Banks, Treasury, government agencies | Batched direct debit and direct credit payments. Used for pre-authorized recurring payments, such as payroll, social security, and utilities. | In 2021:<br>Commercial ACH<br>Transactions: 17.9B<br>Total value: $37.0T<br><br>Government ACH<br>Transactions: 2.0B<br>Total value $8.1T |
| Electronic Payments Network (ACH) | The Clearing House | Banks (approximately 300) | Batched direct debit and direct credit payments. Primarily used for pre-authorized recurring payments, such as payroll, and utilities. | In 2021:<br>Transactions: 29.1B<br>Total value $72.6T |

30 *See generally* Board of Governors of the Federal Reserve System, *supra* note 2; Federal Reserve System, *Guidelines for Evaluating Account and Services Requests*, https://www.federalreserve.gov/newsevents/pressreleases/files/other20220815a1.pdf; Board of Governors of the Federal Reserve System, *supra* note 16; The Clearing House, *About CHIPS*, https://www.theclearinghouse.org/payment-systems/chips; The Clearing House, *CHIPS Participants,* https://www.theclearinghouse.org/-/media/new/tch/documents/payment-systems/chips_participants_revised_01-25-2021.pdf; The Federal Reserve, *FedACH Products & Services*, https://www.frbservices.org/financial-services/ach#:~:text=FedACH%C2%AE%20Products%20%26%20Services,Clearing%20House%20(ACH)%20network; The Clearing House, *2021 ACH Volume on TCH's EPN Outpaces Industry* (March 7, 2022), https://www.theclearinghouse.org/payment-systems/articles/2022/03/2021_ach_volume_tchs_epn_outpaces_industry_03-07-2022; The Federal Reserve, *Check Products & Services*, https://www.frbservices.org/financial-services/check#:~:text=The%20Federal%20Reserve%20Banks%27%20Check,a%20variety%20of%20processing%20options; The Federal Reserve, *About the FedNow Service*, https://www.frbservices.org/financial-services/fednow/about.html; The Clearing House, *RTP Network Frequently Asked Questions*, https://www.theclearinghouse.org/payment-systems/rtp/institution.

31 *See* Board of Governors of the Federal Reserve System, *Fedwire Funds Services: Data and Additional Information*, https://www.federalreserve.gov/paymentsystems/fedfunds_data.htm; The Clearing House, *CHIPS Annual Statistics from 1970 to 2022*, https://www.theclearinghouse.org/-/media/new/tch/documents/payment-systems/chips_volume_value_ytd_june_2022.pdf; Board of Governors of the Federal Reserve System, *Automated Clearinghouse Services: Data*, https://www.federalreserve.gov/paymentsystems/fedach_data.htm; The Clearing House, *2021 ACH Volume on TCH's EPN Outpaces Industry*, *supra* note 30; Nacha, *ACH Network Sees 29.1 Billion Payments in 2021, Led by Major Gains in B2B and Same Day ACH*, https://www.nacha.org/news/ach-network-sees-291-billion-payments-2021-led-major-gains-b2b-and-same-day-ach; Board of Governors of the Federal Reserve System, *Check Services: Data*, https://www.federalreserve.gov/paymentsystems/check_data.htm; The Clearing House, *Real-Time Payments for All Financial Institutions*, https://www.theclearinghouse.org/payment-systems/rtp. For a discussion of trends in credit and debit payments, see Board of Governors of the Federal Reserve System, *Federal Reserve Payments Study (FRPS)*, https://www.federalreserve.gov/paymentsystems/december-2021-findings-from-the-federal-reserve-payments-study.htm.

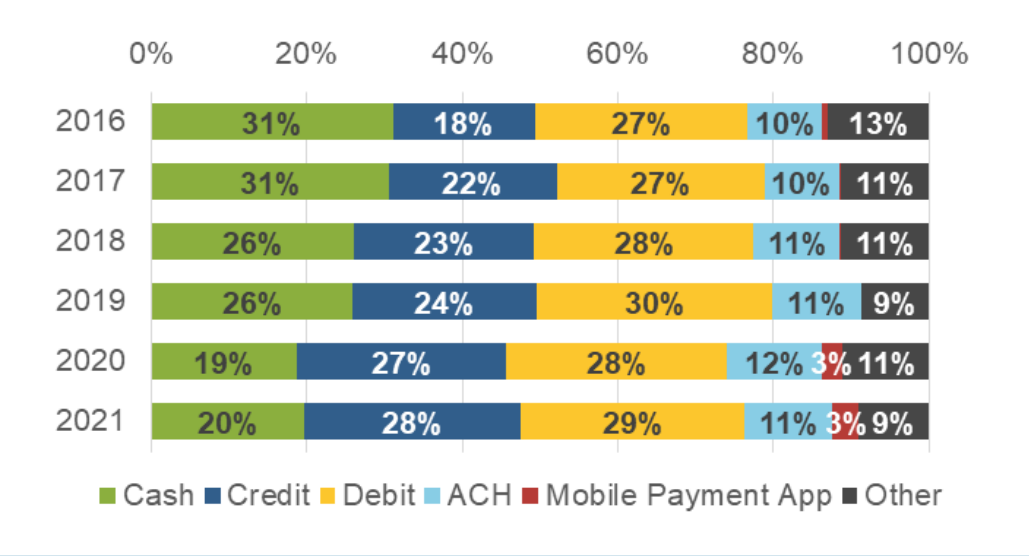
## Table 1: Major noncash payment systems *(continued)*

| System & Type | Operator | Participants | Function & Features | Volume[31] |
|---|---|---|---|---|
| Federal Reserve Check Services | Federal Reserve | Banks, Government agencies | Paper and electronic collection and processing of checks; electronic is now the primary method of check processing, with collection and settlement typically occurring within one day. | In 2021:<br>Commercial checks<br>Transactions: 3.7B<br>Total value: $8.8T<br><br>Government checks<br>Transactions: 131M<br>Total value: $273B |
| FedNow Service | Federal Reserve | Banks and other Federal Reserve account holders, U.S. Treasury Bureau of the Fiscal Service | Not yet operational; expected to launch in 2023. Will enable payments at all times, including after business hours, with real-time gross settlement. | N/A |
| Real Time Payment (RTP) Network | The Clearing House | Banks | Real-time, gross settlement | In 2Q22:<br>Transactions: 41.2M<br>Total value: $18B |

## Consumers and payments today

For most Americans, making a payment involves a choice. When interacting with a seller in person, merchants may present consumers with several payment options, including cash, credit or debit card, prepaid card, mobile payment app, or check. Online shopping and other electronic payments might allow consumers to use some of the same options, as well as bank transfers (e.g., ACH payments) or other mechanisms for making electronic purchases. A survey conducted by the Federal Reserve, illustrated in Figure 1 and Figure 2 below, provides a glimpse into the payment choices made by consumers in recent years.[32] It also reveals how consumer payment preferences may change over time or in different circumstances, as evidenced by the notable decrease in the use of cash during the COVID-19 pandemic.[33] Nevertheless, use of cash in the United States remains higher than in certain other advanced economies.[34]

### Figure 1: Share of payments use (by number) over time




Source: Federal Reserve Bank of San Francisco

32 Emily Cubides & Shaun O'Brien, *2022 Findings from the Diary of Consumer Payment Choice*, Federal Reserve Bank of San Francisco FedNotes (May 5, 2022), https://www.frbsf.org/cash/publications/fed-notes/2022/may/2022-findings-from-the-diary-of-consumer-payment-choice/ [hereinafter "*Diary of Consumer Payment Choice*"]. *See also* Board of Governors of the Federal Reserve System, *Federal Reserve Payments Study (FRPS)*, *supra* note 31.

33 *See Diary of Consumer Payment Choice*, *supra* note 32.

34 *See* Board of Governors of the Federal Reserve System, *supra* note 6, at 16.

## Consumers and payments today

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While consumers can use each of these payment options to pay for the goods and services they need, payment options may differ in important respects. First, the laws, regulations, and rules that govern consumer transactions and promote consumer protection may vary across methods of payment. For example, the extent to which a consumer can be held liable for purchases made on a stolen card depends not just on how quickly the cardholder reports the theft, but also on whether the stolen card was a credit card or a debit card.[35]

Speed and cost may also vary significantly across payment methods. While cash changes hands instantaneously, checks and bank transfers may take up to several days before funds become available to the recipient. And while paying via credit or debit card may be quicker in terms of funds receipt to the seller compared to checks and bank transfers, financial costs for these methods may be higher. The cost borne by users or merchants averages nearly 2 percent and 1 percent for credit and debit card transactions, respectively.[36] These high costs are shouldered by American consumers and businesses at far higher levels than their European or Canadian counterparts.[37] And while the costs in the United States are exceeded by those in Brazil, Brazil's recent instant payments innovation (Pix) could lower transaction costs in Brazil.[38]

Delays and fees also affect American households and businesses as recipients of funds. High fees contribute to many households remaining unbanked or underbanked.[39] Some are forced to draw against already low balances and are charged overdraft fees. Estimates suggest that banks charge $15 billion or more each year in such fees.[40] Other households rely on nonbank check cashers.[41]

35 *Compare* 15 U.S.C. § 1643; 12 C.F.R. § 1026.12(b) (Regulation Z), *with* 15 U.S.C. § 1693g; 12 C.F.R. § 1005.6 (Regulation E).

36 Bank for International Settlements, BIS Annual Economic Report 2022, III: The Future Monetary System 99, https://www.bis.org/publ/arpdf/ar2022e3.pdf.

37 *Id.*

38 *Id.*; *see also* Duarte et al., BIS Bulletin No. 52: Central banks, the monetary system and public payment infrastructures: lessons from Brazil's Pix (March 23, 2022), https://www.bis.org/publ/bisbull52.pdf.

39 FDIC, How America Banks: Household Use of Banking and Financial Services 3, 55 (2019), https://www.fdic.gov/analysis/household-survey/2019report.pdf.

40 CFPB, *CFPB Research Shows Banks' Deep Dependence on Overdraft Fees* (Dec. 1, 2021), https://www.consumerfinance.gov/about-us/newsroom/cfpb-research-shows-banks-deep-dependence-on-overdraft-fees/.

41 *See* FDIC, *supra* note 39, at 55.

## Consumers and payments today

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The payment choices available to consumers must be understood within the broader context of financial inclusion. The percentage of the United States that is unbanked is higher than the percentage in all other G-7 countries.[42] Although most U.S. households maintain bank accounts, estimates suggest that 7 million (5.4 percent of total U.S. households) are unbanked, and an additional 24.2 million or 18.7 percent of U.S. households have bank accounts but still rely on alternative forms of financial services, such as check cashing and money orders.[43] And certain consumers may be less willing, or less able, to participate in newer forms of payments.[44] Some evidence suggests that lower-income consumers, for example, are several times more likely to make payments in cash than consumers with higher income, even during the pandemic, as shown in Figure 2.[45] In addition, making payments internationally can be especially slow and costly (on average 5 percent for sending remittances from the United States), placing burdens on consumers and families that need to send international remittances and may be the least able to bear the cost.[46] In short, not all consumers make the same payment choices or have the same access to payment options, and certain segments of the population may disproportionately bear the costs and inefficiencies of payment systems.

42 *See* The World Bank, *The Global Findex Database 2021*, https://www.worldbank.org/en/publication/globalfindex/Data (survey data reporting 95% of individuals ages 15 and up with an account in the United States, which drops to 91% when considering only those in the poorest 40% of households, and is higher than the numbers reported for all other G-7 countries)https://databank.worldbank.org/source/global-financial-inclusion; *see also* The World Bank, *Databank: Global Financial Inclusion*, https://databank.worldbank.org/source/global-financial-inclusion.

43 A household is "unbanked" if no one in the household had a checking or savings account; estimates for unbanked households come from FDIC, *supra* note 39 at 1. A household is "underbanked" if it had a checking or savings account and used one of the following products or services from an alternative financial services provider in the past 12 months: money orders, check cashing, international remittances, payday loans, refund anticipation loans, rent-to-own services, pawn shop loans, or auto title loans; estimates for underbanked households come from FDIC, 2017 FDIC National Survey of Unbanked and Underbanked Households 1, https://www.fdic.gov/analysis/household-survey/2017/2017report.pdf. *See also* Michael S. Barr, No Slack: The Financial Lives of Low-Income Americans (2012).

44 *See generally Diary of Consumer Payment Choice*, *supra* note 32.

45 *Id.*

46 *See* The World Bank, *Average Transaction Cost of Sending Remittance from A Specific Country - United States*, https://data.worldbank.org/indicator/SI.RMT.COST.OB.ZS?end=2020&locations=US&start=2020&view=bar; The World Bank, *Remittance Prices Worldwide*, https://remittanceprices.worldbank.org/countrycorridors.

## Consumers and Payments Today

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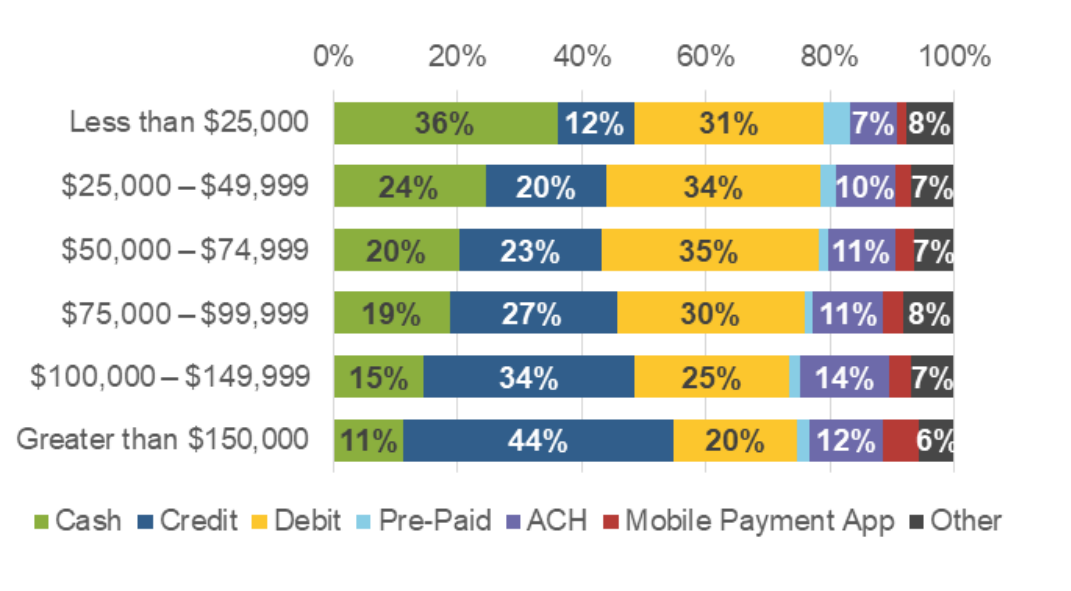
### Figure 2: Share of payment instrument use by household income




*Source: Federal Reserve Bank of San Francisco*

### Recent innovations in money and payments

Recent years have seen innovations in money, U.S. retail and wholesale payments, and cross-border payments.[47] Some of these innovations build additional user functionality on top of existing payment systems, but two innovations are more fundamental and therefore may have farther-reaching implications: Instant payment systems and stablecoins. Instant payment systems are an important upgrade to the current payment system. Stablecoins aspire to be a new type of money supported by a novel payments technology; however, stablecoins present a greater number of risks related to their financial and technological characteristics compared to instant payments and other existing forms of money and payments, making it more difficult to predict the impact of stablecoins on the future of money and payments.

47 For an overview of innovations globally, see generally Eswar S. Prasad, The Future of Money: How the Digital Revolution is Transforming Currencies and Finance (2021).

## Instant payments

Retail instant payment systems (instant payment systems) process small-value interbank transfers such that funds are available nearly instantly, as opposed to the potentially multi-day settlement period for retail transfers on certain legacy bank payment systems.[48] Instant payment systems usually use bank deposit money but ultimately settle in central bank reserve balances, similar to other retail payment systems. In the United States, examples of instant payment systems include the Clearing House's RTP Network (RTP), which was launched in 2017, and the FedNow Service, which the Federal Reserve plans to launch in 2023.[49]

Network effects support the adoption of instant payment systems: Widespread use makes it more likely that a payor can use an instant payment system to make a payment to a payee, increasing the system's value.[50] More specific factors affecting adoption of instant payment systems include the range of institutions that are eligible to participate, the number of institutions that choose to participate, and how these institutions make the service available to their customers. For example, an easy-to-use user interface could promote greater use of instant payments.[51] These systems could also expand access to electronic payments to underserved or unbanked consumers. These capabilities have been included in international contexts, demonstrating potential benefits such as competition and consumer choice.[52]

Currently, federally insured depository institutions are eligible to participate in RTP.[53] The FedNow Service will be accessible by all U.S. depository institutions, as well as by U.S. branches of foreign banks. Broadening the range of financial institutions that are eligible to participate in instant payment systems, as certain foreign jurisdictions have done, could help to enhance speed and efficiency, competition, and inclusion in payments, including for cross-border payments.[54] The FedNow Service will not initially focus on cross-border payments, though it may facilitate cross-border payments in the future.

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48 *See generally* Bank for International Settlements Committee on Payments and Markets Infrastructures, Developments in Retail Fast Payments and Implications for RTGS Systems (Dec. 2021), https://www.bis.org/cpmi/publ/d201.pdf; Bank for International Settlements Committee on Payments and Markets Infrastructures, Fast Payments – Enhancing The Speed and Availability of Retail Payments (Nov. 2016), https://www.bis.org/cpmi/publ/d154.pdf.

49 The Federal Reserve, *About the FedNow Service*, *supra* note 30; The Clearing House, *RTP Network Frequently Asked Questions*, *supra* note 30.

50 *See* Bank for International Settlements Committee on Payments and Markets Infrastructures, Fast Payments – Enhancing The Speed and Availability of Retail Payments, *supra* note 48, at 11.

51 *See, e.g.*, DUARTE et al., *supra* note 38.

52 William Cook, *Comparing India's UPI and Brazil's New Instant Payment System, PIX,* Consultative Group to Assist the Poor (Feb. 2, 2021), https://www.cgap.org/blog/comparing-indias-upi-and-brazils-new-instant-payment-system-pix.

53 The Clearing House, *RTP Network Frequently Asked Questions*, *supra* note 30. Some have expressed concern regarding access to these services. *See, e.g.*, *Faster Payments in the United States*, Hearing before the Senate Committee on Banking, Housing, and Urban Affairs (Sept. 25, 2019).

54 *See, e.g.*, Bank for International Settlements Committee on Payments and Markets Infrastructures, Improving Access to Payment Systems for Cross-Border Payments: Best Practices for Self-Assessments 12–16 (May 2022),

Greater use of instant payments comes with new risks that should be appropriately addressed. For example, payments made across instant payment systems are generally irreversible and, therefore, may expose users to increased risk-of-loss. Financial institutions that provide instant payments may need to manage incremental financial and operational risks, including those related to intraday liquidity, anti-money laundering/countering the finance of terrorism (AML/CFT) compliance, and fraud detection, prevention, and response. High levels of interoperability among instant payment systems in different jurisdictions could help reduce transaction costs, but it could also introduce new illicit finance, counterparty, operational, and cyber risks. Moreover, differences in AML/CFT obligations for institutions that directly participate in instant payment systems, such as different customer identification requirements, could complicate efforts to create a seamlessly functioning whole.

Since 2001, more than 60 jurisdictions across all continents have launched instant payment systems.[55] These systems can have different features such as real-time gross or deferred net settlement, and different design features such as transaction value limits, among others. Certain central banks are also integrating these payment systems with shared directory services. This integration facilitates interoperability between participating financial institutions and payment service providers, enhancing efficiency, speed and competition.[56] As part of the G20 cross-border payments roadmap, jurisdictions are also considering ways to link instant payment systems and the feasibility of new multilateral platforms and arrangements to improve cross-border payments.[57]

## Stablecoins

Stablecoins are digital assets issued by private entities that aim to maintain a stable value relative to a national currency or other reference assets, often utilizing distributed ledger technology, such as blockchain.[58] To maintain a stable value, many stablecoins offer a promise or create an expectation that the coin can be redeemed at par upon request.[59] These "asset-backed stablecoins" are often advertised as being supported or backed by reserve assets, which may consist of short-term or liquid debt claims (e.g., bank deposits, commercial

https://www.bis.org/cpmi/publ/d202.pdf.

55 *See generally* Bank for International Settlements Committee on Payments and Markets Infrastructures, Developments in Retail Fast Payments and Implications for RTGS Systems, *supra* note 48 at 2.

56 *See* Duarte et al., *supra* note 38; Derryl D'Silva et al., BIS Papers No. 106: The Design of Digital Financial Infrastructure: Lessons from India (Dec. 2019), https://www.bis.org/publ/bppdf/bispap106.pdf.

57 *See* Financial Stability Board, Enhancing Cross-border Payments: Stage 3 Roadmap (Oct. 13, 2020), https://www.fsb.org/wp-content/uploads/P131020-1.pdf.

58 *See* President's Working Group on Financial Markets, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency, Report on Stablecoins (Nov. 2021), https://home.treasury.gov/system/files/136/StableCoinReport_Nov1_508.pdf [hereinafter "PWG Report"].

59 Stablecoin redemption rights can also vary considerably, in terms of both who may present a stablecoin to an issuer for redemption and whether there are any limits on the quantity of coins that may be redeemed. *Id.*

paper, or sovereign debt) or other digital assets.[60] "Algorithmic" stablecoins purport to rely, in whole or in part, on automated adjustments or incentives for market participants to, at least theoretically, cause the stablecoin to maintain parity with its pegged asset. In addition to the issuer of the stablecoin, other intermediaries may be important to a stablecoin's functioning. For example, stablecoin users, like other digital asset users, may rely on a custodial wallet provider to hold the cryptographic keys associated with their stablecoins and facilitate the transmission and exchange of stablecoins. In addition, stablecoins may also rely on market stabilization mechanisms to keep the price of the stablecoin close to or at the pegged value, such as encouraging trading by market participants.

While today stablecoins are primarily used to facilitate trading, lending, or borrowing of other digital assets, proponents believe that stablecoins could become used widely as a means of payment by households and businesses, as well as offering some improvement to the efficiency of cross-border payments by reducing the number of intermediaries in a payment chain. However, poorly designed or inadequately regulated or supervised stablecoin arrangements – including both issuers and custodial wallets – may introduce or amplify risks to the financial system, consumers and investors, and illicit finance. Appropriate regulation and oversight of stablecoins and stablecoin arrangements is necessary to address these risks.[61]

Some stablecoins lack reliable means – for example, due to insufficient or illiquid reserves or design flaws – to maintain a stable value.[62] Failure of a stablecoin to maintain a stable value, or loss of confidence in a stablecoin's ability to maintain a value, could result in a run. Stablecoins, including algorithmic and asset-backed stablecoins,[63] have already shown that they are vulnerable to runs. Runs can have spillover effects on digital asset markets and, potentially, on the traditional financial system. For example, markets for reserve assets could experience dislocations if stablecoin activities were to obtain significant scale and if runs on stablecoins were to lead to fire sales of these reserve assets. Exposures could create particularly large vulnerabilities if the asset classes subjected to fire sales are also held by other

60 There are no standards regarding the composition of stablecoin reserve assets, and the information made publicly available regarding the issuer's reserve assets is not consistent across stablecoin arrangements as to either its content or the frequency of its release. *Id.*

61 *See, e.g.,* PWG Report, *supra* note 58, recommending changes to the regulatory framework for stablecoins to address prudential risks. *See also* FSB, Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements (Oct. 13, 2020), https://www.fsb.org/2020/10/regulation-supervision-and-oversight-of-global-stablecoin-arrangements/.

62 *See, e.g.*, Gary B. Gorton & Jeffrey Y. Zhang, *Taming Wildcat Stablecoins* (Sept. 30, 2021, forthcoming, Univ. of Chicago L. Rev.), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3888752.

63 *See, e.g.,* Paul Tierno, Andrew P. Scott & Eva Su, *Algorithmic Stablecoins and the TerraUSD Crash*, CRS Insight (May 16, 2022), https://crsreports.congress.gov/product/pdf/IN/IN11928; Austin Adams & Markus Ibert, *Runs on Algorithmic Stablecoins: Evidence from Iron, Titan, and Steel*, FEDS Notes (June 2, 2022), https://www.federalreserve.gov/econres/notes/feds-notes/runs-on-algorithmic-stablecoins-evidence-from-iron-titan-and-steel-20220602.htm; Robert Hart, *Tether Untethered: World's Biggest Stablecoin Loses $1 Peg As Crypto Market Crashes*, Forbes (May 12, 2022), https://www.forbes.com/sites/roberthart/2022/05/12/tether-untethered-worlds-biggest-stablecoin-loses-1-peg-as-crypto-market-crashes/?sh=593ecabb1cec.

financial institutions that may be subject to runs, such as money market mutual funds, or if a run on a stablecoin were, in some way, to put pressure on a traditional financial institution holding the stablecoin's reserve assets.

Today, stablecoins usually use a combination of blockchain technology and market intermediaries to process payments and transfer ownership of the digital asset.[64] For transactions recorded on a distributed ledger, payments are initiated when the payor broadcasts the details of the intended transaction to validators. Validators then verify the validity of the transactions before the transactions are appended to the record of previous transactions and settled. In a permissionless blockchain, anyone can serve as a transaction validator; in a permissioned blockchain, the ability to validate transactions is limited to a group authorized by the operators of the system.

The design and functionality of the distributed ledger and the governance of the stablecoin arrangement have implications for the speed and reliability of transfers in ownership. For example, many stablecoins currently in circulation are developed on permissionless blockchains. In permissionless blockchains, the reward for validating legitimate transactions must be sufficiently high to incentivize validators to validate legitimate, and only legitimate, transactions. These incentive structures may result in congestion or high fees.[65] By contrast, permissioned blockchains may be less prone to congestion problems but might limit some of the functionalities present in permissionless blockchains. Other stablecoin ownership transfers are recorded "on the books" of an intermediary, such as a custodial wallet.[66] In other respects, stablecoins face many of the same basic risks as traditional payment systems, including credit risk, liquidity risk, operational risk, risks arising from improper or ineffective system governance, and settlement risk.

With respect to AML/CFT considerations, stablecoins are generally not distinct from other digital assets, and financial institutions that deal in stablecoins are subject to AML/CFT obligations. However, if a stablecoin was widely adopted globally as a means of payment, the stablecoin could pose greater risks for illicit finance due to uneven implementation of global AML/CFT standards for digital assets. The liquidity of a widely adopted stablecoin could also make it attractive to criminals and the design of a stablecoin arrangement (e.g., use of permissioned blockchain) could affect the implementation of AML/CFT requirements. Both possibilities would heighten the importance of effective implementation of global AML/CFT regulation and supervision of digital assets to mitigate the illicit finance risks.

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64 *See generally* PWG Report, *supra* note 58.

65 *See* Frederic Boissay, Giulio Cornelli, Sebastian Doerr and Jon Frost, BIS Bulletin No. 56: Blockchain scalability and the fragmentation of crypto, https://www.bis.org/publ/bisbull56.pdf.

66 Digital "wallets" provide a variety of services to users, including facilitating the transfer of stablecoins between users. A "custodial wallet provider" is a wallet provider that users may rely on to hold stablecoins on their behalf. Wallets which can offer certain benefits but also introduce risks if appropriate safeguards are not in place.

# III. Potential U.S. CBDC design choices

A CBDC is a digital form of a country's sovereign currency.[67] In the United States, the existing forms of sovereign currency are deposits held by banks and selected financial institutions at the Federal Reserve (reserve balances) and Federal Reserve Notes (paper currency). A CBDC would have three core features. First, CBDC would be legal tender. Second, CBDC would be convertible one-for-one into reserve balances or paper currency. And third, similar to transfers of reserve balances over Fedwire or the FedNow Service, or payments with paper currency, CBDC would clear and settle with finality nearly instantly.[68]

This section reviews selected design choices for CBDC, including features of the CBDC instrument, intermediaries, and the payment system.[69] While some features are inherent to any CBDC, there are critical design choices that may influence the adoption and use of CBDC.[70] In addition, a distinction can be drawn between wholesale and retail CBDC both in their use cases and design, with wholesale CBDC intended for banks and other financial institutions, and retail CBDC intended to be accessed and used by a wide range of consumers and businesses.[71] That said, certain design features and questions related to the underlying infrastructure of CBDC may blur these distinctions to some degree.

## Money

Wholesale CBDC could be designed for large-value financial transactions. A natural use case for wholesale CBDC would be for large-value payments, analogous to how reserve balances are transferred over Fedwire. A CBDC could also be the cash leg of a range of market transactions, including repurchase agreements or securities purchases, instead of bank deposits or reserve balances. If provided access, nonbanks could also settle financial contracts in CBDC and wholesale borrowing contracts could integrate CBDC. A CBDC could serve as a settlement asset for "digital clearinghouses," which could convert one type of digital asset into another, with the CBDC acting as a highly liquid bridge between assets.[72]

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67 There may be other forms of digital sovereign currency. Consistent with the Executive Order, this report focuses on CBDC specifically. As discussed further in Section III, the ways in which a consumer may interact with a CBDC can vary depending on particular design choices.

68 *See generally* Board of Governors of the Federal Reserve System, *Service Details on Federal Reserve, Actions to Support Interbank Settlement of Instant Payments*, 85 Fed. Reg. 48522 (Aug. 11, 2020).

69 This section discusses the policy implications of various potential features and should not be read to make any determinations on the technological feasibility of these features. For more consideration about technical design choices, see the Office of Science and Technology Policy's *Technical Evaluation for a U.S. Central Bank Digital Currency System.*

70 The Federal Reserve outlined four key design features for U.S. CBDC: privacy-protected, intermediated, widely transferable, and identity-verified. *See* FRB Money & Payments, *supra* note 6 at 13. Broadly, the discussion in this section supports these features.

71 As discussed below ("Intermediaries"), a retail CBDC could use a two-tier structure in which intermediaries onboard and manage payments while the central bank records account balances.

72 *See* Bank for International Settlements Committee on Payments and Market Infrastructures, Central bank digital currencies 8 (March 2018), https://www.bis.org/cpmi/publ/d174.pdf.

A retail CBDC could be designed as an alternative to payments using cash, checks, credit or debit cards, or ACH. For example, a retail CBDC could substitute for cash in low-value transactions, to the extent that it is more convenient, less prone to loss or theft, or has other features preferred by users. It could also be used instead of credit or debit card substitutes for purchases online, automated bill payment, or other financial transactions. In these settings, users could value an instrument that is a central bank liability and is continuously available. Businesses might choose retail CBDC over ACH, instant payments or wires for business-to-business payments, payroll, or other financial transactions. CBDC design features that users may value in these settings include flexibility, safety, security, reversibility, and verifiability.

A key question is whether CBDC would pay interest. In particular, the Federal Reserve could consider whether wholesale U.S. CBDC would pay interest, as reserve balances do.[73] The level of interest paid would affect wholesale U.S. CBDC's substitutability with reserve balances or other Federal Reserve liabilities. Paying interest could also encourage adoption at the introduction of CBDC. If the rate paid was in line with market rates, in normal times, wholesale CBDC could crowd out the production of potentially risky forms of private money, such as money issued by non-bank intermediaries, supporting financial stability. That said, a wholesale CBDC that paid interest could attract destabilizing inflows during stress, and so the rate may need to adjust downwards to minimize these flows.

A retail CBDC could also pay interest. Although paper currency does not pay interest, bank deposits often do. The retail bank deposit rate is often significantly lower than the relevant policy rate and "sticky"; as policy rates rise, deposit rates often follow sluggishly upwards.[74] In theory, if an interest-bearing CBDC was viewed as a close substitute for bank deposits in terms of the use cases they support, deposit and lending rates might increase. That said, there may be practical considerations that limit this pass-through. As with wholesale CBDC, any interest paid on retail CBDC might need to adjust to minimize destabilizing flows.

## Payment system

At its core, a CBDC system would need to support instant settlement. In addition, the system would need to have appropriate cybersecurity incident management, contingency plans, and continuity plans to ensure availability of its functionalities, including during natural disasters

73 The Federal Reserve published a discussion paper in January 2022 titled Money and Payments: The U.S. Dollar in the Age of Digital Transformation. The paper discussed and sought comment on a variety of policy considerations related to a CBDC, including implications for the implementation of monetary policy. Interest paid on Federal Reserve liabilities is one aspect of monetary policy implementation that should be considered. *See* FRB Money & Payments, *supra* note 6 at 21.

74 *See* John C. Driscoll & Ruth A. Judson, *Sticky Deposit Rates*, (working paper, Federal Reserve Board Finance & Economics Discussion Series No. 2013-80), https://www.federalreserve.gov/pubs/feds/2013/201380/201380pap.pdf; Itamar Drechsler, Alexi Savov & Philipp Schnabl, *The Deposits Channel of Monetary Policy*, 132 Q. J. Econ. 1819 (2017).

and foreign attacks. When problems are discovered in CBDC functionality, there would be a clear process and adequate support for mitigating and resolving those problems. A CBDC system would also have to support mitigation of money laundering and terrorist financing risks, as well as anti-fraud measures, sufficient to overcome the risk of providing a highly liquid and price-stable instrument, assuming that it is available in large quantities and that it settles instantaneously.

Beyond these core features, the system could also facilitate the use of transaction programmability, to allow for additional functionality of money. For example, payroll, government, or bill payments could be automated using CBDC, similar to how ACH works today, or new functions could be designed to facilitate micro and machine-to-machine payments. However, programmability could add additional risks to users (e.g., if there are bugs in the code that support the contracts or if consumers find it more difficult to stop payments or modify their agreements) and, therefore, any use of programmability should be carefully evaluated to ensure that these risks can be sufficiently mitigated.

A range of system designs could facilitate wholesale CBDC functions that would extend beyond those offered by traditional payment systems. Similar to Fedwire, final settlement could occur on a gross basis with instant finality, but a U.S. CBDC could be developed that would not have the current limitations in transaction timing based on Fedwire operating hours. Depending on the design features and intermediary structure, wholesale CBDCs may be able to facilitate settlement in systems or environments outside of this closed system. Wholesale CBDC could facilitate the final settlement of retail payment systems and also allow for smoother overall intraday liquidity management.

In terms of the underlying infrastructure, retail and wholesale CBDC could run on centralized payment systems or distributed ledger technology (DLT) for processing payments. Because CBDC is a riskless liability of the central bank, current technology suggests that CBDC would be transferred on a system administered by the central bank. Technological developments such as DLT could enable a variety of models with roles for specialized intermediaries to initiate, process, and execute CBDC payments. DLT-based systems could be both permissioned, meaning the network of nodes that verify or commit transactions would be pre-approved entities, or permissionless, where any entity with the requisite technology and capacity could act as a node. However, a permissionless system could introduce distributed governance and would present substantial risk for a CBDC, such that a central bank would be unlikely to adopt it.[75]

75 For a discussion of similar issues, see Federal Reserve Bank of Boston, *Project Hamilton Phase 1 Executive Summary*, https://www.bostonfed.org/publications/one-time-pubs/project-hamilton-phase-1-executive-summary.aspx.

A U.S. CBDC could be designed to interoperate with foreign CBDCs to support and enhance cross-border payments. Systems could have varying levels of interoperability including separate but compatible CBDC systems that share common technical standards and alignment in their legal and regulatory frameworks, common user interfaces or clearing mechanisms that are jointly designed and developed or adopted across jurisdictions, or jointly operated and governed multi-CBDC systems. Research and experimental work have demonstrated the potential for interoperable CBDC systems to complete international transfers and foreign exchange operations in seconds, compared to the days typically required for cross-border payments processed and settled through correspondent banking networks.[76]

Achieving any of these models of interoperability would require advance cooperation between jurisdictions during the development phase to establish common standards and legal frameworks. As with other payment systems, higher levels of interoperability can introduce counterparty, operational, and cyber risks. Interoperability between central-bank operated payment systems is relatively uncommon today due to the risks and technical complexity, as well as considerations related to jurisdictions' economic governance, rule of law, national security, and the need to align regulations such as data protection and privacy standards, AML/CFT regimes and the enforcement of sanctions. These governance challenges would also exist for new cross-border payment systems developed using CBDCs.

CBDC ledger design could have significant implications for user privacy, cybersecurity, and illicit finance risks. In a system with a publicly visible ledger, user information could be pseudonymously recorded on the ledger, but with the passage of time and accumulation of transaction data, transactions might be attributed to individual users; therefore, a publicly visible ledger may result in reduced user privacy. A CBDC ledger could collect significant amounts of information and, without appropriate safeguards, would pose privacy risks and could be a target for cyber attacks. Finally, the ledger design would also affect the degree of illicit finance risk, based on the degree of transparency into the ledger and whether the nodes in a decentralized system are pre-approved entities.

## Intermediaries

There are two general architectures for CBDC intermediation: (1) a single-tier (i.e., direct) CBDC with the central bank, and (2) a two-tier CBDC where intermediaries (potentially banks or nonbank financial intermediaries) would onboard and manage payments while the central bank records account balances. Under either approach an end user's CBDC holdings would

76 For example, the Bank for International Settlements Innovation Hub's Project mBridge designed a prototype that demonstrated that ability to effect cross-border transfer in seconds. *See* Bank for International Settlements, *Inthanon-LionRock to mBridge: Building a Multi CBDC Platform for International Payments*, https://www.bis.org/publ/othp40.htm.

represent a direct claim against the central bank. However, considerations for these general architectures may differ according to wholesale or retail CBDC.

In a single-tier model for retail CBDC, the central bank would issue CBDC and interact directly with the public. The central bank would be responsible for all AML/CFT obligations, including transaction monitoring, filing suspicious activity reports, and customer due diligence. The AML/CFT obligations associated with holding these accounts would result in a government entity having access to customer due diligence and transaction information for all U.S. CBDC transactions, which would represent a significant expansion of the U.S. government's access to financial data and should be carefully considered. This model would also raise novel challenges for AML/CFT supervision, as another supervisory body would need to monitor the central bank's own AML/CFT compliance. This model also could have implications for credit creation, as discussed further in Section IV.

A more feasible model in the United States for intermediating a retail U.S. CBDC would be a two-tiered system, which is in line with what the majority of jurisdictions globally are considering.[77] Under this model, the Federal Reserve would issue and redeem U.S. CBDC, but the distribution of U.S. CBDC would be handled by intermediaries eligible for an account at the Federal Reserve and payment services would be managed by intermediaries and other private sector participants. This would be similar to how paper currency is distributed through commercial banks. It also shares similarities to responsibilities surrounding noncash retail payments today: the intermediaries onboard, provide customer support, and manage payments. In addition, intermediaries would likely implement AML/CFT obligations, while relevant supervisors would monitor compliance with those obligations.

Both banks and nonbank financial intermediaries could support a wholesale CBDC. In a bank-based system, banks would provide all intermediation services. In a hybrid system, nonbanks could also provide custodial or wallet services. Banks could provide a settlement layer that interacts directly with the central bank, and nonbanks could provide an interface to other financial institutions for the holding or transfer of wholesale CBDC. In all cases, intermediaries would need to ensure availability of wholesale CBDC, as well as a high degree of security and resilience.

There could be institution holding limits on wholesale CBDC. A range of characteristics of the intermediary could determine holding limits, including the size of an intermediary, other business lines of the intermediary, supervisory concerns, or operational considerations. There could also be more general factors, such as the degree to which U.S. CBDC outstanding

77 A BIS survey question showed that more than 70 percent of central banks engaged in some form of CBDC work are considering a two-tiered model. Anneke Kosse & Illaria Mattei, BIS Papers No. 125: Gaining Momentum – Results of the 2021 BIS Survey on Central Bank Digital Currencies 5 (May 2022), https://www.bis.org/publ/bppdf/bispap125.pdf.

displace other liabilities on the Federal Reserve's balance sheet, the size of Federal Reserve intermediation relative to overall private intermediation, or effects on broader financial markets, including the market for Treasury securities. These limits could change in times of stress. In particular, the Federal Reserve might opt to place limits on institutional holdings if flows into wholesale U.S. CBDC appeared to be destabilizing to broader money or financial markets.

Beyond these two architectures for core features, a range of intermediation models could apply. Consumers could hold retail CBDC in digital wallets, similar to some private digital assets and nonbank payments services. Wallets could allow users to convert between CBDC and commercial bank money or hold CBDC alongside other digital assets, promoting convenience and flexibility. The wallets could provide payment verification services as well, particularly for larger-value transactions. Data structures and regulatory frameworks could be established to promote consumer privacy and, as appropriate, additional standards for reversibility or error mitigation.

The scope of the intermediary base could also promote equity and financial inclusion. For example, enabling a range of banks as well as potentially nonbank financial institutions to provide wallets could provide the unbanked and the underbanked with greater options for access. A larger intermediary base could also promote competition and amortize fixed costs.

## AML/CFT controls and CBDC

As with any financial asset, CBDCs could be used by criminals, including terrorists, for illicit activity. Design choices of a CBDC, to include the user base, technological design, data collection, and the scope of usage, would affect the illicit finance risks posed by a CBDC. As part of CBDC design, relevant authorities and supervised intermediaries would need to assess the risks and ensure that appropriate controls are in place to mitigate those risks. For example, the illicit finance risk posed by a wholesale CBDC, in which the only users are banks and possibly other financial institutions already subject to AML/CFT obligations, would be lower than a retail CBDC with which consumers and businesses conduct financial activities.

The potential uses of a CBDC could also impact the illicit finance risk. For example, a retail CBDC used for low value, retail transactions or peer-to-peer transfers could be abused by illicit actors looking to transfer smaller amounts of funds that may not trigger transactions monitoring systems or meet the threshold for certain AML/CFT requirements. In addition, the more readily that CBDCs can be used for cross-border transactions, the higher the values a CBDC will support, and the more rapidly transactions take place, especially to high-risk jurisdictions, the more risk it is likely to entail. Other critical factors may include the extent to which user data is usable by and available to investigators, the types of intermediaries that can distribute the CBDC, the extent to which users are subject to and the scope of a customer due diligence process, and whether velocity or amount limits exist.

### AML/CFT obligations and supervision:

In a two-tiered CBDC, intermediaries would be responsible for implementing all AML/CFT and sanctions obligations, including customer verification, transaction monitoring, record keeping, and the filing of Suspicious Activity Reports (SARs). Regulators would also be responsible for supervising the intermediaries' compliance with AML/CFT requirements, just as they currently are. Depending on the technical aspects of a CBDC, regulators may need additional training, expertise, or resources to adequately supervise intermediaries' compliance with relevant AML/CFT obligations. Additional guidance may be necessary for the industry to understand how to effectively design and implement an AML/CFT program for CBDC.

## AML/CFT controls and CBDC

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### User identification and privacy

While physical cash can enable anonymous transactions, a CBDC could potentially be used at much greater scale and velocity, because it would not be subject to the practical limitations of paper money. Therefore, anonymity in a CBDC system could present greatly expanded money laundering, proliferation financing, and terrorist financing risks compared to physical cash. These risks could be more easily mitigated in an identity-verified system, in which intermediaries collect and verify customer information. Other strategies, including zero knowledge proofs, could also be explored. A CBDC could also have tiered accounts to allow for different functionality, tied to different levels of identity verification and monitoring. Controls could be embedded into the design of any tiered system to enable intermediaries to identify instances of structuring designed to avoid compliance thresholds. Tiered accounts could enable customers without identity credentials, who are often unable to access traditional financial services, to access CBDC. While models that allow different levels of identity verification and monitoring could reach wider user bases and do more to promote inclusion than accounts requiring full customer due diligence, they would need to be carefully assessed and calibrated to appropriately mitigate the illicit financing risks. In addition, a tiered model would need to regularly assess the illicit finance risks and, if necessary, change the tiering to adapt to an ever-changing risk environment.

A CBDC can be designed to incorporate technological innovations to both enable user-identification and maximize privacy protections for users. For example, data collected should be protected from unlawful access. A CBDC could also incorporate trustworthy[78] and effective digital identity solutions that include the necessary safeguards to minimize fraud, while also reducing incentives for fraudsters and hackers to steal and misuse personally identifiable information. A CBDC could also leverage privacy-enhancing technologies to combat illicit finance, promote inclusion, and preserve privacy.[79]

78 "Trustworthy" digital identity is shorthand for technology and infrastructure with built-in safeguards and regulatory policies to address privacy, civil liberties, equity and other concerns. Trustworthy digital identity solutions are optional and voluntary, consent based, privacy preserving, inclusive, equitable, secure, accurate and resilient, allow consumer choice, convenient, and are subject to appropriate technical standards, trust frameworks, and governance.

79 For example, in August 2020 the U.S. and U.K. governments launched a prize challenge on privacy enhancing technologies. *See* The White House, *U.S. and U.K. Launch Innovation Prize Challenges in Privacy-Enhancing Technologies to Tackle Financial Crime and Public Health Emergencies* (July 20, 2022), https://www.whitehouse.gov/ostp/news-updates/2022/07/20/u-s-and-u-k-launch-innovation-prize-challenges-in-privacy-enhancing-technologies-to-tackle-financial-crime-and-public-health-emergencies/.

## AML/CFT controls and CBDC

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### Programmable controls

A CBDC could also offer valuable new opportunities for improved supervision and AML/CFT compliance. For example, automated SAR filings for certain potentially suspicious activities, such as structuring transactions to avoid reporting requirements, could be built-in and thereby reduce the compliance burden on financial institutions. Further work would be needed to understand how intermediaries (in an intermediated CBDC) would be responsible for developing and managing these controls. At a minimum, standards for governance, such as a requirement to provide explanatory information on programmable controls to customers, would need to be developed.

A CBDC with a common interface for intermediaries could also provide opportunities for enhanced private sector data sharing and data pooling enabling financial institutions to identify patterns and trends in money laundering and terrorist financing and improve compliance controls.[80] Any data pooling efforts would need to incorporate robust data and privacy protections and could seek to incorporate technological innovations to enable the identification of trends while minimizing the sharing of customer data. Fundamentally, a CBDC system could increase the amount of data generated on users and transactions. The collection and storage of this data would pose obvious privacy and cyber security risks, but it also could offer opportunities for proper authorities to leverage the data in supervision and law enforcement efforts.

80 *See generally* FATF, Stocktake on Data Pooling, Collaborative Analytics and Data Protection (July 2021), https://www.fatf-gafi.org/media/fatf/documents/Stocktake-Datapooling-Collaborative-Analytics.pdf.

## U.S. international engagement on digital assets

On July 7, 2022, the Secretary of the Treasury, in consultation with the Secretary of State, the Secretary of Commerce, the Administrator of the U.S. Agency for International Development (USAID), and the heads of other relevant agencies, delivered to President Biden a framework for interagency engagement with foreign counterparts and in international fora as directed in the Executive Order.[81] The framework is intended to ensure that, with respect to the development of digital assets, America's core democratic values are respected; consumers, investors, and businesses are protected; appropriate global financial system connectivity, platform and architecture interoperability are preserved; and the safety and soundness of the global financial system and international monetary system are maintained.

The U.S. Government has been an active participant in international engagement on digital asset issues. For example, during the U.S. Presidency of the Financial Action Task Force (FATF) from 2018-2019, the United States led the group in developing and adopting the first international standards on digital assets.[82] Since that time, the United States, in coordination with the G7, continues to work with the FATF to monitor emerging illicit finance risks, including potential risks emerging from CBDCs. During its 2020 G7 Presidency, the United States established the G7 Digital Payments Experts Group to discuss CBDCs, stablecoins, and other digital payment issues. In 2021, the G7 work led to a set of shared policy principles for retail CBDCs that established guidelines for jurisdictions in their exploration and potential development of CBDCs.[83] Moreover, while a country's CBDC would be issued by its central bank, the infrastructure supporting it could involve both public and private participants. This presents opportunities for U.S. companies to lead in the development of these technical systems and for the U.S. Government, working with G7 partners, to encourage technological development that would support a CBDC, if determined to be appropriate, that is consistent with the G7's long-standing public commitments to transparency, the rule of law, and sound economic governance.

81 *See* U.S. Dep't of the Treasury, *Fact Sheet: Framework for International Engagement on Digital Assets* (July 7, 2022), https://home.treasury.gov/news/press-releases/jy0854.

82 *See* FATF, FATF Report to the G20 Finance Ministers and Central Bank Governors on So-called Stablecoins (July 2020), https://www.fatf-gafi.org/publications/fatfgeneral/documents/report-g20-so-called-stablecoins-june-2020.html.

83 G7, Public Policy Principles for Retail Central Bank Digital Currencies (CBDCs) (2021), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1025235/G7_Public_Policy_Principles_for_Retail_CBDC_FINAL.pdf.

## U.S. international engagement on digital assets

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In addition to these contributions, the United States remains actively engaged in collaborative work on digital assets through multilateral fora and will continue to elevate its participation in these bodies. The United States continues work on the G20 roadmap for addressing challenges and frictions with cross-border payments, including on improvements to existing systems, potential impediments from data localization and other frictions in data governance frameworks, the international dimensions of CBDC designs, and the potential of well-regulated stablecoin arrangements.[84] The United States actively participates as part of the Financial Stability Board (FSB), which, together with the international standard-setting bodies, is leading work on issues related to stablecoins, other international dimensions of digital assets and payments, and cross-border payments.

The United States must continue to work with international partners on standards for the development of digital payment architectures and CBDCs to reduce payment inefficiencies and ensure that any new payment systems are consistent with U.S. values and legal requirements. Additionally, the United States will promote the adoption and implementation of international standards through bilateral and regional engagements. Across all engagements, the United States will seek to ensure a coordinated message, limit duplication, and encourage that work is maintained within its primary stakeholders.

84 *See* Financial Stability Board, *supra* note 57.

# IV. Policy considerations

This section reviews policy considerations related to the introduction of a CBDC. To support the assessment of a CBDC that is required by Section 4(b) of the Executive Order, this section compares the policy implications of a CBDC with those of two recent innovations, instant payments and stablecoins. However, there are potentially significant differences in the structure, function, and regulatory status of these products, which provide important context for the comparisons below.

The policy considerations discussed in this section are based on the objectives set out in the Executive Order and outlined in the Appendix. These considerations relate to four broad themes:

- **Building the future of money and payments:** The future system of money and payments should be efficient, provide a foundation for further technological innovation, achieve a high degree of resilience, and facilitate cross-border transactions.
- **Supporting U.S. global financial leadership:** The future money and payment systems should be consistent with the global role of the dollar; enable the enforcement of sanctions; and advance democratic values, human rights, and privacy.
- **Advancing financial inclusion and equity:** Innovations to payment systems, including a potential U.S. CBDC, should enable access to and preserve choice for a broad set of potential consumers and users, particularly for those Americans underserved by the traditional banking system.
- **Minimizing risks:** The system should be consistent with preserving economic growth and financial stability, minimize the risk of illicit financial transactions, and be environmentally sustainable.

## Consideration 1: Building the future of money and payments

Developing a U.S. CBDC could support progress towards goals related to payment system efficiency, technological innovation, payment system resilience, and cross-border transaction costs.

### Payment system efficiency

The payment system should allow for efficiencies that make payments cheaper, faster, and safer, by promoting greater and more cost-efficient access to financial products and services.

*Speed and cost*

A CBDC system could be faster than certain existing electronic payment systems, as a CBDC could reduce technological frictions by increasing the speed of transactions and ensuring

finality.[85] Costs of operating a U.S. CBDC would likely be in line with those of comparable private sector systems to comply with the Federal Reserve's policies regarding provision of priced services. [86] Even so, some consideration of the costs of developing CBDC, how these costs shift with respect to design choices, as well as the time development may take, should be noted.

Transactions using instant payment systems can occur in seconds (or less), but it is possible that CBDC could offer even greater throughput. The pricing of instant payment systems to participating institutions will depend on the costs of operating the service, plus a private-sector adjustment factor that imputes a profit margin. Pricing of instant payments for consumers will depend on competitive dynamics, including the range of institutions that have access to instant payment systems. In particular, access to the FedNow Service will be hybrid, with banks and nonbank financial intermediaries sponsored by banks as service providers or agents.

The speed and efficiency of stablecoins relative to CBDC will depend largely on the stablecoin's system for transferring ownership. As discussed in Section II, stablecoins rely on a variety of different intermediaries and ledger systems. Certain features may make stablecoins prone to congestion and high and unpredictable transaction fees. Further, if not subject to appropriate regulation and oversight, stablecoins present other risks, including the risk of runs.

## Technological innovation

### *Foundational technology*

CBDC would provide a foundation for further innovations in payments by providing a safe asset from a trusted source that can be used reliably in digital contexts. For example, a CBDC could enable transaction programmability (i.e., being able to add rules into a CBDC system such that those rules are executed when predefined conditions are met) or support the tokenization of bank deposits or other financial assets. Under one scenario, when a customer at Bank 1 uses tokenized deposits to transact with a customer at Bank 2, a wholesale CBDC could settle the associated interbank exposures instantaneously and automatically. CBDC

85 Project Hamilton, an exploratory research project involving the Federal Reserve Bank of Boston and the Massachusetts Institute of Technology Digital Currency Initiative, has developed a CBDC architecture capable of processing 1.7 million transactions per second. Lovejoy et al., *A High Performance Payment Processing System Designed for Central Bank Digital Currencies (*White Paper Feb. 3, 2022*)*, https://www.bostonfed.org/publications/one-time-pubs/project-hamilton-phase-1-executive-summary.aspx.

86 As required by the Monetary Control Act of 1980, the Federal Reserve Banks set fees for priced services provided to financial institutions. These fees are set to recover, over the long run, all direct and indirect costs and imputed costs, including financing costs, taxes, and certain other expenses, as well as the return on equity (profit) that would have been earned if a private-sector business provided the services. *See* Board of Governors of the Federal Reserve System, *Policies: Principles for the Pricing of Federal Reserve Bank Services*, https://www.federalreserve.gov/paymentsystems/pfs_principles.htm. *See also* 12 U.S.C. § 248a.

could also allow for nearly instantaneous settlement of a wide range of transactions on a 24/7/365 basis.

More generally, code for CBDC could be open source, expanding the pool of developers who can review and build on the code base, although open-source code may carry its own operational risks that must be considered. Protocols built by such developers could be combined to support additional services.[87] At the same time, given the need for a CBDC to be extremely reliable and stable, it may not be able to experiment with the latest technological developments as fast as the private sector could.

Instant payment systems could also support further innovation in payments, particularly if new entrants that are able to provide innovative services to their clients participate directly in these systems. However, it is not clear that instant payment systems will support the same range of use cases as a CBDC. Stablecoins may support technological innovation in payments, including cross-border payments. At the same time, these benefits may be limited or offset if stablecoins remain vulnerable to runs, use blockchains that are prone to congestion, or are more prone to cyber and operational risks.

*Public-private partnership*

The payment system should support innovations from the public and private sectors to meet the various public policy goals of the United States. In turn, innovations from partnerships could provide building blocks for other technologies, similar to how the internet was first introduced as a public-sector initiative.[88] Current payment systems, including ACH, have also benefitted from public-private sector cooperation, particularly with respect to incorporating new functionality and standard setting.[89]

Both CBDC and instant payments could benefit from public-private collaboration. For example, CBDC systems could allow for composability with private sector-developed applications, while instant payment systems could support integration with private sector-developed services.

*Payment system resilience*

A payment system is resilient if it functions reliably, is capable of handling high user and transaction loads, is well-protected against cyber and operational risks, and can resume normal functioning quickly after a disruption.

A CBDC should aim to be secure and functional in a range of environments, both at initial deployment and over its life cycle. As a public good, a CBDC could be uniquely positioned to

87 *See* Bank for International Settlements, *supra* note 36 at 94.
88 *See generally* Katie Hafner, Where Wizards Stay up Late (1999).
89 The National Automated Clearing House Association (NACHA) brings together public and private ACH system representatives to set standards and policies. *See generally* NACHA, *About Us*, https://www.nacha.org/content/about-us.

have functionality in natural disasters or other adverse circumstances, and offline capabilities could help to sustain commerce under these scenarios, where "offline" is here defined as the ability to execute a CBDC transaction without internet access. In addition, because it is publicly provided, CBDC would be designed in ways to account for potential externalities generated by a payment system. As such, it might provide broader protections against cyber or operational risks than a privately operated payment system would. However, a CBDC also would be a target for cyber attackers and, therefore, would need extensive cybersecurity protection and its design would need a robust incident response program in case of a compromise.[90]

In general, payment systems, including instant payment systems and stablecoins, should consider security and resilience when they incorporate new design features.[91] Potential stablecoin vulnerabilities include coding bugs in the smart contracts that support the stablecoin, security issues related to the keys used to mint and burn stablecoins, and in the blockchain-based applications to which users deploy them.[92]

*Cross-border*

CBDCs could also present an opportunity to rethink the international payment system. Adopting common technical standards and legal frameworks could reduce frictions in cross-border payments. Research and experimental work on cross-border multilateral CBDC systems have suggested the potential for platforms to facilitate peer-to-peer CBDC payments on a payment-versus-payment basis, which could reduce settlement risk and increase the settlement speed of cross-border payments and foreign exchange transactions.[93]

There are some countervailing considerations, however. As noted, high levels of interoperability between CBDCs could introduce counterparty, operational, and cyber risks. Governance of a multi-CBDC system could also prove extremely challenging due to challenges in addressing misaligned or conflicting policy objectives in different jurisdictions and evolving regulations, including data protection and privacy standards, AML/CFT regimes, and the enforcement of sanctions imposed by participating jurisdictions.

Instant payment systems would not be interoperable on a global scale initially, although work is underway to facilitate fast payment system interoperability. By reducing the number

90 *See generally* Darrell Duffie, Thierry Foucault, Laura Veldkamp & Xavier Vives (2022), *Technology and Finance, chapter 2*, *in* The Future of Banking 4 (2022), https://www.iese.edu/faculty-research/initiatives/banking/.

91 *See generally* Tanai Khiaonarong, Harry Leinonen & Ryan Rizaldy, *Operational Resilience in Digital Payments: Experiences and Issues* (Dec. 10, 2021), IMF Working Papers (Dec. 2021), https://www.elibrary.imf.org/view/journals/001/2021/288/article-A001-en.xml.

92 *See* Neha Nerula, *The Technology Underlying Stablecoins* (Sept. 23, 2021), https://nehanarula.org/2021/09/23/stablecoins.html.

93 *See* Bank for International Settlements, *Multiple CBDC (mCBDC) Bridge*, https://www.bis.org/about/bisih/topics/cbdc/mcbdc_bridge.htm.

of intermediaries involved in cross-border payments, appropriately designed stablecoin arrangements could also offer similar cross-border payments benefits.

### Consideration 2: Supporting U.S. global financial leadership

The United States has a strong national interest in reinforcing its global financial leadership.

#### Role of the dollar

Some observers have suggested that a U.S. CBDC is needed to preserve U.S. global financial leadership and the role of the dollar because the potential efficiencies created by foreign CBDCs will create competition for the dollar, undermining its global use. However, the prominence of the dollar reflects factors beyond payment system efficiency. These factors include the United States' strong economic performance; sound macroeconomic policies and institutions; open, deep, and liquid financial markets; institutional transparency; commitment to a free-floating currency; and strong and predictable legal systems.[94]

In the near term, foreign CBDCs and private digital assets by themselves likely offer little new competition to the dollar beyond traditional foreign fiat currency, particularly because they do not address the structural factors above. Additionally, to be broadly adopted, a foreign CBDC or a private digital asset would require interoperability with other payment systems or wide use for payments in other jurisdictions; it would also require deep liquidity to act as a medium for cross-currency settlement.

Nonetheless, the United States should still consider the long-term proposition of a digital future where financial and commercial decisions are tied more closely to technological efficiency and convenience. The emergence of new payment system technologies, tokenized assets, and programmable and automated financial sector activities may support the need for a tokenized version of the dollar.

Fiat based stablecoin demand will largely be driven (or limited) by the underlying fiat currencies' characteristics. Stablecoins could affect demand for dollars globally. The magnitude and consequences of these changes depend on a range of factors, including the demand for stablecoins globally, assets backing stablecoins, and regulatory framework(s) applied to stablecoins in the United States and abroad. Cross-border use of stablecoins could also introduce unintended spillover risks.

#### Sanctions and other financial measures

The United States uses sanctions and other financial measures to address national security threats and deny criminals and other illicit actors access to the U.S. and international

94 *See* U.S. Department of the Treasury, Report to Congress: Macroeconomic and Foreign Exchange Policies of Major Trading Partners of the United States 19 (Dec. 2021), https://home.treasury.gov/system/files/206/December-2021-FXR-FINAL.pdf.

financial systems.[95] The effectiveness of these tools rests in part on the strength and centrality of the U.S. financial system and currency as well as coordination with allies and partners to magnify economic and political impact.

Foreign CBDCs, stablecoins, and private-sector-issued digital assets could provide new avenues for bad actors, such as terrorist financiers, money launderers, and governments proliferating weapons of mass destruction, to fund and conduct illicit activities and evade U.S. sanctions. Foreign CBDC systems could be designed to operate outside of an integrated international financial system, such as a bilateral payment mechanism, thus making it easier for rogue actors or countries that are subject to sanctions or disagree with U.S. sanctions policy to avoid U.S. jurisdiction by not dealing in U.S. dollars, with U.S. persons, or with persons otherwise subject to U.S. jurisdiction. The marginal use of a cross-border payment system created in support of one or more foreign CBDCs, particularly if issued by countries that do not share U.S. values and national security goals, could help actors to circumvent U.S. policy tools.

In the near term, a U.S. CBDC is not necessary to preserve effectiveness of sanctions. Fundamentally, the effectiveness of U.S. sanctions relies on the central role of the U.S. dollar and U.S global financial services and leadership. As previously stated, neither foreign CBDCs nor private-sector issued digital assets are likely to have a significant impact on either of these factors in the near term. Over time, however, it is possible that a U.S. CBDC could help to maintain U.S. leadership in the international financial system, and thereby contribute to preserving the effectiveness of sanctions and other financial measures to address threats to the national security, foreign policy, and economy of the United States. In addition, individuals or entities transacting or holding a U.S. CBDC could be subject to U.S. jurisdiction and thereby subject to U.S. sanctions.

Moreover, any financial institution participating in U.S. instant payment systems will be required to adhere to U.S. sanctions, and so these systems are not expected to meaningfully change the efficacy of U.S. sanctions. To the extent that stablecoins increase demand for dollars globally, and depending on the design and compliance with sanctions obligations, stablecoin arrangements could help preserve the efficacy of sanctions in the long term. While stablecoins backed by assets that are not denominated in dollars may be issued by financial institutions that do not hold dollar-based reserves or are not U.S. persons, other involved financial institutions may have U.S. sanctions obligations.

95 *See generally* U.S. Department of the Treasury, The Treasury 2021 Sanctions Review (Oct. 2021), https://home.treasury.gov/system/files/136/Treasury-2021-sanctions-review.pdf; U.S. Department of the Treasury, *Fact Sheet: Overview of Section 311 of the USA PATRIOT Act* (Feb. 2011), https://home.treasury.gov/news/press-releases/tg1056.

## Democratic values, human rights, and privacy

Payment systems, including a potential CBDC, should be designed in a manner consistent with democratic values, human rights, and privacy. Some countries may seek to leverage new payment systems or CBDCs to surveil citizens and possibly non-citizens, exert influence or pressure on political opponents, or control economic activity. Privacy considerations may be especially pronounced for communities hesitant or unable to engage in the existing financial system, and for certain types of transactions that may present political or social risks to individuals; specifically, members of disenfranchised communities and political activists.

To promote privacy and human rights globally and to aid in adoption, CBDC should prioritize privacy and minimize the amount of transaction and personally identifiable information collected by the central bank. The system design, deployment, and maintenance should adhere to privacy engineering and risk management best practices, including disassociability, the principle of least privilege, and data minimization.[96] Technological innovations, such as privacy-enhancing technologies and zero-knowledge proofs, could increase functionality while maintaining additional privacy protections. The United States could consider prioritizing research and development in privacy-enhancing technologies as a critical component of U.S. CBDC technological research.

Along with these design considerations, a CBDC system should have a governance structure that applies to both the central bank and intermediaries, that includes consumer protections to prevent the disclosure of consumer financial information and protect the user from undue government scrutiny. The central bank and any third-party intermediaries should provide public guidance to users about how any financial information that must be collected will be used and protected. These governance features should be in line with U.S. government privacy standards.[97] Depending on design, a CBDC could present particularly pronounced concerns about the federal government's access to sensitive private information and the development of a U.S. CBDC may warrant the reevaluation of existing privacy standards and emphasize the importance of research into privacy enhancing technology.

Whether or not the United States adopts a U.S. CBDC, other countries may choose to do so. Consistent with the framework outlined in the Executive Order, the United States has an interest in ensuring that such systems are aligned with the principles of privacy, human rights, and other democratic values. As noted in our framework, the U.S. government is actively engaged internationally to promote the development of digital asset and CBDC technologies

96 NIST defines the principle of least privilege as follows: "a security architecture should be designed so that each entity is granted the minimum system resources and authorizations that the entity needs to perform its function." Michael Nieles, Kelly Dempsey & Victoria Yan Pillitteri, NIST Special Publication 800-12 Rev. 1: An Introduction to Information Security, https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-12r1.pdf.

97 *See generally* The Privacy Act of 1974, 5 U.S.C. 552a *et seq.*; Gramm-Leach-Bliley Financial Services Modernization Act, 15 U.S.C. §§ 6801 *et seq.*

consistent with our values and legal requirements and to adapt, update, and enhance adoption of global principles and standards for how digital assets are used and transacted.

The privacy considerations implicated by instant payment systems would be similar to those presented by other bank-intermediated systems, whereby banks are required to protect customer data from disclosure. In some cases, stablecoin transactions are recorded on a public distributed ledger. Given advances in blockchain analytics technology, this public aggregation of transactions could present risks to privacy.

### Consideration 3: Advancing financial inclusion and equity

Promoting financial inclusion and equity are key goals of U.S. economic policy.[98] Financial inclusion and equity may be achieved by expanding equitable access to financial services, particularly for those underserved by the traditional banking system, promoting greater and more cost-efficient access to financial products and services, ensuring that the benefits of financial innovation may be enjoyed equitably by all at their choosing, and mitigating any disparate impacts of financial innovation.[99]

However, as discussed in Section II, a substantial number of American households are currently unbanked or underbanked. Innovations to payment systems, including a potential CBDC, should enable access for a broad set of potential consumers and uses, with appropriate restrictions to mitigate specific risks, including consumer protections to address resolution of errors.

The payment system should expand equitable access to deposit and payment products and services, as well as bank and other sources of credit. This includes expanding access for people of color, rural communities, individuals without the resources to maintain expensive devices or reliable internet access, and individuals with cognitive, motor, or sensory impairments. The payment system should also prevent harm. Technological advances, educational material, and support should be leveraged to overcome the potential technical and economic barriers to using a payment system that may disproportionately harm some communities. If possible, offline capability should be incorporated into new payment systems. The payment system should support equity-advancing initiatives, and, with the cooperation of a range of organizations, could be used for the administration of social safety net programs.

A CBDC could serve the unbanked and underbanked by providing a low-cost, easily accessible alternative to existing private sector payment services. To do so, there would likely need to be an option for access to the CBDC that did not require technological access for lower-value transactions. This could potentially increase access to other financial services

98 *See, e.g.*, Economic Report of the President (April 2022), https://www.whitehouse.gov/wp-content/uploads/2022/04/ERP-2022.pdf; FRB Money & Payments, *supra* note 6, at 16.

99 *See* Exec. Order No. 14067, *supra* note 1, at §2(e).

and reduce the need for the transfer of physical cash. As it is designed, implemented, and maintained, a payment system that is designed by the federal government should take particular notice of E.O. 13985 (***Advancing Racial Equity and Support for Underserved Communities Through the Federal Government***) and E.O. 14058 (***Transforming Federal Customer Experience and Service Delivery to Rebuild Trust in Government***).[100]

Yet, a CBDC could also further exacerbate financial exclusion for individuals lacking reliable access to technological services, the ability to pay for any costs associated with the system, the identification or other requirements to establish accounts, or trust in the appropriate use of the data collected with a CBDC system. To mitigate the risk, a U.S. CBDC could incorporate offline functionality. At the same time, the development of a U.S. CBDC should be coupled with government efforts to increase mobile and broadband access. The United States should also seek to maximize user choice and take steps to preserve the ability of consumers to use cash. Finally, use of a new payment system, including a potential U.S. CBDC, should not be mandated.

There are potential modifications to instant payment systems that would make financial inclusion aspects of CBDC and instant payment systems comparable. Specifically, instant payment systems could have an associated framework or foundation, that could include technology, that participants could use with their communities and customers to promote inclusion. Banks could be encouraged to offer low-cost or no-cost accounts to consumers; these accounts could include access to instant payment services. This could be a gateway into the banking system for consumers who are unbanked. For consumers wary of the banking system, nonbank providers offer similar accounts or other intermediation functionalities; however, they currently generally lack direct access to Federal Reserve payment systems and are not subject to comprehensive federal prudential regulation.

Some proponents of stablecoins argue that stablecoins have the potential to promote inclusion goals by reducing the cost of payments and reliance on banks and other intermediaries. However, the inclusion benefits of stablecoins may be limited to the extent that stablecoins are not appropriately regulated, operate on networks characterized by frequent congestion and high fees, or expose holders to potentially significant counterparty risk of the issuer or custodial wallet, as well as significant cyber or operational risks. And finally, stablecoins may exacerbate issues with financial inclusion in ways similar to CBDC, particularly those associated with access to technology.

100 Exec. Order No. 13985, 86 Fed. Reg. 7009 (Jan. 20, 2021); Exec. Order No. 14058, 86 Fed. Reg. 71357 (Dec. 13, 2021).

## Consideration 4: Minimizing risks

A system of money and payment should have design features that protect the singleness of the currency, support financial stability, preserve credit creation, minimize the risk of illicit financial transactions, and promote environmental sustainability.

### Singleness of the currency

A key consideration is how different forms of money and payments support the singleness of the currency, defined as the use of money that is dollar-denominated and convertible at par from one form or issuer to another. Cash, reserve balances, and bank deposits all satisfy these requirements. Inconvertibility of monies has proven to amplify shocks in times of stress.[101]

Future developments could potentially erode the singleness of the currency. The emergence of private forms of money, including digital assets, that are not subject to effective prudential oversight, could introduce significant levels of risk into the payment system. Fragmentation of the payment system also could result from the growth of private forms of money that are not interoperable.

By construction, and assuming that a U.S. CBDC would be convertible one-for-one with other Federal Reserve liabilities, a U.S. CBDC would preserve a uniform currency.[102] Even if private-sector-issued stablecoins or other money-like digital assets continued to circulate, a CBDC could be used as a settlement medium across platforms, ensuring convertibility across monies and preserving monetary sovereignty. This could anchor confidence in money and the regulated financial system, given that banks must exchange deposits and other short-term liabilities for cash.

Instant payment systems may support the singleness of the currency by providing cheap, fast, and broadly accessible payment services, which could increase the attractiveness of bank deposits and thereby reduce demand for nonbank mediums of exchange.

The implications of stablecoins for the singleness of the currency are less clear. While well-designed and regulated dollar-denominated stablecoins could support the singleness of the currency, stablecoins currently are not subject to appropriate regulation and oversight on a comprehensive and consistent basis, and, therefore, are vulnerable to runs. Legislation to establish such a framework would mitigate these risks and help ensure that they remain in place over time.[103]

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101 *See* Gary B. Gorton & Ellis W. Tallman Fighting Financial Crises (2018); Gary Gorton, *Clearinghouses and the Origin of Central Banking in the United States*, 45 J. Econ. Hist. 277 (1985).

102 *See* Barry Eichengreen, *From Commodity to Fiat and Now to Crypto: What Does History Tell Us?* (NBER working paper no. 25426, Jan. 2019), https://www.nber.org/papers/w25426.

103 *See, e.g.,* PWG Report, *supra* note 58.

## Safe assets and stress

A well-designed CBDC should support financial stability. As with Treasury securities or reserve balances, a broadly available safe asset could crowd out private money creation.[104] This could support financial stability in normal times and potentially decrease the probability of a crisis or losses during periods of stress. A CBDC could also mitigate maturity mismatch on bank balance sheets, if deposit holders substituted towards CBDC and banks then turned to alternative sources of funding.[105]

In addition, a U.S. CBDC could help meet global demand for dollar funding, in normal times and particularly in times of stress. Investors could obtain dollar liquidity in the form of CBDC from banks or other intermediaries, broadening the availability of dollars in more than one form and easing funding pressures in stress periods. Meanwhile, wholesale CBDC could be used for the final settlement of financial transactions, in line with principles for financial market infrastructures that encourage money settlements to occur in central bank money.[106] These safe asset benefits should be weighed against potential costs, including negative implications on credit availability to businesses or consumers.

Under stress, the dynamics of CBDC holdings and substitutability could be notably different compared with normal times. In times of stress, CBDC could attract sizeable inflows if the creditworthiness of private-sector-issued liabilities were to come into question.[107] Evidence suggests that investors are more likely to shift into safer instruments if the costs of doing so are relatively modest; simple interfaces or ease of transfer into CBDC could paradoxically lower such costs and increase risks.[108] Inflows into CBDC could be destabilizing, particularly if there was fear or contagion that led solvent or liquid banks or other institutions to be perceived as fragile. Two tools to mitigate these inflows could be to lower the interest rate paid on CBDC, if that functionality was incorporated, or to impose holding limits.

Authorities would also have to consider the appropriate level of foreign access to a U.S. CBDC to avoid risks of harm to the international monetary and financial system. In general, but

104 *See generally* Robin Greenwood, Samuel G. Hanson & Jeremy C. Stein, *A Comparative-Advantage Approach to Government Debt Maturity*, 70 J. Fin. 1683 (2015).

105 *See* Todd Keister & Cyril Monnet, *Central Bank Digital Currency: Stability and Information* (Office of Financial Research working paper, July 12, 2022), https://www.financialresearch.gov/working-papers/files/OFRwp-22-04_central-bank-digital-currency.pdf.

106 *See* Bank for International Settlements Committee for Payments and Financial Market Infrastructures, Principles for Financial Market Infrastructures 2 (April 2012), https://www.bis.org/cpmi/publ/d101a.pdf.

107 *See generally* Josh Frost, Lorie Logan, Antoine Martin, Patrick McCabe, Fabio Natalucci & Julie Remache, *Overnight RRP Operations as a Monetary Policy Tool: Some Design Considerations*, Board of Governors of the Federal Reserve System Finance and Economics Discussion Series (2015), https://www.federalreserve.gov/econres/feds/overnight-rrp-operations-as-a-monetary-policy-tool-some-design-considerations.htm. Under some conditions, theoretical models suggest the introduction of CBDC could increase the frequency of banking panics. *See* Stephen D. Williamson, *Central Bank Digital Currency and Flight to Safety*, 142 J. Econ. Dynamics & Control 104146 (2022).

108 *See generally* Marco Cipriani & Gabriele La Spada, *Sophisticated and Unsophisticated Runs*, Federal Reserve Bank of New York Staff Reports (No. 956, Dec. 2020).

especially in times of stress, a U.S. CBDC that facilitates easier foreign access to the dollar outside of the United States could increase currency substitution pressures abroad, undermine foreign authorities' ability to manage their macro-financial policy, and amplify any underlying vulnerabilities in a jurisdiction's financial sector or currency.

Instant payment systems could enhance financial stability, as they would offer an orderly and robust funds transfer system, both in normal times and under stress. Inflows to safe assets and runs from risky assets would likely not affect perceptions of instant payment systems. However, credit or liquidity concerns about institutions with access to instant payment systems could affect volumes and values transferred, and so instant payment systems need to be operationally resilient to accommodate increased flows under stress.

A stablecoin might attract inflows in times of stress for reasons similar to CBDC. The extent of these inflows depends on a number of factors, including features of the stablecoin and features of other safe assets. On the one hand, a stablecoin might not incorporate holding limits or other checks on inflows during stress periods that a CBDC might incorporate. On the other hand, a stablecoin that is not adequately backed or perceived as safe could be subject to outflows during stress periods. Moreover, and depending on the underlying technology, stablecoins may be subject to congestion and high transaction fees that could also add to systemic risk under stress. Foreign access and use of U.S. dollar-denominated stablecoins outside of the United States could also raise similar issues abroad as a U.S. CBDC.

## Credit creation

Banks are major providers of credit to households and businesses. If CBDC reduces bank deposits, banks may have a more limited ability to make loans, in addition to potential increases in bank liquidity risk. A wholesale CBDC that is available only to those institutions that currently have access to reserve balances would minimize any potential effect on credit creation at the time of implementation of CBDC. That said, the eventual effects on banking intermediation are uncertain.[109]

The effect of instant payment systems on financial intermediation depends on the types of entities granted access to these systems: whether the ability to participate in the service is limited to banks or extended to nonbanks. Limiting participation largely to banks, as is the current state, could minimize disruption to credit creation, but doing so would also dampen potential benefits arising from increased competition or access to payment systems, including to underserved communities. While nonbanks can participate in instant payment

109 Some research suggests that total intermediation would remain unchanged, although the funding of intermediation could shift. *See* Markus K. Brunnermeier & Dirk Niepelt, *On The Equivalence of Private and Public Money*, 106 J. Monetary Econ. 27 (2019).

systems through a bank, offering direct access could provide additional competitive or access benefits.

Because stablecoins are currently issued by nonbanks, the effects of stablecoins on financial intermediation would depend more on how stablecoins are issued and the extent to which the assets backing stablecoins include loans or other private credit. To the extent that the assets backing stablecoins do not support private credit, negative effects on intermediation could be more pronounced.

## Illicit finance

Criminals and illicit actors can abuse financial technology and services to make fraud schemes, drug sales, corruption, and ransomware attacks more effective and profitable, and achieve other illicit ends. The United States has a fundamentally strong and effective AML/CFT regime designed to detect, report, and disrupt illicit financial activity. The regime is designed to bring transparency to the movement of money within the U.S. financial system, prevent the flow of illicit funds, and enable the reporting of suspicious transactions by U.S. financial institutions when identified.

The FATF standards call for CBDCs to be subject to the same standards as fiat currency and the G7 policy principles for CBDC acknowledge that a CBDC issuer needs to integrate a commitment to mitigate their use in facilitating crime.[110] As a leader in the international financial system, a U.S. CBDC should be designed to promote AML/CFT compliance and mitigate illicit finance risks. This should include a form of effective identity verification and enough access to data to enable compliance with AML/CFT obligations such as transaction monitoring or record keeping, as necessary, as well as ensuring that intermediaries are supervised by the appropriate regulatory authority. In line with the risk-based approach, a CBDC system could also use access tiering based on user accounts, such as where account restrictions (e.g., holding and/or transaction limits) are imposed based on the level of identity verification.

The development of foreign CBDCs with inadequate AML/CFT controls could also pose risks to the international financial system. For example, a foreign CBDC that allows anonymity at-scale could allow malign actors, such as sanctioned individuals, to move, hold, or launder illicit funds with the liquidity and anonymity of cash but without some of its practical limitations.

To promote foreign CBDCs with strong AML/CFT controls, the U.S. should work with the G7 and other allies and partners to consider leading cross-border payment experiments focused on innovations in AML/CFT compliance for cross-border CBDCs. The United States should also work with allies and partners to address the risks of a potential foreign CBDC used to

110 *See* FATF, *supra* note 82, at 26–27; G7, *supra* note 83, at 10.

evade sanctions which will be critical because of the network effect in international currency adoption. The U.S. should also work through the FATF to monitor emerging AML/CFT risks posed by CBDCs.

Any financial institutions with access to U.S. instant payment systems or stablecoin service providers operating in the United States would be generally subject to U.S. AML/CFT obligations. Stablecoins are generally not distinct from other digital assets, and financial institutions offering services in stablecoins in the United States are subject to the same AML/CFT regulatory and supervisory framework as financial institutions providing the same services with other financial instruments.

Globally, most countries lack effective AML/CFT regulatory frameworks for digital assets, including stablecoins, that are in line with the global standards.[111] Illicit actors can exploit these gaps by using services in countries with weak regulatory and supervisory regimes to launder funds, store proceeds of crime, or evade sanctions in stablecoins or other digital assets. The liquidity of a widely adopted stablecoin could make stablecoins more attractive to criminals which would heighten the importance of effective global regulation and supervision of digital assets.

## Environmental sustainability

The United States has set overarching environmental priorities, including cutting U.S. greenhouse gas pollution by 50-52 percent by 2030 and transitioning to a net-zero emissions economy by 2050.[112] A new payments system or improvements to existing payment systems should be compatible with these priorities and seek to minimize energy use, resources, greenhouse gas emissions, and other pollution, and improve environmental performance relative to the status quo of the existing payments system.

Reflecting these priorities, forms of money and payment need to be environmentally sustainable. If based on a blockchain, a U.S. CBDC would likely use a permissioned blockchain, which consumes relatively less energy than a permissionless implementation, as the majority of the energy use from permissionless blockchains derives from the consensus mechanism.[113] In addition, policymakers could require energy efficiency as a key tenet of the development

111 FATF, Targeted Update on Implementation of FATF Standards on Virtual Assets-VASPs 7 (June 2022), https://www.fatf-gafi.org/media/fatf/documents/recommendations/Targeted-Update-Implementation-FATF%20Standards-Virtual%20Assets-VASPs.pdf.

112 *See* U.S. Dep't of State & Exec. Off. of the President, The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050 (Nov. 2021), https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf.

113 *See* White House Office of Science and Technology Policy, Climate and Energy Implications of Crypto-Assets in the United States 5 (Sept. 2022), https://www.whitehouse.gov/wp-content/uploads/2022/09/09-2022-Crypto-Assets-and-Climate-Report.pdf.

of a U.S. CBDC technology. This technology could form the basis of environmentally sustainable technologies for other financial markets, promoting public welfare.

In part because they would not be based on a permissionless blockchain, instant payments do not raise the same questions of environmental sustainability and are likely to be consistent with the Administration's climate goals. The proof-of-work consensus mechanism associated with certain blockchains uses more energy than some countries do.[114] Therefore, stablecoins that rely on proof-of-work blockchains likely represent the least efficient option from a sustainability perspective. Although technologies are under development that could lessen energy use, a permissioned blockchain or instant payments would be more sustainable options with current technology.

114 *See id.*

# V. Recommendations

While the current U.S. system of money and payments has significant strengths, the United States also needs to continue to innovate in support of its policy objectives. As set out in the Executive Order and outlined in the Appendix of this report, these objectives center around themes of developing a future system of money and payments that promotes U.S. values, fosters inclusion, and minimizes risks. The following recommendations would help achieve these objectives. The recommendations are for the U.S. government to:

### Recommendation 1: Advance work on a possible U.S. CBDC, in case one is determined to be in the national interest.

A U.S. CBDC has the potential to offer significant benefits, but further research and development on the technology that would support a U.S. CBDC is needed, and could take years. A U.S. CBDC could contribute to a payment system that is more efficient, provides a foundation for further technological innovation, facilitates more efficient cross-border transactions, and is environmentally sustainable. It could promote financial inclusion and equity by enabling access for a broad set of consumers. In addition, it could be designed to foster economic growth and stability, protect against cyber and operational risks, be consistent with individual rights, and minimize risks of illicit financial transactions.

A potential U.S. CBDC could also have national security implications, and should be designed to help preserve U.S. global financial leadership, and support the effectiveness of sanctions. Moreover, the United States should ensure that international standards for CBDCs are consistent with U.S. values and priorities like protecting privacy and combatting illicit finance.

Still, there could be unintended consequences of a U.S. CBDC, including runs to U.S. CBDC in times of stress, which could pose risks to financial stability; a reduction in credit availability; or higher credit costs for businesses and governments. Moreover, a U.S. CBDC must be extremely reliable and, for that reason, technological experimentation with U.S. CBDC may not be at the same speed as private sector payment innovations.

The Federal Reserve published a discussion paper in January 2022 titled ***Money and Payments: The U.S. Dollar in the Age of Digital Transformation***.[115] The discussion paper solicited comments on a variety of policy considerations and noted that the Federal Reserve will only pursue a U.S. CBDC in the context of broad public and cross-governmental support.

The Federal Reserve is encouraged to: continue its research and technical experimentation on CBDCs, including its work on analyzing the possible choices of technology and other design elements of a CBDC; continue evaluating policy considerations as described in its January 2022 discussion paper; find mechanisms to provide the public with periodic updates

115 FRB Money & Payments, *supra* note 6.

on these initiatives, given the strong public interest in this topic; and consider how research and development on digital assets and other related innovations that is conducted or supported by other Federal agencies could support a U.S. CBDC.

To support the Federal Reserve's efforts and to advance further work on a possible U.S. CBDC, actions in the following areas should be taken:

- The Treasury Department will lead an inter-agency working group ("CBDC Working Group") to coordinate and consider implications of adoption of a U.S. CBDC for policy objectives such as national security, democratic values, the smooth functioning of the international financial system, financial inclusion, and privacy. The CBDC Working Group will continue to assess the merits of a CBDC and leverage cross-government technical expertise to the extent useful for Federal Reserve efforts.
- The CBDC Working Group will engage in information sharing with allies and partners on CBDC policy priorities, and support the Federal Reserve, as appropriate, in engaging with allies and partners to promote shared learning and responsible development of CBDCs.
- The principals and/or deputies of the Federal Reserve, National Economic Council, National Security Council, the Office of Science and Technology Policy, and the Treasury Department will meet regularly to discuss the progress of the CBDC Working Group and share updates on CDBC and other payments innovations. Representatives from other offices and agencies within the Executive Branch will join, as appropriate.

### Recommendation 2: Encourage use of instant payment systems to support a more competitive, efficient, and inclusive U.S. payment landscape.

New instant payment systems have been recently developed or are scheduled to launch soon, capable of handling higher volumes of transactions at lower cost than some current payment systems. Experience with instant payment systems around the world suggests that enhancements are possible to make the payment system more competitive, efficient and inclusive and might also reduce the costs of cross-border transactions.

Yet frictions may limit the extent to which the potential benefits of instant payment systems are realized. Consumers, businesses, and financial institutions may need to adjust their financial habits and practices to incorporate new technologies. In addition, some instant payment systems are directly accessible only by depository institutions or members of the Federal Reserve System.[116] Potential improvements to cross-border payment systems present a range of challenges, including governance issues and risks that might arise when considering interoperability of cross-border systems.

116 Federal Reserve System, *supra* note 30.

The U.S. government should consider the following actions related to instant payment systems:

- The U.S. government should continue its outreach efforts to consumers, businesses, and financial institutions, with a focus on inclusion of underserved communities. International engagement should also continue.
- The U.S. government should promote development and use of innovative access technologies by payment providers, to facilitate greater consumer access to, and use of, instant payment systems. These efforts could include continued engagement in standard setting, including for interoperability, clarification of regulatory frameworks where necessary, and potentially public-private partnerships to explore possibilities for low-tech instant payment system access. These efforts also could include considering the potential benefits and drawbacks of expanding eligibility to directly participate in instant payment systems, as discussed in Recommendation 3.
- In settings where appropriate, U.S. government agencies should consider and support the use of instant payment systems. The U.S. government sends and receives millions of payments per day. Use of instant payment systems by U.S. government agencies could promote the expedient distribution of disaster, emergency or other government-to-consumer payments, potentially providing more rapid support for underserved communities.

### Recommendation 3: Establish a federal framework for payments regulation to protect users and the financial system, while supporting responsible innovations in payments.

The United States should promote responsible innovations in payments. Nonbanks are increasingly providing payment services, including issuing money (or money-like) liabilities and processing payments. On the one hand, participation by nonbank payments companies may contribute to higher levels of competition, inclusion, and innovation. On the other, if these firms are not adequately regulated and supervised, there may be risks to consumers, the financial system, and the broader economy. A federal framework for payments regulation would help to realize the benefits from nonbank payment providers while minimizing the risks. Accordingly, Treasury recommends consideration of the establishment of a federal framework for nonbank payment providers that would complement existing federal requirements, including for consumer protection and AML/CFT.

A federal framework for payments regulation could support responsible innovation in payments by establishing appropriate federal oversight of nonbank companies that are involved in the issuance, custody, or transfer of money or money-like assets. Today, nonbank payment providers are subject to some federal requirements, but are otherwise regulated

and supervised at a state level.[117] State oversight of nonbank payment providers varies significantly, and is generally not designed to address run risk, payments risks, or other operational risks in a consistent and comprehensive manner.[118] A federal framework for payments regulation would provide a common floor for minimum financial resource requirements and other standards that may exist currently at the state level, and thus build on existing state frameworks. In considering and developing a federal framework, policymakers would consider existing state and federal standards, the nature and risks of payment activities, and developments in payments. Such a framework would also complement existing federal AML/CFT obligations and consumer protection requirements that apply to nonbank payment providers.

In addition, a federal framework for payments regulation could support considerations for both a U.S. CBDC and instant payments. As discussed above, a U.S. CBDC system may rely on intermediaries for a wide range of services, including payment services, custody, and distribution. A federal framework for payments regulation would provide a clear basis for oversight of such firms. In addition, an appropriate federal framework for payments regulation could provide a pathway for allowing nonbank payment providers to participate directly in instant payment systems (see Recommendation 2).[119]

### Recommendation 4: Prioritize efforts to improve cross-border payments.

Private sector payment innovations have been driven in part by inefficiencies in the current cross-border payment systems. To respond to these inefficiencies, countries are making efforts to enhance cross-border payments, both through improvements to existing systems and also with forward-looking work that leverages new technologies. The United States also has a strong national interest in being at the forefront of technological development and supporting global standards for cross-border payment systems that reflect U.S. values, including privacy and human rights; are consistent with AML/CFT considerations; and protect U.S. national security.

The United States is already very active in efforts to improve cross-border payments, including through the G20, FSB and Committee on Payments and Market Infrastructure (CPMI). In 2020, the G20 endorsed a roadmap for enhancing cross-border payments, which sets out an

117 Federal law applies to some aspects of payment services, including the Electronic Funds Transfer Act and the Bank Secrecy Act. *See, e.g.*, 15 U.S.C. §§ 1693 *et seq.*; 31 U.S.C. §§ 5311 *et seq.* *See also* 12 U.S.C. § 378(a)(2).

118 *See* Andrew P. Scott, Telegraphs, Steamships, and Virtual Currency: An Analysis of Money Transmitter Regulation (Congressional Research Service Report No. R46486, Aug. 20, 2020), https://crsreports.congress.gov/product/pdf/R/R46486; Lael Brainard, "The Digitalization of Payments and Currency: Some Issues for Consideration," speech presented at the Symposium on the Future of Payments, Stanford, CA, February 5, 2020; Dan Awrey, *Bad Money*, 106 Cornell L. Rev. 1 (2020); Dan Awrey & Kristin van Zwieten, *Mapping the Shadow Payment System* (SWIFT Institute Working Paper No. 2019-001, Cornell Legal Studies Research Paper No.19-44, Oxford Legal Studies Research Paper No. 55/2019, October 8, 2019), https://ssrn.com/abstract=3462351.

119 *See* Federal Reserve System, *supra* note 30.

ambitious workplan to meet the U.S. policy priority of developing a faster, cheaper, and more transparent international payments system. These efforts should be elevated and prioritized to achieve outcomes in coordination with other jurisdictions, including but not limited to:

- Fostering the safety and soundness of private and public sector innovations for cross-border payments, while protecting U.S. national security;
- Considering the feasibility of new multilateral platforms and arrangements for cross-border payments, including utilizing instant payments;
- Working across jurisdictions to align regulatory, supervisory, and oversight frameworks for cross-border payments; and
- Harmonizing data and market practices for cross-border payments.

# VI. Appendix: Policy objectives

This Appendix sets out eight principal policy objectives, drawn from Executive Order 14067, that inform this Report's analysis of payment system innovations, including a potential U.S. CBDC. Because this Appendix may also serve as a set of shared objectives for other reports required by Executive Order 14067, some of the concepts previewed here are more appropriate for in-depth consideration by other reports.

1. Provide benefits and mitigate risks for consumers, investors, and businesses[120]
    a. Consumers, investors, and businesses should be financially protected
    b. Consumers, investors, and businesses should be digitally protected
2. Promote economic growth and financial stability and mitigate systemic risk[121]
    a. The payment system should support economic activity
    b. The payment system should ensure the resilience of the financial system
    c. The payment system should be operable in normal circumstances and under stress
3. Improve payment systems[122]
    a. The payment system should be functional
    b. The payment system should be efficient
    c. The payment system should be secure
    d. The payment system should be flexible
4. Ensure the global financial system has appropriate transparency, connectivity, and platform and architecture interoperability or transferability, as appropriate[123]
    a. The payment system should be appropriately interoperable.
5. Advance financial inclusion and equity[124]
    a. All should be able to use the payment system
    b. The payment system should expand equitable access to the financial system

120 *See, e.g.*, Exec. Order No. 14067, 87 Fed. Reg. 14143 (March 9, 2022) §§ 1; 2(a); 2(d); 4(a)(i); 5; 8(a)(i); 8(a)(v).
121 *See, e.g.*, *id.* at §§ 1; 2(b); § 4(a)(i); 4(a)(iii); 4(b); 4(b)(i); 6; 8(a)(i).
122 *See, e.g.*, *id.* at §§ 1; 2(d); 2(e); 4(a)(i); 4(a)(iii); 4(b); 4(c); 8(a)(ii); 8(a)(iii).
123 *See, e.g.*, *id.* at §§ 2(d); 4(a)(ii); 4(a)(iii); 8(a)(ii); 8(a)(v).
124 *See, e.g.*, *id.* at §§ 1; 2(e); 4(a)(i); 4(a)(iii); 4(b)(ii); 5(a).

6. Protect national security[125]
    a. The payment system should promote compliance with AML/CFT requirements and mitigate illicit finance risks
    b. The payment system should support U.S. leadership in the global financial system, including the global role of the dollar
7. Provide ability to exercise human rights[126]
    a. The payment system should respect democratic values and human rights.
8. Align with democratic and environmental values, including privacy protections[127]
    a. Sensitive financial data should be private
    b. The payment system should be sustainable

125 *See, e.g., id.* at §§ 1; 2(c); 2(d); 2(f); 4(a)(i); 4(a)(iii); 4(b)(v); 4(b)(vi); 7; 8(a)(i).
126 *See, e.g., id.* at §§ 1; 2(f); 4(a)(i); 4(b)(vi).
127 *See, e.g., id.* at §§ 1; 2(a); 2(c); 2(d); 2(f); 4(a)(ii); 4b(iv); 4(b)(vii); 5(b); 5(b)(v); 8(a)(ii); 8(a)(v).

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