

Lassiter, Jennifer

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Jennifer Lassiter

The Business Case for Exploration of a U.S. Central Bank Digital Currency

In May 2020, when the Digital Dollar Project published its initial white paper, *Exploring a U.S. Central Bank Digital Currency (CBDC)*, the world was engulfed by a global pandemic and corresponding economic recession. As the U.S. government struggled to efficiently distribute emergency relief funds to citizens, it became apparent that the United States' financial infrastructure had become just as outdated as its physical infrastructure and that far too many Americans are excluded from the existing financial system.

The pandemic also added a new sense of urgency to already accelerating waves of digital innovation. Public and private entities across the globe expedited their research and experimentation into tokenized assets, including digital commodities, contracts and legal titles. In the years that followed, companies and investors have poured money into developing new digital worlds made accessible via immersive technologies. Novel classes of digital assets underpinned by technologies such as blockchain and distributed ledgers dominated headlines and captured public attention and public awareness of digital currencies increased.

Central banks were watching and have moved to utilize these new technologies – in part because of thoughtful private sector-led education and exploration efforts. Fast-forward to January 2023: The central banks of 114 countries or currency unions are at various stages of active CBDC exploration – a significant uptick from May 2020, when just 35 countries were exploring CBDCs (Atlantic Council, 2023). The rise of CBDCs is no longer hypothetical – it is real, and it is happening now. Several central banks have already deployed a CBDC, and major players on the global stage, such as the European Central Bank (2023), have stated a goal of issuing a CBDC this decade. Notably, China has issued its pilot CBDC to 260 million

digital wallets and is actively engaging with other countries and international organizations to begin shaping global standards for the future of money (Elston, 2023).

In this context of unparalleled technological change and global activity, the United States has significantly increased its own research and experimentation into a U.S. CBDC – or “digital dollar.” From the Federal Reserve Board and System, we have seen three activities: First, in January 2022, the U.S. Federal Reserve Board released *Money and Payments: The U.S. Dollar in the Age of Digital Transformation*, a paper that examines the pros and cons of a potential digital dollar, and whether and how a digital dollar could improve the safe and efficient domestic payments system. Second, in March 2022, the Federal Reserve Bank of Boston, in collaboration with Massachusetts Institute of Technology's Digital Currency Initiative, released phase 1 of Project Hamilton, providing the U.S.'s first and only technical research on the retail application of CBDC (Digital Currency Initiative, 2023). The primary goal of this exploratory research was to design a core transaction processor that meets the robust speed, throughput and fault tolerance requirements of a large retail payment system. For further consideration and iteration, the work was shared under the MIT Open-Source License. And third, in November 2022 and May 2023, the Federal Reserve Bank of New York released findings from Project Cedar Phase 1 and Phase 2 (Federal Reserve Bank of New York, 2022, 2023). Project Cedar is a multiphase technical research effort evaluating the potential applications of financial technology solutions to improve the efficiency of wholesale cross-border payments. Phase 1 developed a prototype for a wholesale CBDC ledger to demonstrate the potential of distributed ledger technology (DLT) to improve the speed, cost and access to a foreign exchange spot transaction. Phase 2 was a joint research experiment with the Monetary Authority of Singapore examining a cross-border multi-currency use case and the ability of DLT to establish connectivity across heterogeneous simulated currency ledgers, reduce settlement risk and decrease settlement time.

Concurrently, in March 2022, the Biden Administration issued an Executive Order on Ensuring Responsible Development of Digital Assets calling for specific federal resources to be dedicated to a variety of measures including the exploration of a U.S. CBDC (The White House, 2022). As a result, several federal agencies requested

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Jennifer Lassiter, The Digital Dollar Project, Washington DC, USA.

public comment and posted working papers between June 2022 and October 2022. Today the U.S. Treasury Department continues to engage in digital dollar research through an inter-agency working group established via the executive order.

From a legislative perspective, while the United States Congress has been more actively engaged on CBDC than other legislative bodies worldwide and there have been some attempts at legislating CBDC research, none have passed through both chambers of Congress for the President's signature.

And finally, the pace of private sector activity has been similarly constant. In November 2022, the Digital Dollar Project, in partnership with the Depository Trust and Clearing Corporation, released findings from a wholesale CBDC security settlement pilot (Digital Dollar Project and DTCC, 2023). The pilot was the first private sector initiative to explore how tokenized securities and a tokenized wholesale CBDC could operate within the U.S. settlement infrastructure leveraging DLT. Leading market firms participated, including Bank of America, Citi, Nomura, Northern Trust, State Street, Virtu Financial and Wells Fargo. Late 2022 also brought the publication of the proof of concept for a regulated liabilities network (RLN) and use case for a U.S. pilot. The RLN pilot explores the feasibility of a multi-entity distributed ledger for use in settling tokenized bank deposits and tokenized CBDC (Business Wire, 2022). Several non-U.S. pilots have included U.S. multinational corporations, including Swift's multi-phase cross-border CBDC experimentation (2023).

Much criticism about the U.S. role in CBDC experimentation is anchored to the fact that the U.S. has been late to the game. That may be true, at least in public form, but the last 16 months have shown increased activity from both the U.S. public and private sectors. This heightened interest is important as the world considers the potential value of central bank digital currency.

Why the research matters

A CBDC is a digital form of a country's national currency that is issued and backed by the country's central bank. CBDCs are used in a manner similar to physical cash but exist in a digital format. In the context of the United States, a digital dollar would be issued by the Fed with the U.S. government's full faith and credit, a complement to and not a replacement for physical cash.

CBDCs can be used for a wide range of transactions, including retail purchases, peer-to-peer (P2P) payments, and business-to-business (B2B) payments. They may

also be used to facilitate the efficient clearing and settlement of financial transactions and to support the operations of payment systems. As central banks evaluate and seek to utilize CBDCs, one of the main goals identified is providing the general public with a safer and potentially more inclusive and accessible payment option. CBDCs could also be used to foster financial stability and support monetary policy.

When discussing CBDCs, it is important to understand the two main forms: retail and wholesale. Retail CBDC¹ refers to a CBDC accessible to individual consumers that can be used for everyday purchases and P2P payments. Wholesale CBDC is a type of CBDC utilized by financial institutions or other major entities rather than individuals that can be used for interbank settlements and other large financial transactions.²

The fundamental benefit of the concept of a digital dollar is that there is no better riskless settlement medium than U.S. central bank money, which must be codified for continued relevance and accessibility. A digital dollar could upgrade the infrastructure of money – the ultimate public good – and future-proof the dollar for the increasingly digitized 21st century.

A CBDC is distinct from other forms of existing digital payment instruments, such as credit cards and payments apps, as it would be a direct claim on a central bank instead of a liability of a private financial institution. And a tokenized digital dollar could be a bearer instrument that would represent a significant technical upgrade over the outdated and time-consuming account-based financial system.

Further, if designed to ensure interoperability with existing domestic and foreign payments systems, robust pri-

- 1 Among the multitude of highly effective payment options in the U.S. (e.g. cash payment, credit, debit, etc.), a digital dollar could offer a new choice for digital transactions, instantaneous P2P payments, and in-person transactions. It could also potentially lower costs and further diversify payment rails. A digital dollar could be distributed to the end user through commercial banks and trusted payment intermediaries while facilitating financial inclusion by broadening access to services via additional mechanisms, such as digital wallets.
- 2 Today, wholesale payments rest on national payment systems, and they are typically conducted through interbank clearing using central bank money to settle securities and other large value payments in real time gross settlement systems like Fedwire. Current wholesale large value transactions are account-based and predominantly executed by banking and payment providers who have accounts with the Federal Reserve. Due to the nature of the prevailing account-based system, only organizations with accounts can transact in central bank money. Just like a physical dollar, a tokenized digital dollar would provide alternative access to central bank money outside of accounts. Accordingly, it could facilitate broader, more diverse access for institutions to large value payments and support the emergence of digital financial market infrastructures.

vacy protections, and distribution through regulated payments companies and banks, a digital dollar has the potential to increase payments efficiency, lower transaction costs and broaden access to financial services. These benefits could be realized across a range of domestic applications.

Tokenization

Tokenization is the act of turning an asset, good, right or currency into a representation with properties that suffice to attest to and transfer ownership. As an analogy to our current situation, cash is a physical token. To verify the transaction, you only need to verify the authenticity of the bill (the token), and because each bill is unique, it is impossible to spend the same bill more than once at the same time. As a bearer instrument, a dollar bill cannot be physically held by two people simultaneously (i.e. when it leaves one person's hands, it is now in the counterparty's possession). This differs from account-based electronic money, which uses a reconciliation-intensive, message-based approach to adjust entries in a ledger.

While electronic transfers of cash have been evolving for several decades, U.S. central bank money as legal currency has seen few, if any, innovations since the proliferation of bank notes during the nineteenth century. Its circulation has remained strictly local, and its functionalities limited.

Just like a physical dollar, a tokenized digital dollar could provide alternative access to central bank money outside of accounts. It is hypothesized that a token-based digital dollar would not require third-party intervention to be verified and transferred – a significant departure from today's account-based transactions (Digital Dollar Project, 2023). This is because a tokenized digital dollar would be actual money in the form of a digital token, a bearer instrument.

Accordingly, a tokenized digital dollar could facilitate broader, more diverse access for institutions to large value payments and support the emergence and evolution of digital financial market infrastructures. From a settlement perspective, a tokenized digital dollar could provide certainty of settlement with atomic delivery, either Delivery versus Payment (DvP) or Payment versus Payment (PvP). In addition to accelerating settlement, these potential approaches could serve to reduce fraud and counterparty risk. It is worth noting that decisions about settlement duration will be a business and/or policy design choice to determine the optimal settlement window for transactions.

In one example, a U.S. CBDC could support a non-Fedwire and Fedwire participant in sending and receiving pay-

ments and could provide a faster and more secure method of B2B payments. A digital dollar could exist alongside Fedwire and complement (not impede) in-flight initiatives like FedNow, a new interbank 24x7x365 real time gross settlement service with integrated clearing functionality. If available by 2023, FedNow will allow 24/7 instantaneous settlement at the Fed account level between two banks (Federal Reserve, 2023). A digital dollar is in line with the precedent set by the FedNow initiative in that it provides real-time settlement to inherently digital and portable tokenized cash without needing an intermediary to debit and credit accounts. Increasing the payment options for banks and businesses offers enhanced choices, could lower the barriers of entry to allow increased competition and encourages a higher standard of service, rather than a network run by the largest banks.

The ability for banks to make real-time debit payments available on a 24x7x365 basis improves the capital requirements and the liquidity of participating banks. A CBDC could also act as a single network throughout the U.S. that would be ubiquitous across all organizations. This stands in contrast to “closed-loop networks,” where the sender and recipient must be signed up with the same service or use chains of services. Today's services often carry some degree of credit risk because funds are made available to the recipient before the actual interbank debits and credits necessary to fund the payment have occurred. This delay occurs because funds are still travelling over existing, slower rails like automated clearing house (ACH) or credit cards and are often passing through multiple intermediaries.

For a financial markets use case, optimizations could arise through the settlement of tokenized cash and tokenized securities on ledger that could unlock new market opportunities such as variable settlement time and associated value constructs. It is hypothesized that a CBDC would enable atomic settlement of tokenized cash and tokenized securities on ledger, as well as dynamic settlement windows, without the need for additional cash settlement at the Federal Reserve through nominated banks. These new capabilities could deliver a myriad of benefits including reduction in risk, increased capital efficiency, and reduction in trapped liquidity, among other broad-based efficiency, transparency and workflow benefits.

Standards

As the global exploration of CBDC evolves, the Digital Dollar Project advocates for an active global discussion on governance, interoperability, security, privacy and scalability protections. This should include the development of an international regulatory framework around dig-

Table 1
Summary of use cases for a tokenized U.S. digital dollar

Category	Use case	Impacted stakeholders	Sizing	Hypothesized U.S. CBDC benefits (qualitative and quantitative)	Hypothetical pilots
Domestic payments	Peer-to-peer (P2P) payments	Consumers (end users), commercial banks, mobile payment providers	\$3.45 billion transaction value (2022) ¹	Faster accessibility of funds Reduced cost of a mobile payment transfer Increased financial inclusion Increased speed and ease by which developers can build secure digital wallets	<ul style="list-style-type: none"> Banking deserts Effective P2P payments Offline transactions Bank-Lite Services (no or low fee) Privacy enhanced payments
	Domestic retail payments (consumer)	Consumers (end users), commercial banks, retailers, mobile payment providers	\$9.43 trillion total card payments value in 2021 ²	Reduction of trapped liquidity Reduced need for intermediaries Additional consumer payment choice Introduction of cash-like treasury benefits Reduced verification costs	P2P Payments hypothetical pilots and: <ul style="list-style-type: none"> CBDC as a complementary offering to enhance existing account-based systems Programmable nature of currency Treasury management benefits
	Domestic retail payments (business)	Manufacturers, wholesalers, retailers	\$25 trillion business-to-business (B2B) payment volume in the U.S. in 2022 ³	Introduction of Fedwire-like benefits for non-Fedwire participants Introduction of settlement finality Reduction of settlement risk	<ul style="list-style-type: none"> Digital payment efficiencies Cash and securities on ledger Non-Fedwire participant access to central bank money for settlement
	Delivery versus payments	Settlement and clearing systems, buyer, seller	23.19 trillion equities traded annually in the U.S. (2019) ⁴	Introduction of settlement innovation, straight-through processing, and efficiencies in risk and margin requirements	<ul style="list-style-type: none"> Settlement of tokenized cash and securities on ledger
International payments	Remittance payments	Consumers (end users), commercial banks, banking intermediaries	\$626 billion remittances sent globally in 2022 ⁵ \$74 billion remittance payment outflow from the U.S. in 2021 ⁶	Ability to transfer funds without needing an intermediary Reduced costs to transfer funds Increased speed and efficiency for remittance payment processing	<ul style="list-style-type: none"> Remittance efficiencies (e.g. between U.S. and partner countries, given the \$48.9 billion in remittances sent from the U.S. to Mexico in 2021)⁷
	Cross-border payments	Institutional payers and payees, correspondent banks, settlement agents	\$136 trillion in cross-border payment flows (2018) ⁸	Introduction of atomic settlement, trade oversight transparency, risk management, and interoperability Improved efficiency Enablement of front-end modular innovation Improved experience in niche trade corridors	Remittance payments hypothetical pilots and: <ul style="list-style-type: none"> Counterparty payments without an intermediary Bank-to-bank payments Streamlining the correspondent banking network Streamlining trade corridors
Government benefits	Benefit administration	Government agencies, consumers (end users)	\$1.6 trillion spent on welfare programs in the U.S. in 2021 ⁹ 70 million benefit recipients in the U.S. in 2021 ⁹	Streamlined, transparent, and expedited distribution of federal, state, and tribal benefit distribution Operational time and cost efficiencies Mitigate fraud increase participation	<ul style="list-style-type: none"> Operational efficiencies Benefits created by programmable tokens Fraud reduction (e.g. 6.8% of SNAP payments were made fraudulently or in error in 2019)⁹
	Exceptional circumstances	Government agencies, consumers (end users)	165 million COVID-19 stimulus paper checks worth \$386 billion distributed as of May 2020 ¹⁰ \$16.9 billion in FEMA aid for New York's Hurricane Sandy recovery ¹¹	New ability to transfer riskless means of payment quickly and autonomously to households and corporations during times of crisis and national emergencies	Similar hypothetical pilots as outlined under benefit administration use case.

Sources: ¹ GSMA (2023), State of the Industry Report on Mobile Money. ² The Federal Reserve (2023, 21 April), The Federal Reserve Payments Study: 2022 Triennial Initial Data Release. ³ Mastercard (2022), How Industry 4.0 is defining the future of business payments. ⁴ World Bank (2023), Stocks traded, total value (current US\$). ⁵ The World Bank (2022), Remittances Grow 5% in 2022, Despite Global Headwinds. ⁶ Statista Research Department (2023, 12 April), Leading countries worldwide, by value of migrant remittance outflows in 2021. ⁷ BBVA Research (2022), Mexico: Remittances grew 27.1% in 2021, reaching a new historical maximum. ⁸ McKinsey & Company (2019), Global Payments Report 2019. ⁹ Lexington Law (2023), 50 important welfare statistics for 2023. ¹⁰ AARP (2021), What Is the IRS Timeline to Send the Third Stimulus Checks? ¹¹ FEMA (2015), FEMA aid reaches \$16.9 billion for New York's Hurricane Sandy Recovery.

ital currencies, including CBDCs, that prioritizes privacy, consumer protection, financial anti-crime compliance, financial stability and the protection of monetary sovereignty.

With other economies, the United States should play an important role in setting international standards for digital currencies, given the U.S. dollar is the global reserve currency. It is important to note that U.S. engagement in standards setting is independent of whether (or not) the U.S. chooses to deploy a U.S. CBDC.

Global standards are critical to ensure international operability, transferability, consistency and safety. They can reduce barriers and enhance international cooperation, and often promote societal values – including democratic values such as privacy, free enterprise and economic liberty.

Interoperability is particularly important in the design of a CBDC. It can prevent market fragmentation, increase payment provider competition and achieve broad adoption. Recent, observed trends toward siloed development should be a cause for concern.

Privacy

Privacy – a fundamental democratic ideal – is among the core principles underlying the potential success and adoption of a digital dollar. The digital dollar must support a balance between individual privacy rights and necessary compliance and regulatory processes, decided upon by policymakers and considering Fourth Amendment precedent, which generally protects privacy based on a “reasonable expectation of privacy” (see Amdt4.3.3 Katz and Reasonable Expectation of Privacy Test). Even so, Fourth Amendment privacy protections have been eroded considerably since the attacks of September 11, 2001. In fact, no account-based financial transactions are truly private because, in every case, they require personal identity as a prerequisite. The consideration of a U.S. CBDC presents a once-in-a-generation opportunity for Americans to reconsider the state of their financial privacy. Privacy protections, constitutional or otherwise, must clearly apply to data generated by all legal use, not just consumer use, of a U.S. CBDC – if it is to enjoy broad societal support.

With the proper constitutional application and thoughtful design choices relating to anonymity and individual privacy, a U.S. CBDC could well enjoy privacy protections that are far superior to many competing instruments – whether provided by commercial interests or other sovereigns. A U.S. CBDC may have certain advantages over private stablecoins if it is properly and affirmatively bound by

constitutional Fourth Amendment protections, to which private stablecoins are not currently subject. Coding traditional democratic ideals of economic liberty and privacy into a U.S. CBDC will greatly enhance its global appeal. Hundreds of millions of people in the U.S. and around the world may well be reluctant to surrender their economic security and autonomy to authoritarian state surveillance simply for the convenience of digital payments.

Privacy remains a complex discussion: the initial proposal for a digital dollar should maintain individual financial privacy while addressing legitimate law enforcement and national security concerns. Additional research is needed to understand the potential trade-offs between privacy and security concerns, and additional discussions are necessary regarding the different types of privacy and the design choices necessary to achieve them.

Use cases

A critical point to reiterate about the introduction of a tokenized U.S. dollar is that it would be used alongside the existing forms of money and would enhance competition and choice in financial service infrastructures. Thus, the expectation is not that it will materially change all existing processes but instead that it will drive benefits and unlock new opportunities in specific use cases. Outlined in Table 1 are several initial use cases where a tokenized U.S. dollar could add material value (Digital Dollar Foundation, 2020).

Conclusion

Until 2022, the United States had been conspicuously absent from global CBDC discussions – an unsustainable position as the issuance of CBDCs by foreign nations will significantly impact the U.S. economy.

As foreign countries develop CBDC systems that replace traditional payment rails and provide CBDC as a service to international financial participants, U.S. policymakers should develop a strategy to preserve the dollar’s central role in the global digital economy and consider how best to future-proof the dollar in a way that is consistent with American ideals and values and grounded in empirical data and research. This is becoming increasingly important given rapid changes in consumer and investor preferences and the potential of new products, shifts that could alter the balance of perceived costs and benefits enough to overcome some of the inertia that helps to maintain the dollar’s leading role. A digital dollar that seamlessly integrates and transacts in an increasingly digital world could prove critical to retaining the U.S. dollar’s status as the world’s reserve currency (Bertaut et al., 2023).

Global leaders of CBDC exploration will play an out-sized role in setting the standards for the future of money as these technological developments continue to advance. The Digital Dollar Project is focused on supporting the United States in taking a leadership role in exploring and designing a CBDC that upholds American democratic values of freedom, economic stability and personal privacy.

In the future, the United States should actively participate in global governance discussions with a continued focus on interoperability, security, privacy and scalability standards, rather than reacting to foreign CBDC decisions. Independent of a decision to deploy a U.S. CBDC or not, the United States should contribute leadership towards the development of international regulatory frameworks around digital currencies, including CBDCs, that prioritize privacy, consumer protection, financial anti-crime compliance, financial stability and the protection of monetary sovereignty.

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