

Digital Dollar Project
Exploring a United States Central Bank Digital Currency
Proposed Pilot Programs

Document Guidance:

We intend to highlight how a US CBDC (a digital dollar) could address some common challenges faced by different stakeholders, including consumers, businesses, financial institutions, and fintechs. These examples are illustrative of challenges faced and opportunities that can be explored with a US CBDC where testing the merits of such a solution either against or as a complement to other solutions would be sound national policy.

It should be expected that as pilots are further developed and solutioned, a broader set of requirements will be gathered to address the challenges of specific communities. Regardless of the in-scope constituents, geography, or other elements, each pilot could be developed to test specific challenges and hypotheses to ensure real-world value is delivered. Value should be measured by a digital dollar's ability, more than traditional services, to offer lower costs, improve financial inclusion, enhance convenience and functionality, increase competitiveness, and maintain security standards. We welcome the opportunity through these pilots to pressure test the benefits of a tokenized U.S. CBDC and to consider risks and challenges. To develop a resilient, robust, and widely adopted U.S. CBDC, we propose the following core components as the champion model that will serve as the baseline for testing, in which the digital dollar should be -

- tokenized, making it a true bearer instrument.
- issued by the Federal Reserve.
- distributed through the existing two-tier banking system and regulated intermediaries.
- balanced towards individual privacy rights with necessary compliance and regulatory policies.
- a monetary policy neutral transaction object, akin to how cash and accounts-based commercial money currently function.
- architected and built for future flexibility and driven only by functional requirements that are informed by policy and social decision.
- able to transact offline when both parties are in close physical proximity.
- accessible to all persons in the United States regardless of location, income, or federally protected classes.
- supportive and complementary to additional payment sector innovation.

We can expect that alongside the myriad of opportunities unlocked by a U.S. CBDC, an equally complex set of questions regarding foundational and nuanced design elements will be unearthed. One of the most important elements will be balancing the right to privacy while ensuring appropriate regulatory protections are in place such as AML and KYC. Vital questions will be raised about privacy from the government surveillance which will be guided by established 4th amendment jurisprudence as well as consumer protection from commercial usage of user data. It can be certain that this new technology will

raise new questions as well as offer new features for user control of data and may offer users the ability to opt in or out of certain elements based on their personal preferences. These pilots are designed to begin experimentation with CBDC and user behaviors to collect empirical evidence to inform design choices of a U.S. CBDC.

The proposed pilots, presented in the following order, are not mutually exclusive and collectively exhaustive, but rather seek to test key hypotheses around value and functionality that, together, will form the foundation needed to launch a true U.S. CBDC:

I. Un- and Underbanked Consumers:

1. Rural
 - Banking deserts
 - Effective peer to peer payments
 - Offline transactions
2. Urban
 - Bank-lite services (no/low fee)
 - Remittances
 - Distrust of Banking
3. Benefits Distribution
 - Operational efficiencies
 - Benefits created by the programmable tokens
 - Fraud reduction

II. Banked Consumers:

1. National Usage
 - CBDC as a complementary and novel offering to enhance existing account-based systems
 - Programmable nature of currency
 - Generational interest of digital currency

III. Small, Medium, Multi-National Business Users:

1. Small Business – Domestic Retail Payments
2. Multinational business – International Payments
 - Cross-border transaction efficiencies
 - Ability to pay counterparties without an intermediary

IV. Financial Market Infrastructure Players:

1. International Payments
 - Banks paying banks
 - Streamlining the correspondent banking network
 - Streamlining trade corridors
2. Domestic Payment/Transfers
 - Non-Fedwire participant access to central bank money for settlement
3. Domestic Atomic Settlement
 - DTCC settlement of tokenized cash & tokenized securities on ledger

UNDERBANKED CONSUMERS:

Rural – Banking Deserts, Effective P2P Payments, & Offline Transactions

Challenge: Jane is a 45-year-old woman with a high school degree who lives in a rural American town.¹ Jane’s town is in a low-income, rural county consisting of residents with fewer years of education.

Jane’s county has been deeply affected by the consolidation of commercial bank branches and only has 0.3 banks per 100 square miles, (1 bank per 333 square miles).² Jane does not have a bank account due to the inconvenience of visiting a distant bank branch. Jane is normally paid in cash and is accustomed to managing her own finances. She doesn’t mind not having a bank account but has difficulty making online transactions. When Jane wants to make a purchase online, she usually will ask her daughter to purchase it for her and repay her in cash, or she will buy a prepaid card from her local pharmacy and use it to transact online.³ Jane is part of the 71% of the rural population who has a smartphone⁴ and part of the 37% of the rural population who doesn’t have a broadband internet connection at home.^{5,6} Jane is comfortable using a modern smartphone to access the internet and social media.

Future Solution: In a world with a U.S. CBDC, Jane would have the ability to access bank and digital wallet services through her smartphone. As a first step, Jane would verify her identity credentials by going to a local regulated entity, or through use of an online provider, to complete the necessary AML/KYC reviews. Once her identity is confirmed, she can download a digital wallet from her preferred provider to receive and make digital dollar payments through her smartphone. Jane prefers this approach because managing digital cash on her smartphone feels more like handling cash physically rather than managing a bank account. Also, Jane can use her digital wallet to make purchases online or send payments to her family and friends remotely. Because Jane does not always have cell signal where she lives, she is able to make in-person CBDC payments offline and upload to the network when she regains signal.

Pilot Proposal: Technologically, pilots should prove that mobile wallets can meet the AML/KYC standards, manage distributed identity and user verification, and prove offline transaction functionality. Functionally, pilots should prove that digital wallets offer an enhanced user experience that increase utility for unbanked users. It should also identify organizations to onboard unbanked users, conduct AML/KYC, and manage digital identities. Finally, the holistic results of the technological and functional assessments should determine whether the capabilities delivered by a tokenized system have the potential to be more cost effective, efficient, convenient, secure, or inclusive than account-based alternatives. This analysis will be critical for determining if operational, regulatory, and technology costs are lower than traditional services and neo banks and can be offered more broadly to support underserved communities.

¹ Unbanked populations pay four times more in fees, FRB, [“Perspectives from Main Street”](#)

² FRB, [“Perspectives from Main Street”](#)

³ 66.1% of unbanked people use cash to pay bills, 22.1% of unbanked people use prepaid cards to pay bills, FDIC [“2017 National Survey”](#)

⁴ PEW, [“Digital Gap between Rural and Nonrural”](#)

⁵ PEW, [“Digital Gap between Rural and Nonrural”](#)

⁶ 18% of U.S. adults aged 30-49 have smartphones but not broadband at home, PEW, [“Fact Sheet”](#)

Urban - Bank-Lite Services (no/low fee), Remittances, & Banking Relationship Uncertainty

Challenge: Ravi is a young immigrant to the United States who lives in an urban neighborhood and is part of the 52.7% of the underbanked U.S. population who don't earn enough money to justify having a bank account.⁷ Although he is financially responsible and is working to one day create a saving account to open a business, on average, Ravi spends 4x more in fees⁸ to participate in the digital economy. Due to the often high and unpredictable fees, he is distrustful of banks.⁹ If Ravi could save the money he spends on fees, he could sooner have a large enough balance to open a traditional bank account. Ravi usually sends \$200 a week to take care of his family abroad,¹⁰ which costs him \$12 per transfer, \$624 total per year. Globally, banks are the most expensive remittance channels, charging an average fee of 11 percent in the first quarter of 2019. Globally, post offices are the next most expensive, with an average fee greater than 7 percent.¹¹

Future Solution: In a world with U.S. digital dollars, Ravi could download a digital wallet app from his preferred financial institution or regulated intermediary and could receive and make payments with digital dollars after going through simple AML/KYC protocols. This bank-lite service acts as an easy on-ramp to financial services and offers a more cost-effective payment tool for Ravi. Due to the simplicity and cost effectiveness of CBDCs, existing banks would be able to offer "bank-lite" services that enable mobile and digital peer-to-peer payments, retail payments, and small-balance saving instruments for underbanked consumers. Ravi would have the ability to directly make remittance payments from the digital wallet on his smartphone without needing to visit a physical bank, post office, or a cash remittance location. This would also begin to build Ravi's trust in the banking sector and increase the likelihood of him opening a full account as his balances grow. A CBDC could also significantly reduce the cost and time it takes to send remittances by reducing the number of necessary banking counterparties.

Pilot Proposal: A pilot program would test the technical extent to which digital dollar wallets and bank-lite services can reduce the costs of traditional bank accounts, be more efficient and convenient for users, and ensure transaction safety and privacy security standards. Functionally, it should prove that digital wallets can serve as viable alternatives to, or gateway into, the traditional banking system for underbanked populations. Similar to the rural pilot, testing the viability of identity verification will also be important, although urban communities have more potential locations to offer this service than their rural counterparts. A pilot should also determine if sending remittance payments digitally can improve the user experience for underbanked communities and reduce the user's time and cost when sending remittances.

⁷ 52.7% of the un/underbanked don't have enough money to keep in a bank, HBR, "[The Hidden Costs](#)"

⁸ Underbanked populations spend 400% more in fees to access their money than those with bank accounts, HBR, "[The Hidden Costs](#)"

⁹ 30.2% of users cited distrust as reason for not having a bank account. (Reasons for distrust can vary but center around bad experiences, and surprise fees), FDIC, "[2017 National Survey](#)"

¹⁰ The average cost to send a remittance from the United States was 6.04% of the transaction, Congressional Research Service, "[Remittances: Background and Issues](#)"

¹¹ World Bank, "[Record High Remittances](#)"

Benefit Distribution – Operational efficiencies, programmable tokens providing enhanced retail, customizability, & fraud reduction

Challenge: Local and state government assistance agencies run many types of benefit programs through their local offices to specifically address the needs of underserved populations. When distributing benefits there are important systems to manage that taxpayer money is allocated efficiently and effectively to help participants. Although there have been significant improvements to state programs, there are still challenges to be addressed, such as distributing social welfare benefits in cash.¹² The United States Government Accountability Office estimates fraudulent or improperly filed charges account for 1 out of 10 payments in 2016 for a total of \$77.8 billion in payments that were found improperly filed or fraudulent.¹³

Future State: With a CBDC, government benefits can be distributed directly to consumers with improved efficiency and transparency. The programmable nature of digital dollars would enable specific government organizations to tailor how benefits are used and to whom they are distributed. Organizations like the Supplemental Nutrition Assistance Program (SNAP) or welfare could better ensure that benefits or cash payments are spent on food and other qualified expenses. For those without a bank account, a digital dollar can create meaningful improvements in reducing the cost and time associated with physically cashing a check.¹⁴ Direct digital dollar distribution to participants would create a more efficient channel for ensuring the full benefit is delivered to the recipient in a timely manner.

Pilot Proposal: A digital dollar pilot program could partner with local, state, or federal government organizations to understand the potential for a U.S. CBDC to distribute benefits. A pilot should test how benefits can be directly distributed to participants' digital wallets and be spent with participating retailers while measuring the operational improvements. A pilot program should also outline the process, including identity validation, for users to obtain a digital wallet to receive and use benefits. A potential pilot could explore the benefits of distributing SNAP benefits and making payments with those benefits. In 2019, 35.7 million people participated in SNAP to receive \$1,558 on average per year.¹⁵ For the 55.6 million total benefits SNAP distributed, 4.7 million (8.5%) were spent on administrative costs.¹⁶ A digital dollar could make meaningful reductions in administration costs and could more effectively distribute benefits to program participants.

¹² EY, "[Blockchain has the potential](#)"

¹³ Lexington Law, "[Important Welfare Statistics for 2020](#)"

¹⁴ The cost of government check cashing can vary depending on the vendor, Forbes, "[Where To Cash Your Stimulus Check](#)"

¹⁵ SNAP, "[Supplemental Nutrition Assistance Program](#)"

¹⁶ SNAP, "[Supplemental Nutrition Assistance Program](#)"

BANKED CONSUMERS:

National Level – CBDC as a Complementary Offering to Enhance Existing Account-Based Systems, Programmable Nature of Currency, & Generational Interest of Digital Currency

Current State: The American banking sector is an incredibly sophisticated financial infrastructure and offers world class solutions to consumers around the country. The banking sector has been diligent in expanding innovative, secure, and reliable offerings to their customer base with increased speeds and lower costs. Since the creation of the internet, the banking sector has offered U.S. consumers with digital payment solutions that address the inherent limitations of physical cash. As new technologies such as distributed ledger, blockchain, and tokenization have proven their efficacy, the banking sector has begun to experiment and adopt technologies that enhance their offerings. Private settlement coins, cryptocurrencies, and banking ledger consortiums offer innovative solutions but cannot reach their full potential without integrating with Central Bank Digital Currencies.

Future State: A digital dollar would not bring a revolutionary, changed experience to American consumers who are already well served by the banking sector; rather, a digital dollar would complement and enhance existing banking solutions. Digital currencies offer programmable solutioning that allow businesses not only to program the rails that money moves on, but also to program the money itself. This programmability provides financial institutions with broader and more specific control over their finances and offerings. The portability of digital dollars allows them to integrate well with current bank stable coins and cryptocurrencies to create a healthier, robust, and streamlined digital economy. Some banks are currently testing internal proprietary tokens to transact with tokenized cash but cannot easily transact in that token with outside entities because the token cannot move outside of its existing network. A digital dollar would offer a tool that could be used across banking networks or connect the proprietary systems of banks to enable tokenized-cash to tokenized-cash settlement, as opposed to tokenized-cash to account-based cash settlement. A CBDC also provides improved transparency and traceability that improve analytics and reduces the need for expensive and time-consuming multi-party reconciliation processes. Reconciliation improvements can create significant cost and time savings for institutions and their consumers which allows time and resources to be spent on more meaningful tasks. The programmability, portability, and traceability of CBDC offers a platform with the potential to unlock entire new markets, offerings, and opportunities that businesses can pass on to their customers such as overnight wiring services, payment traceability, and improved usage analytics. Similar to the creation of the app store or the internet, the potential unlocked opportunities of a digital dollar cannot be fully realized until it applied to the innovation of the American private sector.

Pilot(s) Proposal: Pilot programs should work with the banking sector to understand current initiatives, offerings, and areas of opportunity for a digital dollar. Although the end consumer in this group's user experience may not change significantly, their institutions will be able to offer enhanced solutions and better services. It is for this reason that pilots for banks consumers should establish regulatory sandboxes for banks, with consumer consent, to test new solutions and leverage their internal expertise and innovation capital that is already being deployed. For testing of the technical components, the appropriate government entity could convene a working group to collaborate on standards and ensure the broader banking community is working towards interoperable systems.

BUSINESS USERS: (SMALL, MEDIUM, MULTI-NATIONAL)

Small/Medium Businesses – Domestic Retail Payments

Challenge: Alexis is a small retail business owner in the suburbs who opened her business after getting her associate degree.¹⁷ Alexis is part of the 27% of women and 41% of millennials who are small business owners and operators in the United States.¹⁸ Alexis opened her business because she wanted to be her own boss and pursue her passion.¹⁹ Although Alexis' retail business is part of the 78% of small businesses that are currently profitable, her business often struggles from a lack of cash flow.²⁰ The greatest impact on her business' cash flow is the amount of time it takes money to process after receiving payments.²¹ Based on the method of payment, it can take anywhere from a few hours to five days for credit and debit payments to process.²² Therefore, Alexis prefers physical cash due to the immediate settlement and benefit to her working capital. Alexis even hangs a sign on her counter that offers a discount on her products if her customers use cash.²³ Even though cash is her preferred method, the physical nature of cash has high costs associated with handling it; it can cost Alexis from 4.7% to over 15% of the cash she takes in.²⁴ It also can take over 100 hours a month in labor hours for Alexis and her team to handle cash²⁵ which she would prefer to spend doing other work. Alexis is also nervous to be handling cash because she knows it makes her store more of a target for theft.²⁶

Future Solutions: In a world with CBDC, customers can pay Alexis' store directly with digital dollars without the need for an intermediary to process the payment. Alexis' customers would have the option to pay in traditional account-based debit or credit payments, physical cash, or digital dollars. The programmable nature of digital dollars allows automated treasury management. In Alexis' case, she can program payments to automatically deposit some dollars directly to her bank to earn interest, move some to her safe deposit box secured at the bank, and keep the remainder in her register. With the digital cash Alexis keeps on hand, she can directly pay merchants who stock her store. Digital dollars provide Alexis the ability to accept payments with the ease and confidence of accepting cash while still having the security and capabilities of electronic payments.

Pilot Proposal: A pilot program should functionally test the treasury management and security benefits for small businesses over physical cash handling as well as the cost benefits from minimizing card processing fees and the longer settlement times. Overall, a pilot should work with retailers and card networks to prove that a CBDC could potentially be more cost effective, efficient, convenient, secure, or inclusive than account-based alternatives.

¹⁷ 31% of small business owners have their associate degree, Guidant Financial, "[2020 Small Business Trends](#)"

¹⁸ Guidant Financial, "[2020 Small Business Trends](#)"

¹⁹ 55% of small business owners start their companies because they are ready to be their own boss. 39% of small business owners start their companies because they wanted to pursue their passion, Guidant Financial, "[2020 Small Business Trends](#)"

²⁰ Lack of capital and cash flow is the top challenge for small businesses, 78% of small business owner respondents say that their business is currently profitable, Guidant Financial, "[2020 Small Business Trends](#)"

²¹ 69% of small business owners say the greatest impact on their company's cash flow is the amount of time it takes money to process after receiving payments, Forbes, "[4 Cash Flow Challenges](#)"

²² Johnson, "[The Merchant's Guide](#)"

²³ Cash discount programs became legal across the United States in October 2011, following the passage of the Durbin amendment of the Dodd-Frank Act, FRB of Atlanta, "[Cash Discount Programs](#)"

²⁴ IHL Services, "[Cash Multipliers](#)"

²⁵ Depending on the segment and current processes, retailers spend upwards of 200-500 labor hours a month per store to handle cash, IHL Services, "[Cash Multipliers](#)"

²⁶ U.S. retail businesses lose about \$40 billion annually because of the theft of cash alone, HBR, "[The Hidden Costs](#)"

Multinational business – International Payments

Challenge: When U.S. businesses want to make payments to an overseas business, they are required to use banking institutions as intermediaries to ensure that they, or their counterparties, are paid in full and on time. In order to transact internationally, banks utilize a correspondent system to make up for the lack of a single, omnipresent system for directly transferring money from one institution to another across borders. In the past few years, as ecommerce has grown, cross-border payment volumes have increased, leading to more cross-border payment options. Although there have been innovations in the cross-border payment space, there are still significant time delays and risks that businesses need to consider when making payments. Longer payment settlement times increase the risk that an unpredictable event could affect the transfer of cash or ownership of assets from the point of execution through to settlement. Businesses also need to consider and hedge against currency foreign exchange risks as exchange fluctuations during the time of a payment can leave the payment worth less than expected.

Future State: A digital dollar would enable a real-time payment option for American businesses to receive and make payments with a much higher level of security, finality, speed, and ease. A digital dollar should materially reduce fees in single-currency settlement and dual-CBDC settlement and also reduce fees during CBDC to account-based dual-currency exchanges. A digital dollar would enable the ability to pay counterparties without an intermediary. A digital dollar would enable large American corporations to manage their dollar holdings when moving large amounts of money cross-border, improving liquidity and reducing their exposure. The technology would enable multiple parties to keep records across all transaction participants to improve reconciliation which reduces fraud and/or omissions. This also helps data processing efficiency, which could reduce back office function costs.

Pilot Proposal: A pilot focusing on international payments by businesses should explore the potential of a U.S. CBDC in cross-border payments. Pilots should be conducted under two scenarios, first that the other country has launched a CBDC that is interoperable with a U.S. CBDC. Secondly, it should evaluate the efficiency gains for transacting with a U.S. CBDC against a non-CBDC currency. This second pilot will consider situations where the recipient opts to hold the U.S. CBDC or use separate channels to exchange for the local currency. Functionally, a pilot should work with large corporations to experiment with a U.S. CBDC in international payments and corporate remittances to identify the business benefits when completing U.S. CBDC, multi CBDC, or account based to CBDC payments.

FINANCIAL MARKET INFRASTRUCTURE PLAYERS:

International Payments – Banks Paying Banks & Streamlining the Correspondent Banking Network

Current State: Currently, cross border transactions are typically conducted by financial institutions on behalf of the requesting parties, usually by clients who bank at that institution. Over the past decade, as cross-border payments have increased, payment providers have grown internationally by integrating networks and increasing the speed and standardization of messages. Increased competition has driven down margins by using innovative technology to offer cheaper and more transparent fees. Despite the financial sector’s advances in cross-border payments, wire transfers still dominate the landscape at 68% of organizations’ cross border payments being done by wires.²⁷ There are also challenges with the correspondent banking corridors where low-volume, high risk channels are being consolidated due to cost of liquidity and AML/KYC/KYB requirements. Per the BIS, the number of correspondent banks decreased 20% between 2011-2018²⁸, despite an increase in transactions and value of payments. This decrease impacts financial inclusion²⁹ and may raise the prices on cross-border transactions.

Future State: Tokenized CBDC would enable direct monetary relations between financial institutions regardless of pre-existing correspondent relationships. Banks would no longer need to maintain nostro/vostro banking structures to execute payments and transfers internationally. This ability to transact in U.S. CBDC with the counterparty would greatly increase the speed and efficiency of global trade and finance. While the act of executing the transaction would occur in near real-time, financial institutions will still need to maintain AML/KYC/KYB regulations with each counterparty. Thus, while there are still costs for low-volume corridors which may not be served by all banks, some could likely see a competitive advantage in offering proprietary networks. Finally, there will still be a need for foreign exchange market making; however, given the U.S. dollar is currently the world reserve currency, it is reasonable to assume many counterparties would be willing to accept and maintain a USD balance.

Pilot Proposal: A pilot program should engage a foreign government with strong relations with the United States and interest in learning more about the benefits a U.S. CBDC could offer to global trade and financial markets. Engaging foreign governments is important to ensure that both financial institutions are given clear regulatory guidance and ensure compliance with all local laws and regulations. Whether the pilot is executed in parallel or sequentially, we recommend executing one test with a currency pair that has significant liquidity and another one with a less liquid partner. This will help clarify the efficiency gains and improved ability to transact regardless of current FX liquidity and highlight the ability to offer low-cost, fast transactions regardless of existing correspondent corridors.

²⁷ McKinsey, [“Global Payments Report 2019”](#)

²⁸ BIS, [“On the global retreat”](#)

²⁹ BIS, [“On the global retreat”](#)

Domestic Payment/Transfers – Non-Fedwire Participant Access to Central Bank Money for Settlement

Challenge: Small businesses and fintech who do not have access to Fedwire payments are currently dependent on financial institutions with access to Federal Reserve accounts to execute payments on their behalf. The payment role of the banks through debiting and crediting accounts is a system that was created to efficiently pay people without needing to move physical cash. Although electronic payment options have become more prevalent over the past few years, paper checks are still the most common and preferred payment medium due to their low costs and ease of use.³⁰

Future Solution: A CBDC would support a non-Fedwire or Fedwire participant sending and receiving payments as well as provide a faster and more secure method of B2B payments. A digital dollar would exist alongside Fedwire and complement (not impede) in-flight initiatives like FedNow, a new interbank 24/7/365 RTGS service with integrated clearing functionality. When available by 2024, FedNow will allow 24/7 instantaneous settlement at the Fed account level between two banks. 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, lowers the barriers of entry to allow increased competition, and encourages a higher standard of service, rather than a network run by the nation's largest banks. One private-sector solution presents a single point of failure, while multiple settlement providers ensures greater systemic resiliency with the philosophy that the “private sector alone may face significant challenges in providing equitable access to an RTGS infrastructure with nationwide reach, which in turn would jeopardize the development of ubiquitous, safe, and efficient end-user faster payment services.”³¹ The ability for banks to make real-time debit payments available on a 24x7x365 basis improves the capital requirements and improves the liquidity of participating banks. A CBDC also acts as a single network throughout the U.S. that would be ubiquitous across all organizations rather than “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 ACH or credit cards.

Pilot Proposal: A pilot program should work with non-Fedwire businesses to understand the benefits provided through instantly settled and finalized transactions of central bank money. Technologically, it should work with institutions to outline technology requirements participants would need to enable in order to transact in CBDC. Functionally, a pilot should outline a process for onboarding and credentialing businesses to transact in CBDC.

³⁰ In 2019 42% of organizations made their payments to businesses using checks, McKinsey, [“Global Payments Report 2019”](#)

³¹ Federal Reserve, [“Actions to Support Interbank Settlement”](#)

Domestic Atomic Settlement

Challenge: The Depository Trust & Clearing Corporation (“DTCC”) is an American post-trade financial services company providing initial onboarding through trading, clearance, settlement, asset servicing, data management and trade reporting, bringing increased security and soundness to financial markets.³² It exchanges securities on behalf of buyers and sellers and functions as a central securities depository by providing central custody of securities. In 2019, the DTCC had the world’s largest depository hold of 1.35 Million active U.S. issues worth \$48.3 Trillion, conducted 102.1 Million broker-to-broker transactions cleared per day, worth \$965.5 Billion, and processed \$4 Trillion per day in U.S. government and mortgage-backed securities.³³

The recent, unprecedented volatility experienced in March 2020 resulting from the COVID-19 pandemic have highlighted the opportunity for industry improvements and operational efficiencies that reduce industry-wide risks and costs.³⁴ Buy-side counterparty exposure and clearing fund requirements increase considerably during high stress/high volatility periods. During the volatility in March 2020, margin increased dramatically by more than 300 percent over historical averages.³⁵

Despite using DTCC’s premier post-trade market infrastructure, DTCC participants must usually wait two days before their trades settle.³⁶ Longer settlement times increase the risk that an unpredictable event could significantly affect the transfer of cash or ownership of securities from the point of execution through settlement.

Future State: The DTCC proposed in its recent Project ION that optimizations could arise through the settlement of tokenized cash & tokenized securities on ledger, and that a “Digital Accelerated Settlement Service would support both netted and bilateral settlement and incorporate a new integrated DTC/NSCC Settlement model as well as a pre-funding option for both netted and bilateral settlements.”³⁷ Such optimizations unlock new market opportunities such as variable settlement time and associated value construct. 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 would deliver a myriad of benefits including reduction in risk, increased capital efficiency, reduction in trapped liquidity, among other broad-based efficiency, transparency, and workflow benefits.

Pilot Proposal: Given the DTCC’s deep expertise and the investment they have made into blockchain-related pilots and research, our recommendation would be for the appropriate regulatory and statutory bodies to give the DTCC necessary tools to develop and run a pilot. Given the right regulatory construct, whether a no-action letter or a regulatory sandbox, the DTCC could develop a pilot program that would test the hypotheses around atomic settlement of tokenized cash and tokenized securities using CBDC. DTCC has already indicated a desire to proceed with a pre-funded model, which, although the details are unknown, could use a form of tokenized commercial bank money or other similar liability. However, if DTCC’s implementation of pre-funded tokenized cash occurred in partnership with the government using a true CBDC, we believe the pilot could truly kick off a wave of

³² DTCC, [“Our Capabilities”](#)

³³ DTCC, [“Our Capabilities”](#)

³⁴ DTCC, [“Project Ion”](#)

³⁵ DTCC, [“Project Ion”](#)

³⁶ DTCC, [“Project Ion”](#)

³⁷ DTCC, [“Project Ion”](#)

innovation and modernization of the U.S. financial infrastructure not seen since the advent of the internet.

Global Assessment:

In an effort to support this critical analysis, we have included the below list of research publications we consider helpful to this process. Finally, we recommend using the strong diplomatic relations the United States has around the world to engage bilaterally and multilaterally with other nations and organizations exploring CBDCs. Most organizations, whether public or private, recognize the importance of interoperability across systems and are willing to engage in dialogue.

Central Bank Digital Currency Related Research:

- Banque de France: [Model for public-private innovation and collaboration on pilots](#)
- Sweden's Riksbank: [Technical solution for the e-krona pilot](#)
- Bank of England: [CBDC opportunities, challenges, and design](#)
- World Economic Forum: [Central Bank Digital Currency policy-maker toolkit](#)
- Bank for International Settlements: [Survey on CBDC](#)
- European Central Bank: [Research into privacy and CBDCs](#)
- International Monetary Fund: [Designing CBDC](#)

Technical Blockchain and DLT Research and Pilots:

- [Project Jasper](#) (3 phases, Payments Canada and other parties)
- [Project Ubin](#) (5 phases, MAS and other parties)
- [Project Stella](#) (BOJ and ECB)
- [Project Aber](#) (The Saudi Arabian Monetary Authority (SAMA) and the United Arab Emirates Central Bank (UAECB))
- [Project Ion](#) (DTCC)