WINNING THE FUTURE OF MONEY:

A PROPOSAL FOR A U.S. CENTRAL BANK DIGITAL CURRENCY

US CONGRESSMAN

JIM HIMES

REPRESENTING CONNECTICUT'S FOURTH DISTRICT

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I. Introduction

In the last several years, as cryptocurrencies such as Bitcoin and Tether have emerged and attracted growing attention, governments around the world have begun to consider the issuance of a Central Bank Digital Currency ("CBDC"). A CBDC is a digital form of central bank fiat currency. In the case of the U.S., a CBDC would be a digital representation of a dollar. Like a physical dollar, it would be a liability of the Federal Reserve ("the Fed"). Unlike a physical dollar, it would reside and transact in a network of hardware and software with substantial and novel implications for transparency, security, and privacy.

The idea for a CBDC and the opportunities and challenges associated therewith are not entirely new. Many consumers currently use money in digital form via products like Venmo and Zelle or through the use of debit and credit cards. Such digital money is generally connected to a checking or savings account at a commercial entity such as a bank or credit union. This electronic currency is a liability of the commercial entity, not the Fed. Privately issued stablecoins, which are intended to maintain a stable value based on a basket of reserves, are often positioned as alternatives to traditional fiat currency and are also subject to the credit and operational risk of their sponsoring entity.

A U.S. CBDC would have advantages over privately issued stablecoins and crypto-assets, most notably the ability to be backed by the full faith and credit of the U.S. government, like traditional cash, and would provide holders with a degree of safety that may not be offered by privately issued stablecoins because of the risk associated with sponsors' reserves. Consumers who may be hesitant to use other crypto assets due to their price volatility, possible digital security concerns, and conflicting regulatory requirements may be more inclined to use a CBDC that is issued directly by a trusted central bank and holds the same purchasing power as physical cash.

While it is possible that stablecoins and CBDCs might coexist, central banks should not delegate the development of a digital dollar entirely to the private sector. Central banks and the people they serve could benefit from a sovereign digital currency that provides the same utility as physical cash, is insulated from drastic market swings, and is not dependent on private sector participants' reserves or financial standing.

Many of the world's central banks are considering the implementation of a CBDC or moved into deployment. While some central banks have considered issuing

digital currencies directly to consumers, most have issued digital currencies through commercial intermediaries which facilitate transactions and custody. The central banks that are in the development stage are reviewing a variety of different technological architectures for their CBDCs. Some have chosen to issue a CBDC tracked by a centralized database while others have employed a distributed ledger system that is maintained by participating intermediaries each verifying transactions by consensus.

Of the nearly 105 central banks that are considering CBDCs, the majority (63) – including the United States – are currently undecided on possible domestic CBDC technological architecture. 50 countries are in an advanced stage of CBDC exploration, meaning they have moved forward on a pilot program, are testing architecture designs, or have executed a soft launch. 16 the G20 countries are in the development or pilot phase, with only the U.S., Mexico, and the United Kingdom still in the research phase. [1]

In January of 2022, the Fed issued a paper, "Money and Payments: The U.S. Dollar in the Age of Digital Transformation" designed "to foster a broad and transparent public dialogue about CBDCs in general, and about the potential benefits and risks of a U.S. CBDC." The paper did not make explicit policy recommendations. It did, however, note a collection of potential benefits of a CBDC, including risk-free payments, better cross-border transfers, support for the dollar's global role, and opportunities for better financial inclusion. The paper also identified several risks, including disruption to the financial system, flight to safety issues, effects on monetary policy, and privacy and data protection concerns.

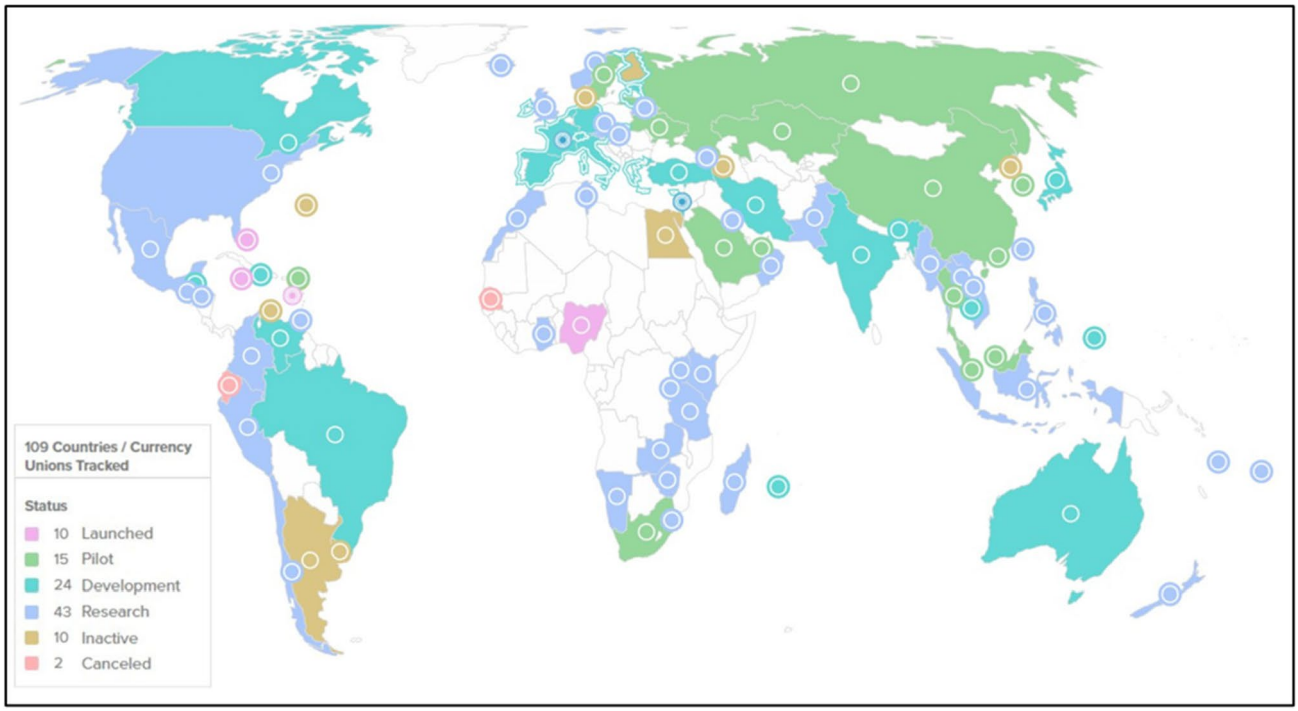
The paper noted that the Fed would not proceed with the issuance of a CBDC "without clear support from the executive branch and from Congress, ideally in the form of a specific authorizing law. In March of 2022, President Biden signed Executive Order 14067, calling for a comprehensive U.S. policy for cryptocurrency and digital assets.

The House Financial Services Committee has focused on the benefits and risks of CBDCs. On July 27, 2021, the Subcommittee on National Security, International Development, and Monetary Policy held a hearing titled, "The Promises and Perils of Central Bank Digital Currencies," where the subcommittee heard testimony from academics, national security experts, and economists. Under Chairwoman Maxine

[1] Atlantic Council GeoEconomics Center CBDC Tracker. https://www.atlanticcouncil.org/cbdctracker. Accessed on 6/21/22

Waters' leadership, the Committee has held multiple hearings to review CBDCs, stablecoins, and digital asset regulation. On February 8, 2022, the full Committee held a hearing titled, "Digital Assets and the Future of Finance: The President's Working Group on Financial Markets' Report on Stablecoins," where the Committee heard testimony from Nellie Liang, Treasury Under Secretary for Domestic Finance, on regulatory issues for stablecoins. On May 26, 2022, the full committee held a hearing entitled, "The Future of Money: Assessing the Benefits and Risks of a U.S. Central Bank Digital Currency," with Dr. Lael Brainard, Vice Chair of the Board of Governors of the Fed. The Committee's work has been an invaluable resource in furthering Congress's understanding of CBDCs, cryptocurrencies, and digital payment advances.

It is now time for Congress to begin the process of considering and ultimately passing authorizing legislation for the issuance of a U.S. CBDC. The purpose of this "white paper" is to begin the process of dialogue, education and debate that will lead to draft legislation to authorize further studies, pilot projects, and the possible creation of a U.S.-issued CBDC. The potential benefits of developing a CBDC meaningfully outweigh the risks, many of which can be mitigated. This paper takes the approach that a CBDC should not be thought of as replacing legacy payment systems and currencies but as an additional alternative for consumers and businesses.



Source: *Atlantic Council GeoEconomics Center CBDC Tracker*

II. Wholesale vs. Retail

The activities of the U.S. banking system generally fall into two categories: wholesale and retail. Wholesale banking involves financial institutions conducting business with large clients (such as other financial institutions). Retail banking involves services offered to the public. Integrating a U.S. CBDC into these systems will require careful consideration and the implementation of safeguards to protect stability in times of stress. Financial institutions must be able to trust the infrastructure and technology that secures large payments and inter-bank settlements, and retail transactions must be seamless and protected from fraud and hacking. Importantly, a U.S. CBDC should be structured in a way that preserves commercial banking maturity transformation and does not materially reduce credit availability.

To integrate a CBDC into the wholesale payment system, the Fed should allow financial institutions the option to tokenize assets held at the Fed that are used for inter-bank payments and settlement. Financial institutions could use such tokens to send and receive funds. Importantly, the wholesale CBDC token would complement rather than replace existing systems. The intent of tokenization would be to provide an option to make settlement, clearing, interbank transfers, and other wholesale banking activities faster, cheaper, and more efficient and eliminate credit risk between intermediaries. Access to the wholesale CBDC would be limited to qualified financial institutions and would not be used for retail purposes.

Through a variety of changes and innovations the Fed and its commercial banking partners have made significant progress in modernizing the wholesale banking system in a direction that offers many of the characteristics and benefits of a wholesale U.S. CBDC. This paper focuses on the issues involved in deploying a retail CBDC.

III. Why a U.S. CBDC?

In a sector changing and innovating as rapidly as the money and payment system, it is fair to ask what advantages a CBDC would bring to the market. In their May 18, 2022, letter to the Chairman of the Fed, House Financial Services Committee Republicans note as their first concern the need to identify “the inefficiencies in the U.S. payment system” that would indicate a need for a U.S. CBDC. Relatedly, many incumbent players in the U.S. financial system are skeptical of the “use case” for a U.S. CBDC. What is the case for proceeding?

The answer is at least threefold: 1) a U.S. CBDC, by exclusively leveraging the full faith and credit of the U.S. government, could be a uniquely secure and trusted platform for innovation; 2) as the digital equivalent to a physical U.S. dollar, a CBDC is a likely vehicle for preserving or even buttressing the dollar's position as the global reserve currency of choice, and 3) a CBDC might have trust and cost advantages that encourage the unbanked and underbanked to participate more comprehensively in the financial system.

The nature of money is changing. Today's money and payment systems would have been unimaginable to previous generations that carried cash and wrote checks to pay for purchases. Innovations in new transaction networks and the emergence of digital currency have revolutionized the way we send and receive money, pay our bills, and conduct business. A U.S. CBDC that offered a safe, reliable, appropriately transparent, and trusted network to transact with a digital dollar could help keep the United States at the forefront of innovation, encourage the next wave of entrepreneurship, and spark the development of transformative payment technologies.

Americans are justly proud of our history of technological innovation. We should not risk the erosion of this position. It is not difficult to imagine dramatic innovations in payment systems, money transmittal, and fintech generally that might be built on the platform of a trusted, transparent digital dollar.

As noted above, many nations including China, India, and Russia are considering the possibility of establishing digital versions of their currencies. Notably, the Euro Area is actively researching the development of a digital Euro to be "a fast, easy and secure instrument for…daily payments. It would support the digitalization of the European economy and actively encourage innovation in retail payments.[2]"

It is important, in the face of the potential for dramatic innovation, not to focus too narrowly on "inefficiencies" in the status quo. The current stage of development of digital assets and blockchain generally resembles the development of the internet in the early 1990s. At that time, there was skepticism about the internet's "use case", breathless speculation about the future, and disbelief in the seeds of truly transformative technology. In the early 1990s, no one accurately predicted the transformational effect of the internet 30 years later, any more than we can predict the ultimate "use cases" of cryptocurrency today.

[2] The Euro Area consists of the 19 member states of the European Union that have adopted the euro as their single currency.

The U.S. benefits substantially from the position of the U.S. dollar as a global reserve currency. Nations, organizations, and individuals around the world understand the U.S. dollar to be a uniquely stable store of value due to the strength and size of the U.S. economy. Over time, however, other global currencies have offered alternatives. This is driven by complex factors including trade, balance of payments and perception of relative risk. Were the U.S. to lag in the development of a CBDC behind alternative reserve currencies such as euros, sterling, or yuan, additional pressure might be put on the dollar's premier position. In her testimony before the House Financial Services Committee on May 26, 2022, Fed Vice Chair Lael Brainard noted that a "U.S. CBDC may be one potential way to ensure that people around the world who use the dollar can continue to rely on the strength and safety of the U.S. currency."

Finally, a U.S. CBDC could meaningfully contribute to financial inclusion among the historically unbanked and underbanked. According to a 2019 report by the Fed, 19% of American adults are either unbanked or underbanked. Nearly a third of respondents cited trust as the reason they remain unbanked. Households without banking services are often forced to rely on expensive products and services like payday loans, check cashing services, and money orders.

Apart from potentially addressing banking trust issues, a CBDC could encourage qualified non-financial institutions to participate in intermediary services, including technology partners and payment providers that might reach consumers in ways that banks and credit unions do not. A CBDC that is available and distributed through regulated intermediaries, operates outside of traditional business hours, is accessible at convenient locations, and offers appealing features like no minimum deposit balances could help advance the goal of financial inclusion and increase access to financial services to the underserved.

A U.S. CBDC could provide an alternative payment option for consumers, businesses, and financial institutions to send and receive funds faster and more cheaply than current options. A CBDC could potentially make it less costly to send and receive money internationally, offer inexpensive or cost-free deposits and withdrawals, and be broadly obtainable in areas that lack traditional banking services. A CBDC could also lead to faster settlement times and allow workers to receive money sooner than existing checking and deposit processes, which can help consumers save funds, reduce financial hardship, and ensure greater financial security. Policymakers and the Fed should also consider integrating a CBDC into federal programs like the Special Nutrition Assistance Program, Social Security, and the Special Supplemental Nutrition Program for Women, Infants, and Children.

The deployment of a U.S. CBDC should also be an opportunity for policymakers to advance financial literacy and increase trust in legacy banking services. The Fed and financial intermediaries should work with advocacy groups and community organizations to spread awareness of CBDC technology, products and services. Building strong relationships between government officials, intermediaries, and community leaders can help make sure that communities understand retail CBDC products and that individuals can access training and assistance when needed.

IV. Potential Risks of a U.S. CBDC

The creation of a U.S. CBDC would carry meaningful risks. Many of these risks, such as security and privacy protection, are present and mitigated in current digital payment systems. A CBDC, however, by virtue of its federal backstop, carries unique risks to credit provision, monetary policy, and the stability of the banking system. Under certain conditions, a U.S. CBDC might be regarded as a substitute for commercial bank money, raising the possibility of reduced deposits in the banking system. A CBDC might also be regarded by consumers as a safe refuge in times of financial stress, leading to a countercyclical reduction in bank deposits.

A U.S. CBDC should be regarded as an alternative rather than a substitute for commercial money and payment systems. Therefore, the architecture and characteristics should not "squeeze out" activity more efficiently or appropriately provided by commercial entities.

Perhaps the most consequential decision for policymakers crafting a CBDC is whether it should be intermediated or not. An intermediated system is analogous to the existing retail banking system while a non-intermediated system would create a direct relationship between consumers and the central bank, in some ways analogous to the existing wholesale banking structure.

Our existing system of money is intermediated. Accounts into which currency is deposited (by individuals) are established and maintained primarily by banks and brokerages rather than directly at the central bank. An un-intermediated system would require individuals to hold their currency in an account or wallet established and maintained by the central bank. In its 2022 white paper, the Fed argued that an intermediated CBDC would be most appropriate to "facilitate the use of the private sector's existing privacy and identity-management frameworks; leverage the private sector's ability to innovate; and reduce the prospects for destabilizing disruptions to the well-functioning U.S. financial system." For these reasons, a U.S. retail CBDC should be intermediated.

In this scenario, a CBDC would be a direct liability on the central bank, but commercial firms would compete for customers and offer different client services, just as existing payment operators compete for market share today. Intermediaries would oversee onboarding, custody services, and wallet management, allowing commercial firms to leverage existing know your customer (KYC) and anti-money laundering (AML) protocols.

To prevent credit disintermediation and protect the financial services sector during times of stress, the Fed should take two important steps: limiting the amount of digital currency that could be maintained in a CBDC wallet and paying no interest on CBDC deposits. While this paper does not take a position on the specific dollar cap appropriate for CBDC deposits, research should indicate an optimal limit that would allow for most retail transactions, money transfers and limited savings without creating a significant "flight to quality" risk relative to traditional insured deposits. The Fed should consider charging the 12 Reserve Banks, other financial regulators, research institutions and the private sector with evaluating the possible impacts of a retail CBDC wallet cap across markets.

Legally foreclosing the possibility of paying interest on U.S. CBDC wallets would both remove a possible route of competition with traditional deposit accounts and negate the possibility of the imposition of negative interest rates on wallets. While of interest to economists, the possibility of negative interest presents overwhelming legal and political challenges.

V. Architecture

A crucial architectural decision pertaining to a CBDC is the nature, location and access protocols of the database tracking transactions in the CBDC. Most existing digital currency and payment systems employ a centralized database to track transactions. Such databases are maintained by commercial entities, typically banks, and accessed using proprietary technology and protocols. On the other end of the spectrum, some cryptocurrencies, such as bitcoin, employ a permissionless distributed ledger blockchain that is open and freely accessible to the public. Such ledgers (or nodes) are maintained by anyone willing to invest in the equipment required. Transactions are recorded to the blockchain and validated through a form of consensus among individual nodes. While all transactions are publicly visible, some privacy is maintained through pseudo-anonymized wallet numbers rather than names or other identifying information.

A U.S. CBDC should be deployed using a permissioned semi-distributed architecture. This structure would permit only authorized participants to access the underlying payment database. Access to the CBDC network would depend on the functional role of the intermediary. For example, a depository institution that offers custody service may have permission to modify the network, while a payment service provider may only have permission to read the network. Together, the intermediaries could each play a role in validating the authenticity of transactions, possibly complementing a master database. Access to the CBDC network would require authorization from the Fed or designated financial regulators.

A permissioned system would offer high levels of network security against unauthorized access or cyber-attacks as well as privacy. Since firms must be granted access to the system, unauthorized entities could not view transactions, validate transfers, or participate in payment processing without gaining approval – which can help ensure that the Fed and other financial regulators are aware of who is operating on the network. This could increase system resiliency and functionality, allowing it to continue operating without error if an intermediary is compromised.

VI. Account-Based Wallets

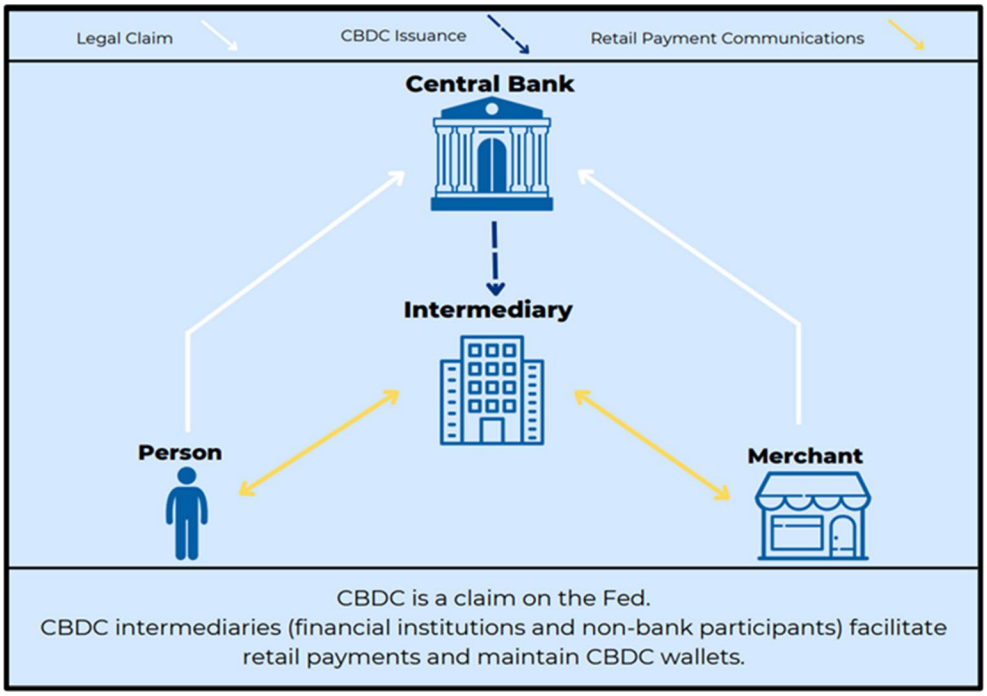
A CBDC wallet and custody regulatory structure should include strong user identification processes that require intermediaries to certify the identity of wallet holders. This structure is also known as an "account-based" structure and differs from a "token-based" structure, which involves verifying the authenticity of the digital asset rather than the wallet holder.

An account-based structure mirrors existing digital banking structures in the U.S., such as Fedwire and commercial payment systems. Both require participating intermediaries, like financial institutions and third-party payment service providers, to implement strong user identity procedures and to validate participants before finalizing transactions.

An account-based CBDC system must include robust protections against fraud, identity theft, and unauthorized access. Intermediaries participating in retail CBDC processing would be required to prove their resilience to security threats and would coordinate with other participants and the Fed to develop thorough and rigorous security standards capable of withstanding system attacks and shielding personally identifiable information.

It will also be important for the Fed and participating commercial entities to establish clear guidance for user identification and privacy. In its white paper, the Fed noted that a "CBDC would need to strike an appropriate balance…between safeguarding the privacy rights of consumers and affording the transparency necessary to deter criminal activity." A U.S. retail CBDC would permit the Fed to work with intermediaries and experiment with cryptographic techniques that allow for officials to identify money laundering operations and track illicit funds while protecting personal information and data. Though some cryptographic techniques have shown promise in validating transactions without revealing personal information, it is critical that the Fed ensure that these validation techniques are robust and scalable before deploying a retail CBDC. Establishing the U.S. as a worldwide leader on CBDC privacy standards could encourage other platforms – both domestic and international – to implement data privacy mechanisms that protect consumers in the digital asset ecosystem.

Congress must also play a leading role in crafting a clear legal privacy framework for CBDCs – both wholesale and retail. Policymakers need to be sure that authorizing statutes build trust between intermediaries, the Fed, and the public. By establishing comprehensive regulations that enable user identification for CBDC wallets, protect consumer privacy, and build on existing mechanisms that track illicit financing, the U.S. can be a standard-setter for the international community.



VII. Non-Bank Participants

To maximize the reach and utility of an intermediated retail CBDC, the system should be open to non-bank entities and other firms that wish to offer CBDC wallet services, provided that non-banks can meet critical infrastructure safety parameters like user identification protection, cybersecurity resilience, network maintenance management, and data storage protocols.

Including non-bank participants in the CBDC intermediary network would present opportunities for more private sector innovation, increase competition, and expand consumers' options for CBDC products. A diverse network of both bank-and-non-bank CBDC intermediaries would also encourage widespread retail use and spur businesses to design CBDC services that complement legacy payment systems. Non-bank participants would also help reach unbanked and underbanked households that may be hesitant to open a bank account. Provided that access to the CBDC payment system is subject to regular, appropriate, and strong prudential oversight, the participation of non-bank intermediaries would lead to a healthy and diversified marketplace of CBDC payment providers.

VIII. Privacy

A U.S. CBDC would present novel and serious privacy challenges. Today, the use of physical cash allows millions of Americans to transact mostly anonymously. To consumers that fundamentally value privacy and confidentiality and prefer that their transaction history remain unknown to intermediaries or the government, this is a critical characteristic. A CBDC as envisioned herein would involve the collection of substantial personally identifiable data, transaction history, and other sensitive consumer data. This will raise concerns that a CBDC payment system could evolve into a shortcut for government surveillance, data collection, or worse. Moreover, a CBDC that stores consumer data would be an attractive target for cybercriminals.

Many of these risks exist in current payment systems (including large cash transactions), which are governed by laws and regulations that help protect privacy and civil rights. Today, the government and the private sector – including banks – work together to analyze suspicious activity and identify financial crime. Because not all transactions are tracked and shared with regulators, consumers have an understanding that their complete financial behavior cannot be viewed or accessed by government officials. This careful alignment of expected privacy and anonymity,

along with strong financial crime enforcement, should be integral to the development of a U.S. CBDC.

To achieve these goals, the Fed should experiment with a wide range of encryption proofs and privacy solutions that safeguard consumer data and collect only the information necessary to validate transactions. The Fed and other financial regulators should consider testing methods that shield identities and transaction amounts and prevent the aggregation of consumers' financial history without proper legal justification. The Fed should undertake this consideration with significant public participation, education, and outreach to ensure that consumers and market participants are made aware of testing results and understand how a CBDC is and is not comparable to physical cash. Regulators and Fed officials should examine the possibility of making CBDC test design structures open source to allow academics, computer scientists, and privacy advocates to confirm the software's efficacy and legitimacy. Congress should implement strict notification requirements so that officials tasked with oversight and civil liberties enforcement are regularly informed of CBDC privacy violations and operational risks.

IX. Domestic and National Security

Security standards and best practices for a U.S. CBDC should be consistent with the goals of the Bank Secrecy Act, particularly with regard to documentation, record-keeping, employee training, audit cooperation, and internal policies. Because a CBDC should be difficult to use for illegal activities, it will require substantial oversight, done under the auspices of strict confidentiality. Intermediaries must be required to make similar efforts to monitor CBDC funds as is currently required to monitor commercial bank money, such as currency transaction reports and suspicious activity reports. While the digital nature of CBDC funds will likely allow for faster and easier communication between intermediaries and law enforcement, such communication must be consistent with legal due process and consumer privacy regulations.

A U.S. CBDC should also allow policymakers to experiment with technologies to better target illicit actors. Many national security experts believe that a CBDC design could include programmable abilities that automatically alert officials to sanction evasion activities and notify law enforcement when sanctioned individuals or entities are transacting in CBDC funds. A U.S. CBDC should be adaptable to global security requirements and assist law enforcement and financial intermediaries with sanctions screening protocols. As foreign central banks continue research and development on

CBDC projects, U.S. foreign policy officials should push for international agreements that institute legal best practices for identifying foreign criminal threats and activities, but also honor legal sovereignty and international criminal protocols.

X. Adaptability

A U.S.-issued CBDC should be adaptable to future payment innovations, emerging technology trends, and policy objectives. The Bank for International Settlements (BIS) cites "flexibility and adaptability" as one of its 14 core features for central banks developing CBDC projects. As digital payment options evolve and digital payment adoption continues to grow, intermediaries and private sector participants will likely offer products, services, and other options to meet consumer preferences.

To increase adaptability and flexibility, U.S. CBDC should encourage the safe integration of innovation into the underlying payment system. Just as our existing domestic payment system allows for private sector participation, a U.S. CBDC should be developed to harmonize with existing payment products and services and be open to changes in the digital payment space. CBDC intermediaries that seek to offer a service or product on the payments framework could be granted tailored access to the system that is specific to the business model and product offering.