

PROJECT NEW DAWN

Working Paper: “A Digital Cash Infrastructure For All”

An **EMTECH** Initiative.

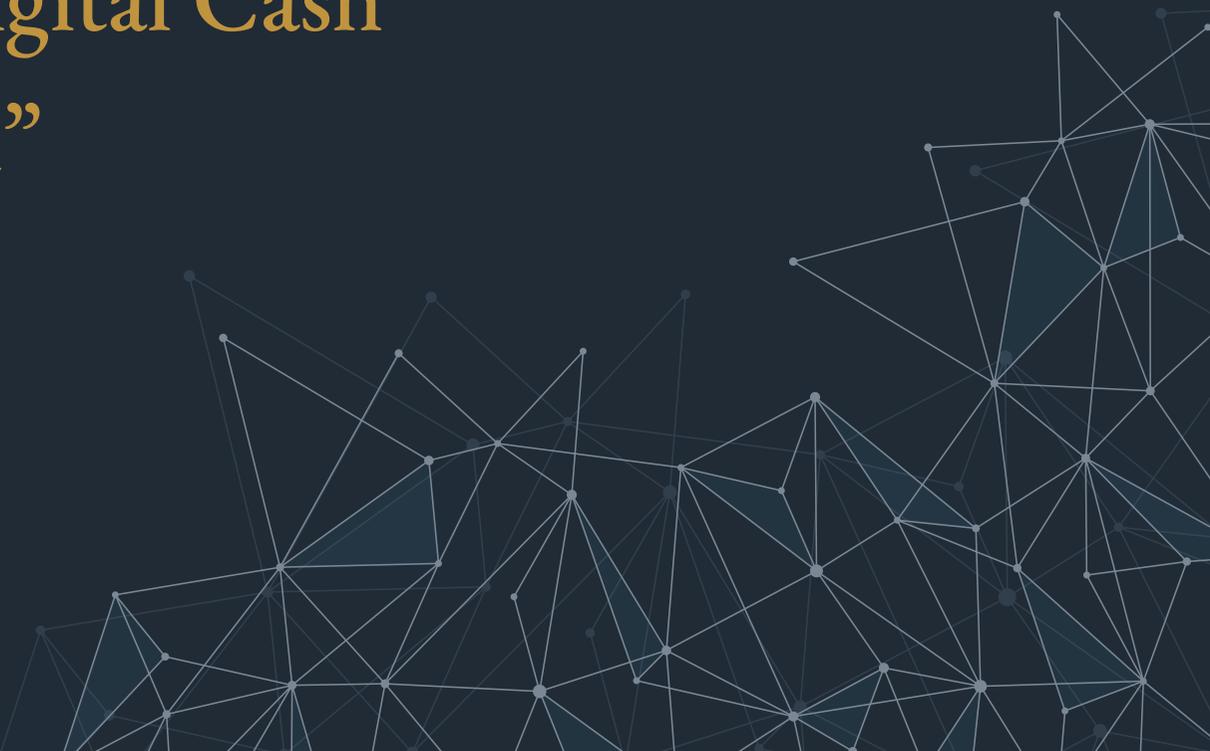


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01. Cover Letter

As U.S. Congressional leaders search for digital and inclusive solutions to reach low-income, cash-based, and unbanked constituents, in order to close inclusion and equality gaps, Project New Dawn (PND) presents a Digital Cash Infrastructure Framework, using Central Bank Digital Currency (CBDC).

In a 2017 Survey , The Federal Deposit Insurance Company (FDIC) estimated over 60 million people were either unbanked or underbanked, and the rate is 2-3 times higher among Black and Hispanic Americans. In fact, out of an estimated 38 million Black Americans, around 7 million are unbanked .

Financial inclusion is a building block of the solution to the brutal reality for American minorities exposed by the much higher than average COVID-19 impact, not receiving stimulus checks, George Floyd death and subsequent protests. Access to the financial system stimulates economic growth, brings financial stability and provides wealth building tools. The fastest and most impactful route to financial inclusion of the unbanked is through legislation, regulation, and proven technologies integrated with the existing financial system.

As a guiding principle of “People First”, we have a simple hypothesis:

A Digital Cash Infrastructure built with Central Bank Digital Currency (CBDC) will directly address the inclusion and inequality gaps left by the

current banking system.

It is with this hypothesis we come forward with a framework that will aim to:

- Give everyone a digital means to hold and pay with “Digital Cash”
- Boost liquidity in the market with real time and final settlement
- Interoperate with banks and nonbanks
- Leverage blockchain for trust, transparency and privacy
- Disincentivize bad actors

In this Working Paper, we put forward an ambitious vision to create a “Base” in the financial infrastructure, where everyone in the United States has access to cash digitally, regardless of if they have a bank account.

We look forward to engaging Congressional Leaders and their staff to further define the requirements and invite various stakeholders to participate in our incubation process.

Financial, Digital and Economic Inclusion for all. All possible. All Feasible.

Let’s get to work.

[1. 2017 FDIC National Survey of Unbanked and Underbanked Households](#)

[2. Who Are The Unbanked?](#)

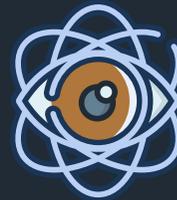
02. Project Overview

Project New Dawn (PND) is an initiative spearheaded by EMTECH-sponsored to drive an inclusive and structured engagement with Congressional and Industry Stakeholders from various fields and backgrounds to ultimately present the technical implementation of a **Digital Cash Infrastructure** that addresses the pain points of a cash-based population, including unbanked individuals and merchants, in the U.S.



THE VISION

Create a Digital Cash Infrastructure that is accessible to everyone to enable economic growth for the over 60 million Americans underserved by the current banking system, and to increase speed, convenience and ubiquity of electronic payments for the general population.



THE MISSION

To present an executional Framework and Reference Implementation of a “Central Bank Digital Currency” as a digital form of cash accessible to everyone..



THE STRUCTURE

PND Advisors and EMTECH welcome partners, advisors and stakeholders to join us. This initiative plans to deliver its work in two (2) installments:

- Working Paper: Framework
- White Paper: Reference Implementation

03. Background: Central Banking & Payments

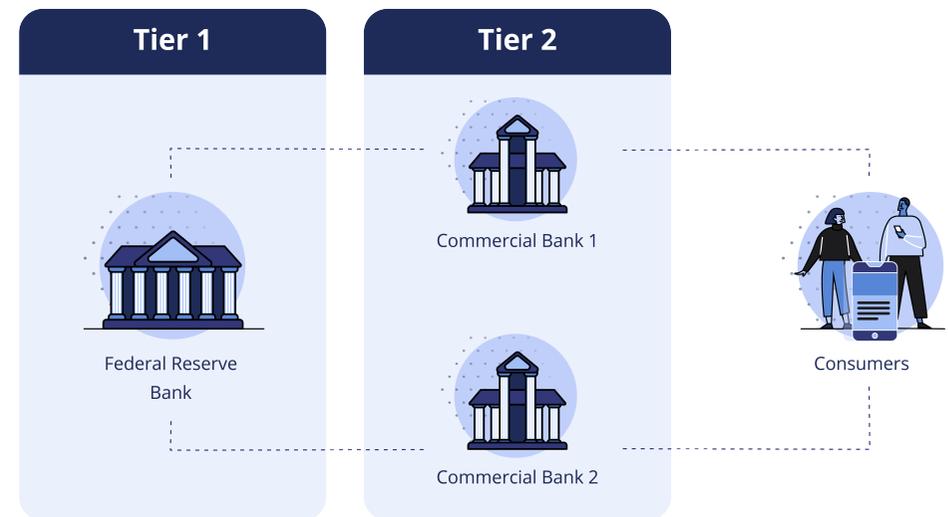
The basic need for payments in society led to the creation of central banking. Regulatory policy and sovereign currency management are some of the vital roles needed in every financial sector. In the case of The Federal Reserve System, it was established to serve the public's interest³.

It has since established a financial infrastructure that mostly limits its interaction in payments to Interbank Settlement activities and Reserve Management (wholesale payments), while leveraging a commercial bank network for consumer banking and payment services (retail payments).

This is often referenced as the “2-Tier” banking structure that makes the banks the principal intermediaries between people and the Federal Reserve. Although cash is printed by the Federal Reserve for people and businesses to use, the distribution of cash also depends on banks via cash deposits and withdrawals/ATMs.

In addition to a concentration risk, the data and research have extensively shown that the current financial infrastructure continues to leave millions of people (and small businesses) out of the digital finance world, because they are underbanked, unbanked and many are deemed “unbankable.” Many of the policies put in places after the Great Recession made servicing small businesses and low income individuals unprofitable for banks. It is also well documented

FIGURE 1
Current 2-Tier Structure



03. Background

that this dynamic disproportionately affects minorities and low income families the most.

Further, data suggests that financial inclusion can directly decrease income inequality and decrease a country's healthcare costs.

In this Working Paper, we are introducing a Digital Cash Infrastructure Framework we urge Congressional Leaders and The Federal Reserve to consider in their search to address the needs of the unbanked population with digital tools to streamline payments

The framework being presented aims to:

- Address the Digital Financial Inclusion and Income Inequality Gaps
- Preserve financial stability by modernizing cash for everyone utilizing financial technology tools
- Present economic and monetary policy perspectives

Context

- Even with the exploding level of innovation in electronic payments and digital banking, cash is still the most used form of payment around the world, accounting for 30% of all transactions in the U.S.⁵
- Early analyses have already predicted lowering levels of income and increasing levels of income inequalities in a Post-COVID world.⁶ Yet, digitization, which often ends up leaving many excluded, is expected to exponentially expand.⁷
- In the U.S., digital financial services are only available through the retail banking infrastructure (mobile apps or user friendly web portals often obfuscate that dependency and its complexity). However, the risks in such centralization were recently observed with the difficult roll out of the Small Business Administration Loans program or the inefficiencies observed in the distribution of stimulus payments.

[4. Understanding the Racial/Ethnic Gap in Bank Account Ownership - FDIC](#)

[5. Cash Report from Federal Reserve Board of San Francisco](#)

[6. Impact of pandemics on income inequality](#)

[7. COVID Digital Acceleration](#)

04. Central Bank Digital Currency - As “Digital Cash”

Broadly defined, a **Central Bank Digital Currency (CBDC)** is a form of money issued by a central bank or monetary authority (i.e The Federal Reserve), just like cash is today.

- It **differs** from the traditional forms of money because of the technology used to issue it as a digital token with defined programmable attributes.
- It is **similar** to traditional forms of money because of the Central Bank’s liability and being accepted as legal tender.

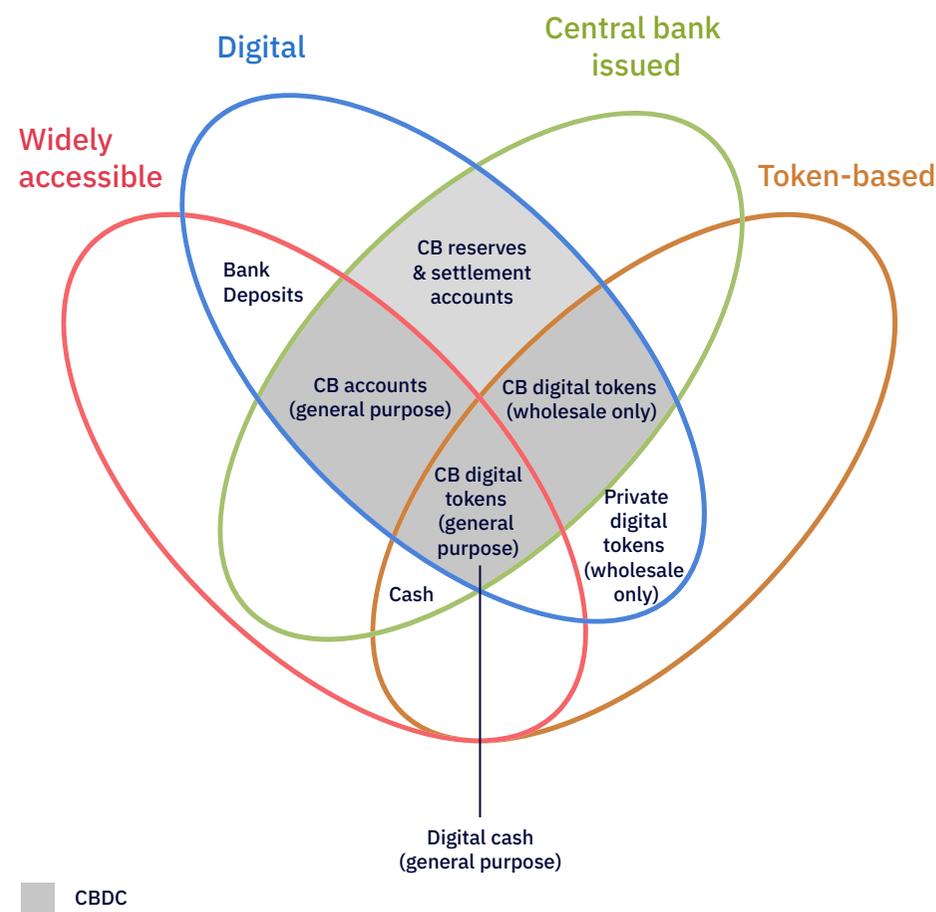
The Bank of International Settlements defines⁸ CBDC as a “Digital form of central bank money that is different from balances in traditional reserve or settlement accounts (i.e. balances in accounts held by commercial banks at the central bank)”.

It also introduced the widely used “The money flower: a taxonomy of money⁹” that describes the factors that differentiate CBDCs from established forms of digital and non-digital forms of money.⁹

The role of cash in the economy is vital in many ways. Above all, people prefer the concept of having cash because it allows the freedom and privacy of their financial decisions. Whether they privately want to save, spend it on ice cream or gifts, it offers unique benefits that makes it still the most widely used form of payment.

FIGURE 2

The Money Flower: a taxonomy of money



04. Central Bank Digital Currency - As “Digital Cash”

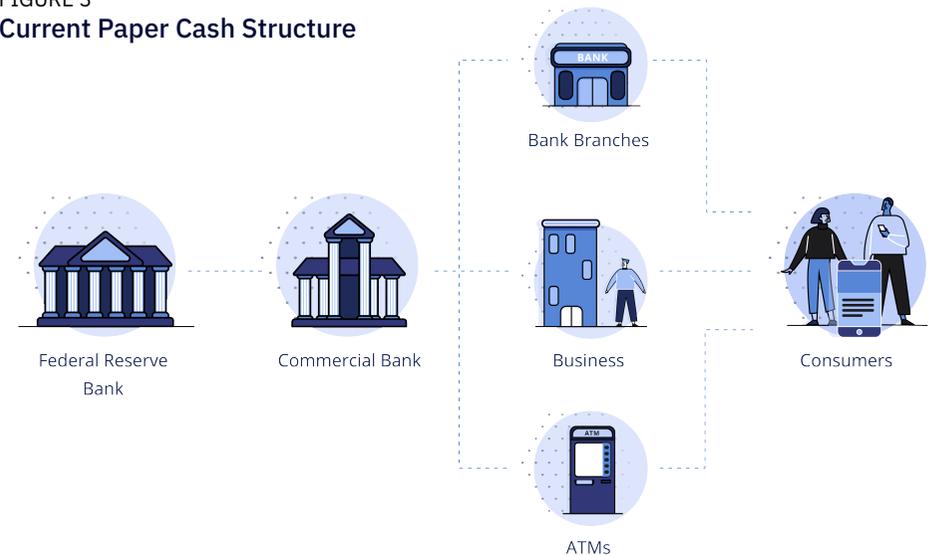
Furthermore, cash is the most trusted, reliable, legal means of payment and allows for privacy in transactions. Last but not least, **it is the fail-safe form of money.** As of February 2020, \$1.8 Trillion dollars in circulation.

In the post COVID-19 world, small and large institutions are already accelerating their digital transformation. In order to access goods and services digitally, cash users must have compatible, digital, payment solutions. The banked population has access to those solutions with debit and credit cards and other mobile apps.

By contrast, a cash user who is unbanked or underbanked must find a way to convert cash to a bank deposit or a prepaid card in order to access it in a digital form (debit card, zelle, venmo, etc.). In the case of a check deposit, the fees and the delay in accessing funds are significant pain points for unbanked.

Given the highly concentrated paper model, introducing cash in digital form helps diversify the methods through which people can get and use cash. Furthermore, the use of digital cash, given the right design, should have **little impact on the traditional banking sector, while contributing to market stability, economic growth and inclusion.**

FIGURE 3
Current Paper Cash Structure



The latest reports on Central Bank Digital Currencies (CBDCs) from the various stakeholders such as the World Economic Forum¹⁰, Central Bank of Bahamas¹¹, Digital Dollar Project¹² and the BIS report showcasing the “Cash Like” or “Direct” Design Architecture for CBDCs¹³ have validated interests, risks and benefits.

It is important to note that in the future it is anticipated that the issuance of the U.S. Dollar as a CBDC will most likely be issued or used in various networks, as the U.S. Dollar is today via the banking system. If properly designed, it would have a democratizing and inclusive-creating effect on the banking

[10. WEF Central Bank Digital Currency Tool-Kit](#)

[11. Central Bank of Bahamas - Project Sand Dollar](#)

[12. Digital Dollar Project - White Paper](#)

[13. BIS - The Technology of Central Bank Digital Currency](#)

04. Central Bank Digital Currency - As “Digital Cash”

infrastructure and provide the critical infrastructure that normally only the biggest global banks have budgets to build. Establishing a model for small banks and credit unions to access an efficient payments infrastructure as their global peers will help free up significant capital for lending for community lending and small business loans.

In the proposed framework, the Digital Cash will be issued on a private permissioned Ethereum blockchain network, named “Digital Cash Blockchain,” (for the purpose of this paper) with an integrated platform of settlement and wallet services.

Key Assumptions for Digital Cash Framework:

- A Self-Contained Instrument (Issued by The Federal Reserve or a Delegate)
- Universally Accepted Form of Payment
- Non-Interest Bearing CBDC
- Privacy Transactions
- Instant Final Settlement
- A Central Bank Liability (no intermediary)

The Digital Cash Infrastructure assumes everyone can access a digital wallet for the storage and transfer of funds. It will most likely reduce The Fed’s cost for cash operations (\$680M as of 2018), but also overtime will help eliminate the need for the conversion from paper to digital funds. Moreover, the diversification of digital finance makes the sector more resilient and maintains a competitive public option of digital currency, which is also sound for economic stability.

FIGURE 4
Digital Cash Blockchain

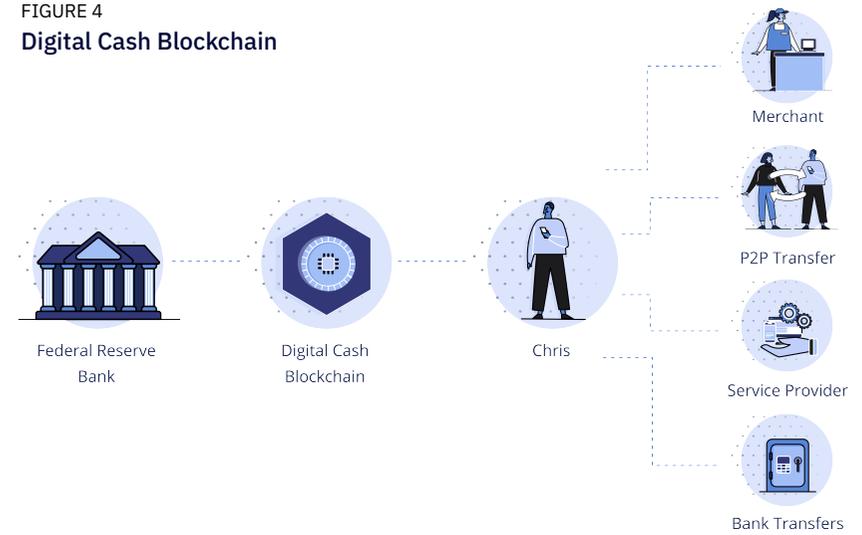
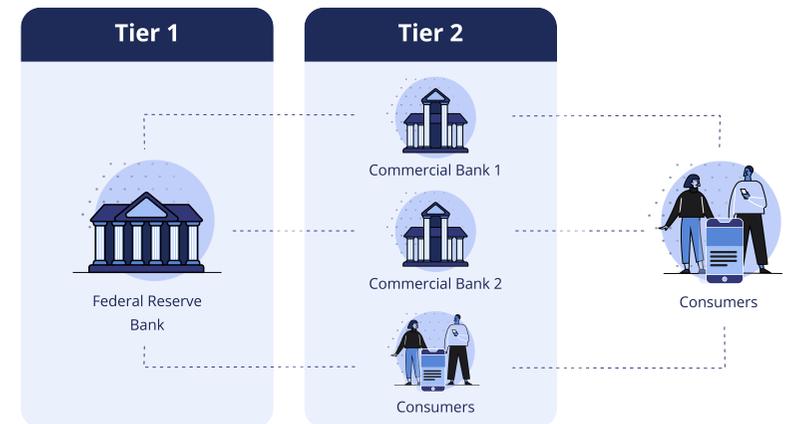


FIGURE 5
Proposed 2-Tier Structure



05. Economic Policy & Impact

Income Inequality

Before this crisis, Brynjolfsson and McAfee in what they called the “Great Decoupling” where wages and productivity were highly correlated from 1947 to 1973, but post 1973 productivity doubled but wages were stagnant. This wage stagnation has directly contributed to income inequality disparities.

This pandemic has impacted the low income families disparately, somewhat different from previous economic downturns. For example, 40% of the households earning \$40,000 (USD) or less have lost their jobs or have been furloughed (Powell, 2020).

The COVID-19 has exposed various gaps in the U.S. financial market and in anticipation of the institution of a ‘minimum income’ policy to mitigate the ever growing income divide, Congressional Leaders are urged to call for a modern and inclusive financial market infrastructure that is accessible to everyone.

Existence of CBDC as a Digital Cash instrument and associated digital wallet can:

- Digitize Cash-based or check-based payments (payroll, refunds, benefits, etc..)
- Streamline the implementation of Universal Basic Income (UBI)
- Facilitate peer to peer transfers of digital cash

- Drastically lower the intermediation costs for the Federal Reserve, individuals and small businesses who use cash.

As a result, financial inclusion of the vulnerable population by utilizing CBDC is paramount to nudging the income inequality gap in the right direction.

Health

Income inequality and associated social divide is causing an irreparable health crisis.

Importantly, empirical evidence suggests that the top stressors included money, work, and the economy, with 61% of Americans reporting money as a stressor. Moreover, Americans with lower incomes reported a disproportionately higher amount of stress and higher inability to manage stress (Layte, 2011, Segram and Sequeira, 2020). The extant empirical research supports the notion that lack of financial security leads to both physical and mental ailments.

Narrowing the income inequality gap will lead to savings in healthcare costs in the long-term, although it is noted that the immediate solution to healthcare challenges is a public option.

Competitiveness

The modern cold war between the U.S. and China and the race to superiority revolves around maintaining the reserve currency status and technology. At present, U.S. dollars account for more than 60% of all foreign currency reserves in the world.

If the US Dollar loses its reserve currency status, during the next pandemic, the U.S. treasury might not be able to access the global debt markets with ease as it did throughout COVID-19. Moreover, the ability to fund the U.S.'s ever increasing national deficit becomes restricted. A Bank of England study has found that the CBDC being 30% of the GDP could possibly lead to 3% increase GDP due to savings in transaction costs, lowering real interest rates and distortionary taxes. The People's Bank of China (PBOC) is moving to digital yuan and the possibility of the digital yuan becoming the world's reserve currency, is an existential threat to the U.S. progress.



06. Monetary Policy

Central Banks' development goals across all jurisdictions explicitly or implicitly recognize that financial infrastructure, including wholesale and retail banking platforms, require realignment.

Central Banks play a key role in not only guiding monetary policy but also in directing fiscal and financial stability. The public option of creating a digital currency places additional fiduciary and oversight responsibilities for the modern and independent Central Bank.

Challenges in meeting traditional Central Bank mandates of maintaining price stability, financial stability and often employment targets, can be skewed in favor of maintaining global or even regional nationalist and competitiveness strategies.

“Effectiveness of CBDC in fulfilling the basic functions of any public currency, namely, its efficiency as a medium of exchange, its security as a store of value, and its stability as the unit of account for economic and financial transactions”, present added components to the Central Bank monetary policy challenge (NBER Working Paper 2371, Bordo, Leven). Implicit in this discussion is the concept of protecting and promoting national sovereignty.

Monetary Policy Considerations - Expanding the Policy Toolbox

Distribution of fiscal stimulus payments in an era of ongoing quantitative easing initiatives, illustrates the benefits of both transparent policy and cost-efficient direct payment to both businesses and consumers.

Without a CBDC distribution mechanism, not only is monetary policy implementation challenged, but the benefits of quantitative easing in promoting fiscal stimulus are stymied. Restorative monetary policy goals and actionable strategies to assuage the crisis, including reducing interest rates and providing liquidity injections, if executed through CBDC, ideally will improve the monetary policy transmission mechanisms and facilitate the transparency of desired policy initiatives.

Microeconomic Benefits - Promoting Economic and Financial Inclusion

Microeconomic issues detail economic and financial inclusion. The Bank of Canada (April 2020) argues that their CBDC issuance is not a priority. Incentives to promote CBDC can, at the national level, spur improvements in money laundering compliance. For both wholesale and retail CBDC, questions of utility focus on maintaining the competitive posture of domestic banking markets. Implications on bank liquidity, reserves, deposits and capital are top of mind risks for the Central Bank as supervisor.

Maintaining a resilient financial sector and preserving accessibility for the broader 'marginalized' underbanked underscore the fiduciary roles and responsibilities of the Central Bank in protecting the public. More immediate concerns, pervasive across many countries, emphasize the need for updated payment systems and remediating cross border payment issues.

As countries continue supporting economies to bolster COVID-19 recovery, digital currency and potentially CBDC holds great promise. Reducing the spread of disease and providing a faster and more efficient distribution of support payments are important considerations.

Innovation & Collaboration

A public private partnership is critical to fulfill the public option of initiating digital currency especially as a CBDC. Both Banks and Tech Companies are strategic partners for Central Banks. Regardless of the structure chosen, the moral and mandated obligation to enhance an efficient, secure and rapid medium of exchange, embraces both the innovation of fintechs in partnership with traditional banks and a **collaborative public partner in the Central Bank.**

07. Technical Considerations

PND's forthcoming Reference Implementation will present a Digital Cash Blockchain built for the purpose of establishing a resilient and trusted network of Digital Cash issuer and users. We are starting with an Ethereum deployment, and replicating the current Federal Reserve System to define the initial network participants and roles. Furthermore, blockchain technology can embed trust, compliance, privacy and transparency in such networks. The toolchain is mature and actively developed, with a growing mindshare.

Cryptographic technology is rapidly evolving and providing better solutions to data integrity, confidentiality and availability. The proposed framework's goals is to provide a good starting point and to be able to continuously incorporate future advances. Here are the top three (3) key considerations for the Reference Implementation

- Privacy
- Transparent & Embedded Compliance
- Interoperability

Privacy vs Anonymity vs Confidentiality

PND platform implements anonymous and confidential transaction processing, while also allowing law enforcement to selectively reveal the accounts participating in specific transactions in an auditable way. This also ensures accountability of compliance to privacy laws.

- Anonymity refers to the identity of the transaction participants being hidden. This is in line with users' preference for privacy of the identity even if their activity is publicly broadcasted.
- Confidentiality refers to the transaction amounts and account balances remaining hidden to observers of the blockchain. This can apply also to any data passed to smart contracts.

Transparent & Embedded Compliance

The Digital Cash Blockchain assumes compliance to jurisdictional laws to disclose information about specific transactions. In our implementation, this request is logged on the blockchain signed with proper authorization. A zero-knowledge computation oracle monitors the blockchain, picks up the request, verifies authorization and if it is deemed correct, reveals the encrypted information to the party requesting it outside the blockchain. In this way all information disclosure is logged on the blockchain and can be scrutinized by democratic institutions.

PND enforces compliance of payments in respect to e.g. AML rules programmatically - transactions are not accepted if they fail to pass the required validation.

Interoperability

Gateway Nodes or Services could allow any financial institution to connect to the Digital Cash Blockchain and utilize its infrastructure as cash becomes deposits, and vice versa. The Digital Cash Blockchain can be integrated with existing systems and does not require major retooling of the current banking system. Further, working with the Hedera Hashgraph Network, we will develop further understanding how to use interoperability to provide trust in the private CBDC network.

08. Advisors' Insight



Digital Cash & Behavioral Shifts: Designing for Adoption

Barbara Bickham

Physical Cash has 100% availability and reliability; it is anonymous; it is an immediate direct medium of settlement. Physical cash allows the unbanked and under-banked to participate in the economy. Digital cash must have these same characteristics.

Simplicity

A digital dollar interface should be easy to use; look and feel like something they have used before; and fun. The easier and more fun, the more it will be adopted since the technical blockchain portions will be abstracted away from the everyday user.

Businesses can plug into current infrastructure to make it easy to extend their customer base with the new types of consumers that will have access to the digital cash infrastructure. Consumers can

have a seamless transition between paper cash and digital cash. As more businesses go digital, this will empower the consumer to participate in a digital economy that is being created now and into the future.

Availability and Reliability

Digital Cash needs to be 100% available. When consumers (which can be businesses or people), want to use Digital Cash, it's there to use. For example, if a consumer has \$10.00 digital cash, and they want to make a purchase, they can do so freely.

Digital Cash needs to be reliable. When consumers (which can be businesses or people), have digital cash, it operates like paper cash. For example, if a consumer has \$10.00 digital cash, that \$10.00 can be used and spent just as any \$10.00 paper cash. This allows the digital version to be trusted just like the paper version.

Consumer Data Protection

Many people use paper cash as a means of doing transactions in an anonymous way. This may be a myth, since in the current society with cell phones and other electronic tracking (cameras, loyalty programs, money serial numbers, etc.) a company may have more information on buying patterns and habits than the average consumer knows.

Digital cash can help with these concerns since a consumer can opt-in/out with the data that they would like to provide (completely anonymous vs. show everything), versus how many companies just take that data and sell it for their own benefit. This can help create trust in digital cash since the consumer will have more say in who and how their data and information is used.

Password Recovery (Private Key/Public Key)

People with Digital dollars need the ability to recover their information in case of a lost private key. This is key to building trust with the brand and the method. Most consumers and businesses are used to operating in a digital world where a centralized entity is used in order to give them comfort in case their access is removed.

This is a differentiator with paper cash. If paper cash is lost or stolen, then there is a long process that might result in no recovery.

Our solution will create a simple way for this to occur without having to have secret words or 256bit keys to remember.



Strategic Partnerships: Financial Institutions and Community Organizations Focused on Assisting the Unbanked

Natasha Bansgopaul

Digital Cash and PND's success is a direct product of strong partnerships that serve as the foundation for adoption of a digital cash infrastructure. In order to increase adoption and credibility, throughout the incubation period it is imperative to build these relationships with trusted community organizations and leaders that understand the need to provide more efficient methods of distributing capital to the unbanked and create solutions that rely on secure, compliant, non-fungible, and easy to access technology. Partnerships will be developed with key organizations and companies spanning across the following industries:

- Banking and Financial Institutions
- Community Organizations supporting unbanked and closing the wealth disparity gap
- Organizations supporting development of CBDC
- Local/Regional Governments supporting financial literacy and digital adoption
- Local/Regional Merchants Adopting Digital Cash Options
- Startup Technology Firms in FinTech, Financial literacy, and digital cash payments

By partnering with trusted community organizations, PND can bring

financial technology innovation, via Digital Cash, to sectors of the United States that have been forgotten or ignored, simply because of the difficulty in reaching this portion of the un-banked population. As financial needs are more directly addressed among this core segment of the population, the expectation is that overall GDP experiences a positive lift that can continue to trend upwards as usage and adoption of digital cash expand nationwide.

Digital cash also provides a unique opportunity that was previously not available: a more efficient way to address wealth gap disparities and gauge adoption with a segment of the population that the government tends to have significantly less data and access, for a myriad of reasons. PND's digital cash infrastructure is a new age way, using secure and compliant technology solutions, of addressing a systemic and antiquated issue plaguing the United States for decades: the financial services ecosystem that creates wealth gap disparities and consistently ignores the unbanked).

It's time to work with key stakeholders to change systems and behaviours to more willingly adapt a digital cash infrastructure that will provide benefits for all, in the short term.

09. Conclusion

Financial, Economic and Digital Inclusion are paramount for the U.S. economic recovery to reach everyone. Growing income inequality is multifaceted, however, research notes that low income and minorities are unbanked and underbanked at 2-3 times more than the national average.

Moreover, we've witnessed the flaws of a financial market overly dependent on banks, repeatedly.

Project New Dawn is urging The Federal Reserve and Congressional Leaders to consider making Cash, the most trusted and reliable form of payment, digital and accessible for everyone. Modern technology has provided an opportunity to create ecosystems that provide trust, privacy, compliance and interoperability. More importantly, a Digital Cash Infrastructure would establish an efficient "Cash to People" model that can support the unbanked, cash-based populations.



10. About The Contributors



Carmelle Cadet

Founder & CEO @ EMTECH
Blockchain, Treasury & Financial Services
Former IBM

Carmelle is an experienced Finance and Business Leader in the Enterprise IT sector, with specializations in the Financial Services and Blockchain Technologies. A passionate advocate for financial inclusion, economic development, and a former Finance and Business Executive at IBM, Carmelle is now the founder and CEO of EMTECH, a Modern Central Bank Technology Company.

For the last 3 years, Carmelle worked on Digital Currency technologies and strategies for the purpose of addressing financial inclusion and lowering the cost of cross border payments.

As a thought leader in the Central Bank Digital Currency (CBDC) space, Carmelle engages with Central Banks from Africa to the Caribbean to enable their transition to the digital currency era in an inclusive way. Carmelle was also named NYC Fintech Women's Inspiring Fintech Females 2019



Barbara Bickham

Managing Director @ Women Innovation
Fund Accelerator (WIFAX), Blockchain CTO

Barbara Bickham, CTO with extensive experience in Technology and Entrepreneurship. Her current areas of expertise are in the Internet of Things, Blockchain, Augmented Reality and Artificial Intelligence.

Barbara is also the Founder and CTO of Trilyn Ventures, a Blockchain Advisory Company. She provides strategic advice and technical execution for companies incorporating Blockchain and/or Artificial Intelligence into their company and products.

Ms. Bickham founded TechGenii, Inc., a digital strategy company; Wilderforex.com, a Forex Software company; and PCNLA an investment association connecting Southern California businesses with venture funding.

She holds degrees from the University of Chicago, New Entrepreneurs Program, an MSCS from West Coast University and a BACS from University of California, Berkeley.

10. About The Contributors



Dr. Haran Segram

NYU Stern

Advisory Board Member @ EMTECH

Haran Segram joined New York University Stern School of Business as a Visiting Assistant Professor of Finance in January 2009 and became a Clinical Assistant Professor of Finance in September 2016.

Professor Segram's research focuses on the application and economics of AI and Blockchain. He co-hosts a speaker series on AI, Blockchain and other emerging technologies with Stern Technology Association. He has been interviewed on various finance related topics by BBC, Bloomberg, Business Insider, CNBC, China Global Television Network (CGTN), Channel News Asia, Knowledge@Wharton, Kurier (Austria), Reuters, and Zacks. He has been quoted in CNBC, New York Times and Yahoo Finance via syndication. Professor Segram received his Ph.D. in Economics from the University of Sydney.

Research Interests: Artificial Intelligence, Blockchain, Cryptoassets, Discrete Choice / Probability Modeling



Evgeni Mitkov

CTO @ EMTECH

Currency Markets an Blockchain Expert

Evgeni has 23 years of Capital Markets infrastructure experience focused on innovation: opened up the interbank currency derivatives market to buy-side firms and created the first electronic exchange for currency derivatives.

For the past 6 years, Evgeni has merged high-frequency FX trading technology with blockchain payments and settlement to create a powerful vision for the future of cross-border payments and currency markets.

Evgeni has advised several European governments on how to use blockchain technology to advance their economies and two successful ICOs in the past 2 years, raising, \$28m and \$250m respectively.

Evgeni graduated with honors from Babson College in Massachusetts.

10. About The Contributors



Diane R Maurice

Advisory Board Member @EMTECH
Former Federal Reserve Bank of New York

D. R. Maurice is a former Federal Reserve Bank supervisor with over 25 years of experience as an international banker in New York, London and San Francisco.

As a technical advisor on financial services to EMTECH, current focus includes payment innovations; Sandbox Framework; Central Bank Digital Currency; and other financial technology solutions for Central Banks.

Ms. Maurice has two advanced degrees including a Master's from the London School of Economics where she worked towards a PhD on international regulation and compliance. Her most recent publications (November 2016 and March 2018) address financial technology and strategic risk management.

Disclaimer: Any views or opinions expressed as an Advisor to EMTECH or Central Banks represent personal opinions and not the views of any government; public or private institution.



Natasha Bansgopaul

Co-Founder & COO @ DarcMatter, Konstellation
& VegaX Holdings Konstellation
Fintech, Blockchain, and Digital Assets Entrepreneur

As the Co-Founder and COO of DarcMatter (DM), Konstellation, and VegaX Holdings, Natasha is an experienced fintech, marketing, strategy, and M&A professional with over 10+ years of demonstrated leadership through key strategic roles at Fortune100 companies. She is the founder of three fintech companies and significantly increased the platform's assets under management to over \$7 Bn.

She holds an MBA from The Pennsylvania State University, and has successfully led the company to secure numerous awards globally such as, "Startup of the Year," NextMoney Global FinTech Finals, HFM Technology "Best FinTech Solution for Hedge Funds", and "Best Blockchain Technology Provider" in the 2019 Wealth Management.com Industry Awards.

Natasha is currently focused on using her experience in fintech to build the next generation of investment strategies and indices with digital asset management firm, VegaX Holdings: The 'BlackRock' of Crypto-Assets. With a passion for learning, business development, diversity and inclusion, financial literacy, and technology, Natasha continues to pioneer the need for change in the financial services industry via fintech solutions.

10. About The Contributors



Nikola Toshev

Blockchain Architect, EMTECH

Nikola Toshev has been building software and teams that build software for more than 20 years. He has worked with stock exchange trading, financial technology in general, blockchain and cryptography, and machine learning. Founder and owner of a software service company, Blue Edge, in 2001. Co-founder and served as CTO in Sciant, 2016-2020. MSc in Computer Science.



11. Technical Collaborators

Hedera

Hedera Hashgraph is a public distributed ledger for building decentralized applications. Developers can build secure, fair, blazing-fast decentralized applications on top of the Hedera platform. Dr. Leemon Baird, Hedera Co-founder and Chief Scientist, and Mance Harmon, Hedera Co-founder and CEO, patented the groundbreaking hashgraph technology after working together at the United States Air Force Academy and as Founders of Trio Security, BlueWave Security, and Swirlds, Inc.

Hedera is the only public distributed ledger network built to run mission-critical enterprise workloads. Structured as an LLC, Hedera is owned and governed by leading global institutions across various industries, including Boeing, Deutsche Telekom, DLA Piper, FIS Worldpay, Google, IBM, LG, Magalu, Nomura, Swirlds, Swisscom Blockchain, Tata Communications, University College London, and Wipro.

The Hedera Consensus Service (HCS) is a globally distributed fair ordering service that allows any application to leverage the performance and security features of the hashgraph consensus algorithm. HCS can be plugged into private permissioned networks like Hyperledger Fabric, R3 Corda, or Quorum to extend the utility of private networks while enabling them to enjoy the decentralization

at scale of public networks.

Hedera Hashgraph was founded in 2017. The company has raised \$140 million to date and has 60+ employees across 4 continents.

www.hedera.com

Microsoft

Microsoft Startup granted EMTECH cloud credits to build our solution on Microsoft Azure.

www.microsoft.com

12. APPENDIX

Appendix I

Legislative Perspective

Congress has introduced three bills that reference a ‘Digital Dollar’.

1. The ‘Financial Protections and Assistance for America’s Consumers, States, Businesses, and Vulnerable Populations Act’

Congresswoman Maxine Waters (D-CA)

- Classified under ‘Direct Stimulus Payments For Families’, the digital dollar is defined as: (A) a balance expressed as a dollar value consisting of digital ledger entries that are re-corded as liabilities in the accounts of any Federal reserve bank; or (B) an electronic unit of value, redeemable by an eligible financial institution (as deter-mined by the Board of Governors of the Federal Reserve System).
- A “digital dollar wallet” shall mean a digital wallet or account, maintained by a Federal reserve bank on behalf of any person, that represents holdings in an electronic device or service that is used to store digital dollars that may be tied to a digital or physical identity. Any Member Bank must provide a pass-through account. Member banks are Federal Reserve Members (all OCC + Federal Reserve); non-Member

and Credit Union are state banks that are not Members of the Fed. If the Member Bank has \$10 Billion or more, the account must be made available online. The accounts may not be subject to any account fees, minimum balances, or maximum balances; (B) shall pay interest at a rate not below the greater of— (i) the rate of interest on required reserves; and (ii) the rate of interest on excess reserves. The accounts shall provide functionality and service levels not less favorable than those that the member bank offers for its existing transaction accounts. Labelled a “pass-through FedAccount’.

- Federal Reserve mandate to offer digital dollar wallets and where geographically not available, partnerships with the United States Post Office should occur. Displayed as a ‘FedAccount’, and shall provide, in conjunction with the United States Postal Service, access to auto- mated teller machines to be maintained on be- half of the Board by the United States Postal Service at branch offices; Fed to create regulations.

2. Automatic Boost to Communities Act

Representative Rashida Tlaib (D-MI) and Prayal Jayapal (D-WA):

- The term “digital dollars” means dollar balances consisting of digital ledger entries recorded as liabilities in the accounts of any Federal reserve bank and digital coins or currency instruments issued by the United States Treasury as legal tender, and held as bearer instruments in any digital dollar cash wallet approved by the United States Treasury.
- Digital Dollar Account Wallets - The term “digital dollar account wallet” means a digital dollar account, maintained by a Federal reserve bank on behalf of any person, for the purpose of holding digital dollar balances.
- Digital Dollar Cash Wallets - The term “digital dollar cash wallet” means any software program, whose standards, specifications, and functions are authorized and regulated by the United States Treasury, which stores, sends, and receives digital coins or currency instruments issued by the United States Treasury as legal tender, and which are considered bearer instruments in the possession of the individual or entity on whose behalf the wallet is managed and administered.

Focus is on UBI with \$2,000 a month and involves money from the Treasury (MMT)

3. Banking For All Act (Senate)

Senator Sherrod Brown (D-OH)

Calls for a FedAccount for the unbanked Americans.

<https://www.bankingsenate.gov/imo/media/doc/SIL20449.pdf>

Appendix II

Exhibit 1: The Federal Reserve System



Exhibit 2: The CBDC Pyramid

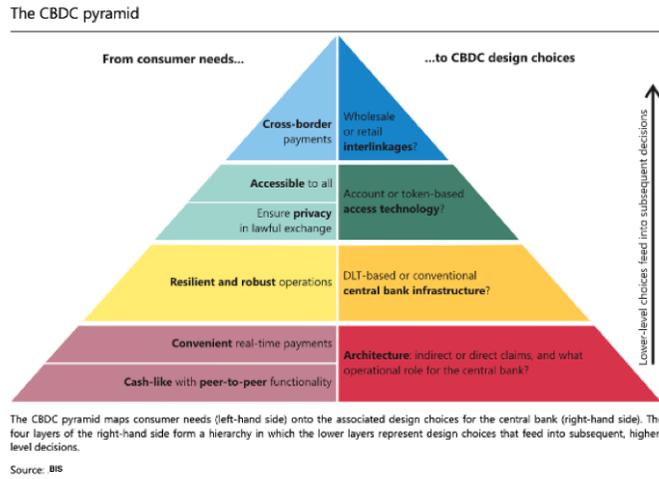


Exhibit 4: Potential CBDC Architecture

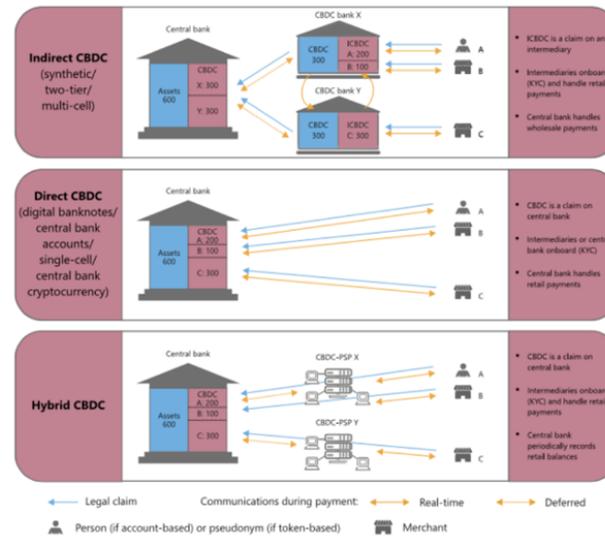
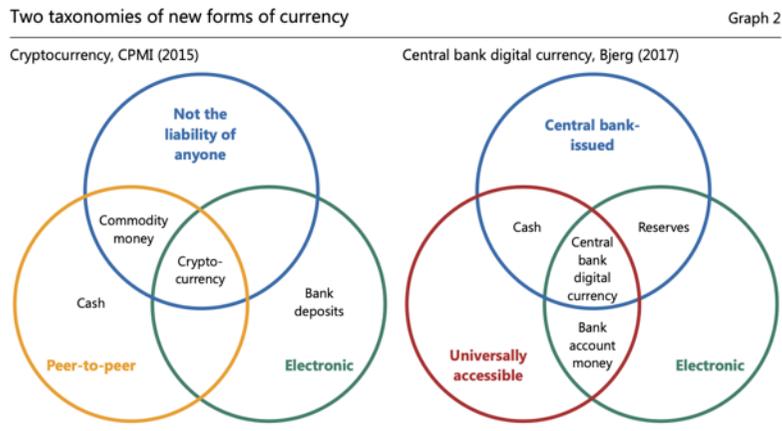


Exhibit 3: Two taxonomies of new forms of currency



EMTECH

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