

Central Bank Digital Currencies: A Trillion Dollar Opportunity

How effective are retail central bank digital currencies in promoting wealth distribution and economic growth when compared to the standard reserve currency?

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Introduction

In an increasingly digitized world, with the rapid development of artificial intelligence and new technology, the need for adaptability and digital competence is more vital than ever. This development is prominent in various sectors of the economy. For instance, cryptocurrencies such as bitcoin have been taking the word by storm, and while some investors have gained exponential profit, Forbes estimates that some have lost up to \$114 billion in wealth¹. This is because cryptocurrency is both speculative and highly volatile, meaning that its value undergoes rapid and unpredictable fluctuations. However, the emergence of Central Bank Digital Currencies (CBDC) establishes a regulated method to innovate the future of money and financial transactions. Due to the new and developing nature of the technology, there is currently no precise and accepted definition for CBDCs. The Bank for International Settlements defines CBDC as “a digital payment instrument, denominated in the national unit of account, that is a direct liability of the central bank².” The Atlantic Council’s definition supplements this, claiming that “a CBDC is virtual money backed and issued by a central bank. As money and payments have become more digital, the world’s central banks have realized that they need to provide a public option—or let the future of money pass them by³.” Ultimately the design features of the CBDC will dictate the definition and legal framework of the technology. While only three fully functioning CBDCs have been released, over 100 countries globally, including the United States, are conducting experiments and pilot versions that plan on being released in the near future⁴.

The implementation of a successful CBDCs requires significant investment of time, money, and resources. That being said, CBDCs have the potential to offer many significant

¹ Hyatt, “These Crypto Founders And Bitcoin Moguls Lost \$114 Billion In 2022.”

² “Central Bank Digital Currencies: Foundational Principles and Core Features.”

³ “Central Bank Digital Currency Tracker.”

⁴ “Central Bank Digital Currency Tracker.”

benefits over traditional forms of currency, both responding to a trend of increased overall digitization and addressing inefficiencies in traditional transactions. Data shows that as the years progress, cash is being phased out of financial transactions: BBC reported that “Australia’s transition to a truly cashless society is well underway. Experts say it will happen within five to eight years. Others, such as Professor Richard Holden from the UNSW Business School, say it could happen within three years⁵.” Currently, this transition has manifested an increase in the use of tap-card technology and other digital payment platforms such as PayPal and Venmo. In the future, biometric payment methods, such as facial recognition, voice recognition, and finger/palm prints, can be expected to become the norm. The global biometric card market is expected to grow at a compound annual growth rate of nearly 118% between 2024 and 2029, representing an eighteen and a half billion dollar valuation⁶. CBDCs are positioned to play a critical role in the development of a transition to this digital economy.

In addition to the development of new technology, the transition to digital currencies and payments can be attributed to five main inefficiencies in traditional financial transactions:

- 1) Traditional financial transactions, especially ones that are international and must cross borders, can be very slow and costly (due to the process of counting, verifying, and transporting physical currency).
- 2) Since cash is difficult to trace, it is often vulnerable to theft, loss, money laundering, and tax evasion.
- 3) Cash transactions and traditional payment systems are not effective in rapidly implementing monetary policy. With cash in circulation, central banks have limited

⁵ “Why Cash Is No Longer King.”

⁶ “Biometric Card Market - Size, Share & Industry Analysis.”

control over how quickly and effectively policy changes (e.g., interest rates, reserve requirements) affect consumer behavior, and by extension, the broader economy.

- 4) Cash-based economies are more vulnerable to disruptions (economic crises and natural disasters) and prolonged periods of financial instability.
- 5) Due to the high fees and barriers, traditional financial and banking services are inaccessible to many low-income, immigrant, and rural communities, resulting in a large unbanked and underbanked population⁷. Excluding predatory banking practices, these barriers allow banks to manage costs, maintain high profitability, comply with regulatory requirements, and manage risks. Sound CBDC implementation and policy structure will promote greater financial inclusion without compromising risk management and revenue generation. This potential can be attributed to its cost-effectiveness and real-time monitoring and reporting capabilities through blockchain/distributed ledger technology, among other benefits.

The motivations for CBDC implementation vary depending on the country's economic development, government structure, and the type of CBDC. For emerging markets, priorities for CBDC functioning include financial inclusion, payment efficiency, and resilience in the payment system. Conversely, for developed countries financial safety, payment efficiency, and monetary policy implementation are at the forefront of the CBDC mission⁸. CBDC implementation also has geopolitical implications, with many countries wanting to be the dominating force in the emerging digital currency market. Currently, the US dollar, as the federal reserve currency, in conjunction with the global messaging system SWIFT gives the United States the power to easily

⁷ "A Cashless Society."

⁸ Auer et al., "Central Bank Digital Currencies."

borrow money and impose damaging financial sanctions. Other countries, especially China (Digital Yuan), want to encourage the usage of digital currency in order to reduce global reliance on the United States and position themselves as dominant in the digital economy.

With the capacity for CBDCs to either mitigate or create significant financial issues, many countries have jumped at the opportunity to delve into CBDC research. Currently, over 90% of central banks are researching CBDCs, with about 75% being retail CBDCs⁹. The goal of each of these organizations is to assess the implications of digital currency (ie. whether they will solidify or destabilize a country's economy), and develop the proper policy and legal framework to ensure that the transition to a digital currency supports economic stability and growth. This rapid innovation has captured my attention, making me want to investigate how the CBDC technology can be leveraged as a force for good. Ultimately, CBDC implementation has the power to significantly impact the way every person and country conducts financial transactions. Thus, the research question that I will be addressing is **how effective are retail central bank digital currencies in promoting wealth distribution and economic growth when compared to the standard reserve currency?** Ultimately, I will argue that by addressing the limitations of traditional financial currencies, CBDCs will promote significant wealth distribution and economic growth. **By offering underserved communities access to secure and efficient financial services, CBDCs will promote financial inclusivity and resilience, allowing for more equitable wealth distribution and sustainable economic development.** I will construct this argument by analyzing the causes of financial exclusion and examining how CBDCs impact each of these factors using mathematical models and existing economic data. I will then establish the impact of CBDCs through the economic models of a poverty trap and LRAS diagram, showcasing how CBDCs affect both productivity and the cycle of poverty graphically.

⁹ Kosse and Mattei, "Gaining Momentum – Results of the 2021 BIS Survey on Central Bank Digital Currencies."

Types of CBDCs

There are several different types of currencies, and in order to focus the scope of this paper, it is important to distinguish between these types. First, the broad concept of digital currencies are defined as payment methods that do not exist outside of their electronic forms. Many forms of digital currencies exist, including crypto currencies, stablecoins, virtual currencies, and central bank digitized currencies¹⁰. Each of them utilize various technologies to support their functioning, including centralized systems or distributed ledger technology platforms. These digital currencies can be grouped according to their operation into three main categories:

a) Issued and a direct liability of the central bank

This category encompasses all digital currencies that are issued directly by a country's central bank and represent a legal tender of that country. CBDCs and distributed ledger technology (DLT) Projects such as Project Ubin are examples of this type of digital currency because they are backed by the full faith and credit of a country's central bank, allowing currency to go directly from the central bank to the citizens of a country¹¹.

- Within CBDCs there are both wholesale and retail CBDCs. Retail CBDCs are digital forms of central bank-issued money designed to be used by the general public for everyday transactions, functioning as a digital equivalent of physical cash. Wholesale CBDCs are designed for use by financial institutions and intermediaries for large-scale, interbank transactions. They are useful in monetary policy, interbank transactions, and financial asset transactions¹². This paper will focus more closely on retail CBDCs as they can be a larger driver of financial inclusion.

¹⁰ "Digital Currency."

¹¹ Asian Development Bank, "Recent Central Bank Digital Currency Developments in Asia and Their Implications."

¹² "A Breakdown of the Different CBDC Models."

b) Approved, authorized, regulated by central bank

Although not a direct liability of the central bank, this type of currency is fully backed by either the country's federal currency, a foreign currency, or other fiat currencies and reserves. These currencies are under the oversight of the federal government, but are issued by other commercial banks and financial institutions and also represent a legal tender under the jurisdiction of that country's government¹³. Ultimately, in this setup digital currency goes from the central bank to other third parties before being issued to citizens.

c) Operated by independent organizations or computer codes

This category encompasses all other digital currencies that are decentralized and exist independently of financial institutions such as third party and central banks. Examples of this include Crypto currencies such as Bitcoin and Ethereum which utilize distributed ledger technology to allow individuals to process financial transactions without the need for intermediaries.

Technological framework

- CBDCs can also be broken down into account and token based transactions. An account-based approach involves the use of a third party to verify a user's identity and check their account balance in order to make a payment. In account based transactions, a distributed ledger maintains a record of account balances and transactions. However, traditional database systems can also be utilized.

¹³ Asian Development Bank, "Recent Central Bank Digital Currency Developments in Asia and Their Implications."

- This method is challenging for universal access because it still requires a banking relationship. To transfer funds, banks would have the responsibility of processing each payment.
- Token-based, on the other hand, involves verification through blockchain technology. This means that as long as they can show that they are the token holder (by signing through a private key/cryptographic signatures and meeting identity requirements), they can access their account to make a transaction. This approach is suited for distributed ledger technology (eg., blockchain) because these technologies are inherently suited for managing digital tokens¹⁴.

Breaking Down the Problem: What are the key drivers and conditions of financial exclusion?

1) Income factors

- Individuals with low or unstable incomes often struggle to meet the minimum balance requirements or afford the fees associated with traditional banking services.
- Unstable employment can lead to fluctuating incomes, making it difficult to maintain bank accounts and meet banking requirements.
- Banks may prioritize higher-income clients and communities, leaving lower-income and less profitable customers underserved¹⁵.

2) Geographic and Infrastructure factors

¹⁴ Rod Garratt, Michael Lee, Brendan Malone, and Antoine Martinauthor, “Token- or Account-Based?”

¹⁵ “FDIC Community Banking Study 2020.”

- People living in rural or economically disadvantaged urban areas often face limited access to banking facilities. Bank branches are more likely to close in these areas, creating “bank deserts.”
- Limited access to the internet and digital devices hinders the ability to use online banking and fintech solutions. This divide is often pronounced in rural areas and among older populations¹⁶.

3) Social and Legal Factors

- Distrust in financial institutions due to past discriminatory practices or negative experiences can lead to avoidance of formal banking systems.
- Complex Know Your Customer (KYC) processes can be a barrier for individuals without proper identification, such as immigrants or homeless individuals. (tightening of money laundering rules in response to terrorist attacks means that many people may face difficulty in getting access to services)¹⁷.
- Undocumented immigrants may avoid banks due to fears related to their immigration status and potential legal repercussions.
- Weak consumer protection laws can make financial services risky for vulnerable populations, leading them to avoid these services.
- Many immigrants, especially those who are undocumented, face significant barriers to accessing financial services due to identification requirements and fears of legal consequences.

¹⁶ “2021 FDIC National Survey of Unbanked and Underbanked Households.”

¹⁷ “The KYC Process Explained.”

Breaking Down the Solution: The Data Use Cases of CBDC Implementation

In his paper, *Central Bank Digital Currency Adoption: A Two-Sided Model*, Brandon Joel Tan utilizes simulatory data through a mathematical model of CBDC implementation to quantify its relationship to wealth, bank disintermediation, financial inclusion, and equilibrium points. In the simulation, Joel assumes that only 57% of the nation's population is banked. However, after the introduction of CBDCs this number jumps to 92%¹⁸.

Graph 1: Pre and Post CBDC Introduction Impact

One of the main counterarguments against CBDC implementation is the potential for bank disintermediation, where bank accounts will no longer be created in the case the CBDC access doesn't require one. Through this data, Tan demonstrates that the upside of financial inclusion (an increase of 35%) outweighs the cost of bank disintermediation (2%)¹⁹. Ultimately, this is due to the fact that high income individuals are still going to utilize CBDC through third party banks as it allows them to gain interest on their savings and investment in the bank.

The significant increase in the access to financial services can be attributed to several qualities of CBDC implementation. First, CBDCs lower the barriers to entry for financial services, making it easier for unbanked individuals to access the financial system without the need for traditional bank accounts. They do this by lowering the requirement to have a certain amount of fees available at all times, reducing requirements for documentation and identification (simplifying the KYC process), and establishing a functioning e-wallet even in locations where the internet is not functioning. By integrating advanced technologies like blockchain and decentralized ledger

¹⁸ Tan, "Central Bank Digital Currency Adoption."

¹⁹ Tan.

systems, governments can ensure the integrity and security of transactions, regardless of bank infrastructure. Additionally, CBDCs can be distributed and managed through one regulated digital platform available on all smartphones, which are widely used even in low-income and remote areas. This digital access ensures that more people can participate in the financial system without the need for physical bank branches. Third, the implementation of CBDCs can promote financial inclusion by offering secure, low-cost, and efficient payment methods. CBDCs will effectively and substantially reduce both transaction costs and transaction processing times, making it more attractive for both consumers and merchants to engage in digital financial activities²⁰. This efficient payment method allows the central bank to better manage the supply and flow of money, facilitating effective monetary policy decisions. This policy can be effective in providing specific demographics, regions, and groups financial benefits to incentivise CBDC utilization. Furthermore, in times of crisis or economic depression, central banks can utilize this feature of CBDCs to make direct transfers, in the form of emergency funds or stimulus payments, to those in need without a delay.

Tan's data reflects how individual consumption in CBDC is cheaper relative to cash payment. While it is important to address the limitations of their solutions such as government distrust and fear of hacking in policy creation, the data reflects that the majority of individuals will be inclined to utilize the technology due to the positive impact on their financial status²¹.

Financial Inclusion, Wealth Distribution, and Economic Growth

According to the world bank, “financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs –

²⁰ Simone, “Central Bank Digital Currency and Other Digital Payments in Sub-Saharan Africa.”

²¹ Tan, “Central Bank Digital Currency Adoption.”

transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way²².” Increased financial inclusion allows marginalized and low-income populations to access essential financial services that they may not otherwise have access to. As can be seen in the data above, CBDCs have a huge impact on this factor of financial inclusion, thus making it a core driver in the implementation of CBDCs worldwide. But, how does this connect to wealth distribution and economic growth? When given access to financial services, communities begin to develop a financial footprint. They are enabled to save, invest, and manage personal financial risks. By creating business and gaining increasing amounts of income, these groups can begin to accumulate wealth, effectively building wealth distribution from the bottom-up. The US Congress highlighted that “Income inequality is at its highest point in nearly 75 years,” adding that “Inequality is higher now than at any time since World War II²³.”

However, CBDC implementation and access to financial services can be instrumental in bridging the gap between different socio-economic groups by providing opportunities for economic mobility and reducing poverty. As a result of this larger portion of the population participating in financial transactions, economic growth is stimulated. When wealth is concentrated in the hands of the few wealthiest individuals, economic growth tends to be slower because high-income individuals save more and spend a smaller proportion of their income. In contrast, when wealth is more evenly distributed, lower and middle-income groups spend a larger portion of their income on consumption and investment, driving economic growth. Without access to financial services, significant portions of the population remain trapped in poverty, unable to invest in their future or contribute meaningfully to the economy. By promoting financial inclusion,

²² “Overview.”

²³ Compass, “A Guide to U.S. Economic Inequality.”

policymakers can ensure that economic benefits are more widely shared, leading to a healthier, more dynamic economy.

Conclusion

Evidently, Central Bank Digital Currencies (CBDCs) have the potential to significantly improve wealth distribution and overall economic growth, in a position to revolutionize the way economies operate and individuals manage their finances. CBDCs facilitate direct government transfers such as social benefits, subsidies, and emergency relief, ensuring that financial aid reaches those in need promptly and efficiently. This can be particularly transformative in times of economic crisis or natural disasters, where timely financial support is crucial. By enabling the direct distribution of government benefits, CBDCs can reduce administrative costs and minimize delays, making social welfare programs more effective and responsive. Furthermore, the implementation of CBDCs can stimulate economic activity by making financial transactions more efficient and reducing transaction costs. The increased speed and security of transactions can encourage more frequent and larger transactions, boosting consumer spending and business investment. In summary, as the global economy continues to digitize, the successful implementation of CBDCs will be crucial in ensuring that technological advancements benefit all segments of society, promoting broader socio-economic development and stability. Policymakers and central banks must therefore prioritize the development and deployment of CBDCs to harness their full potential and create a more inclusive and resilient financial ecosystem. The potential of CBDCs to drive long-term economic growth and financial inclusion makes them a vital consideration for future economic policy and development strategies.

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