

Adoption and Implications of Central Bank Digital Currencies (CBDCs) and Cryptocurrencies

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ABSTRACT: Central Bank Digital Currency (CBDC) represents a digitized form of central bank funds that aims to enhance financial services and revolutionize the economy. It is important to note that CBDCs differ from cryptocurrencies as they are centrally regulated by sovereign authorities. When compared to cryptocurrencies, CBDCs prioritize privacy by limiting transaction details disclosure. The value creation approaches also vary - CBDCs adhere more closely to traditional models while cryptocurrencies are considered disruptive innovations.

CBDCs provide various benefits including social control mechanisms, innovation stimulation and reduced dependence on banks as intermediaries. However, it is improbable for cryptocurrencies to entirely replace traditional money systems. Instead, CBDCs serve as alternatives to both physical cash and digital currencies by offering a digital medium of exchange coupled with regulatory oversight and respect for user privacy considerations.

Keywords: Central Bank Digital Currency (CBDC), Cryptocurrency, Digitalization, Decentralization.

1. Introduction

Central Bank Digital Currency (CBDC) and cryptocurrencies have garnered significant attention as notable forms of digital money in recent years. The aim of CBDC is to enhance financial services and bring about a revolution in the economy through its digital representation of central bank funds. Its main objectives include strengthening monetary policy formulation, currency issuance, and facilitating online transactions with efficiency. These digital currencies primarily focus on delivering better value compared to traditional exchanges. Additionally, CBDCs prioritize aspects such as social control, innovation stimulation, and disintermediation of banks. On the other hand, cryptocurrencies function independently without any interference from national monetary authorities. Encryption techniques combined with blockchain technology ensure secure transactions for crypto currencies like Bitcoin.

While both share similarities in the virtual world, CBDCs and cryptocurrencies embody diverse concepts. CBDCs are introduced by governments as substitutes or complements to decentralized cryptocurrencies. They follow more traditional models of value creation while adapting to meet evolving societal needs. Conversely, cryptocurrencies are often perceived as disruptive innovations driven by citizens. They have the potential to pose threats to conventional financial systems.

This article explores the differences between CBDCs and digital currencies, emphasizing the centralized nature of CBDCs and the decentralized nature of cryptocurrencies. It also delves into the potential benefits and challenges associated with this type of digital money and underpins the importance of understanding the distinct values.

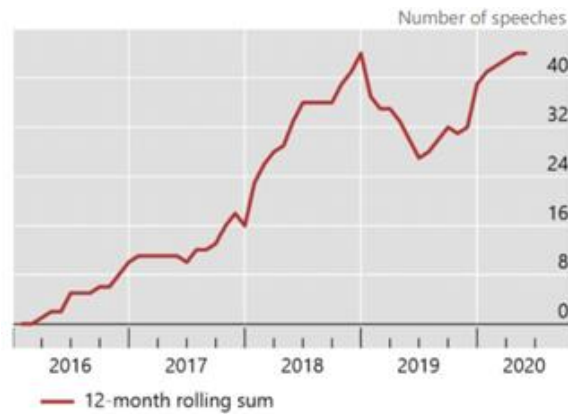
2. Central Bank Digital Currency CBDC

Central Bank Digital Currency (CBDC) refers to a digital representation of central bank funds intended to enhance the provision of financial services particularly with regards to a nation's commercial banking system. It aims to reinforce activities including monetary policy formulation and currency issuance (What is Central bank digital currency, 2018). It serves as a means of exchange utilizing the internet to facilitate and increase the volume of online transactions, leading to a revolution in the economy (Almuraqabai, 2021). The Central Bank has approved and introduced CBDC, that is considered as one of the most recent digital currency innovations now accessible to the public (Alfar J.K.A, 2023). The International Monetary Fund highlights that Central Bank Digital Currency (CBDC) encompasses a novel manifestation of money, displaying three vital characteristics.

- digitalized or electronic structure.
- exclusive issuance managed solely by each nation's respective Central Bank;
- and adherence to the status quo as legally recognized means for conducting monetary transactions (Bossu, W., 2023).

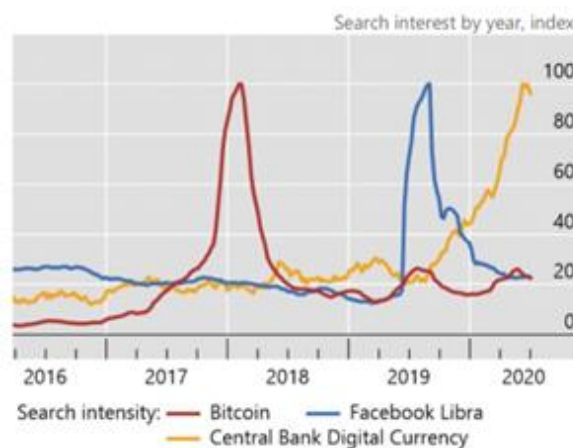
Coins, bills, checks, and credit cards—each one of them—were remarkable innovations in their respective times (Giannini, C., 2011). Within the scope of monetary economics. It has long been accepted that money holds great importance as a vital means of coordination in economic transactions. Its primary objective is to facilitate these transactions with efficiency and effectiveness. Furthermore, money serves a significant purpose in retaining information and serves as an "economic memory" for individuals' undertakings. (Kocherlakota, N., 1998). However, it is important to recognize that this abstract characterization still allows for considering its institutional foundations which ultimately shape its social impacts respectfully. Challenges arise as digital forms emerge including competition concerns, accessibility issues, privacy considerations, and integrity due to security concerns, all linked with network effects and potential misuse or exposure of individual data respectively. Following from a notable surge in development, central banks' pursuit of an electronic form of cash, a logical step forward, emerged. The Physical Cash conceptually. On a side note, central banks have actually already been using digital forms of money in wholesale payments for quite some time. However, presently there has been an increase in discussions around the possibility of making this currency available to the general public. More uncertain development space, volatile cryptocurrencies and ever-evolving technological threats faced by the finance industry, brought about growing concerns, stablecoins, and more enhanced interests which are forcing central banks to earnestly adopt proactive planning strategies for their forthcoming potential systematic actions. Innovations and ongoing advancements are shaping the monetary system with private money forms gaining wider acceptance by both the community and financial institutions. It is no longer enough for them to be content with the current pre-existing system as a guideline or unspoken standard. On the contrary, they are finding themselves proactively engaging in self-research and exploring topics that diversify and involve themselves in different projects related to the benefits and advantages of understanding various digital currencies. They are closely observing active members who collaborate with other participants and key actors in

the industry. Partnerships with private entities on projects, research and developments are also being pursued. Amidst the COVID-19 pandemic last year, public voiced apparent fears physical money used transactions could volatile accelerator contribute make conducive transmission Covid 19 virus potentially spreading contributing new infections among population. (Aurer R., 2020). CDBC's have garnered significant global interest and have become the focal point of banking communication and public search interest, as indicated by Graph 1 and Graph 2 (Aurer R., 2020b).



Graf 1 Timing of reports and Speeches CDBC (CPMI, 2018)

The data presented in Chart 1 illustrates the sum of speeches made by central bank officials over a period of 12 months. This data was obtained through a case insensitive search for terms such as CDBC, central bank digital currency, digital money, and digital currency (CPMI, 2018).



Graf 2 Interest of Goole search over time (CPMI, 2018)

Chart 2 captures the 12-week moving average of global search interest pertaining to Bitcoin, Facebook Libra, and CBDC. The information has been standardized to the peak of each series, ensuring comparability (CPMI, 2018).

2.1 CDBC Money Flower

In a market economy the primary responsibility of the central bank towards the public is to ensure confidence in money. To achieve this. The central bank establishes rules that protect both the intrinsic and extrinsic value of money. These rules are also applicable to reserve obligations issued by the central bank itself, as well as the selection of financial intermediaries. Additionally, they extend to receivables issued by commercial banks that have similar convertibility features as central banks. These rules encompass all forms of money including electronic money issued by non-banking institutions that can be converted into fiat money. Digital payment systems offered by both banking and non-banking entities can potentially replace these traditional forms of money (World Bank Group, 2021). The structure of digital currencies includes both retail and wholesale central bank digital currency accounts rather than reserve and clearing accounts. When adopting a CDBC strategy it becomes crucial to underscore the interrelationships among commercial banks, central banks, and retail customers (Mersch, Y., 2018).

In order to gain a comprehensive understanding of the introduction of digital currencies it is essential to analyse Chart 1 taxonomy of money demonstrated through the Venno diagram known as the Money Flower. To provide an in-depth examination of individual types of currency. It is necessary to consider their functioning systems and various factors:

- Type of issuer: a significant aspect to distinguish between is whether currency issuance lies with central banks or other private institutions.
- Form: differentiating between digital and physical forms of currency proves crucial in comprehending their nature.
- Availability: delineating access level becomes imperative - determining if funds are restricted to specific agents within certain jurisdictions or broadly available globally.
- Technology: evaluating the technological aspects entails assessing whether the currency operates on account-based systems or token based systems that facilitate peer to peer transfers.
- Token versus bank account: token-based money encompasses value stored on either physical or digital records and enables transfers between agents without necessitating reconciliation between databases. Account based money relies on authorized entities' accounts for transactions (World Bank Group, 2021).

Money is typically held in bank accounts or digital tokens that possess stored value within them (Green, E., 2028).

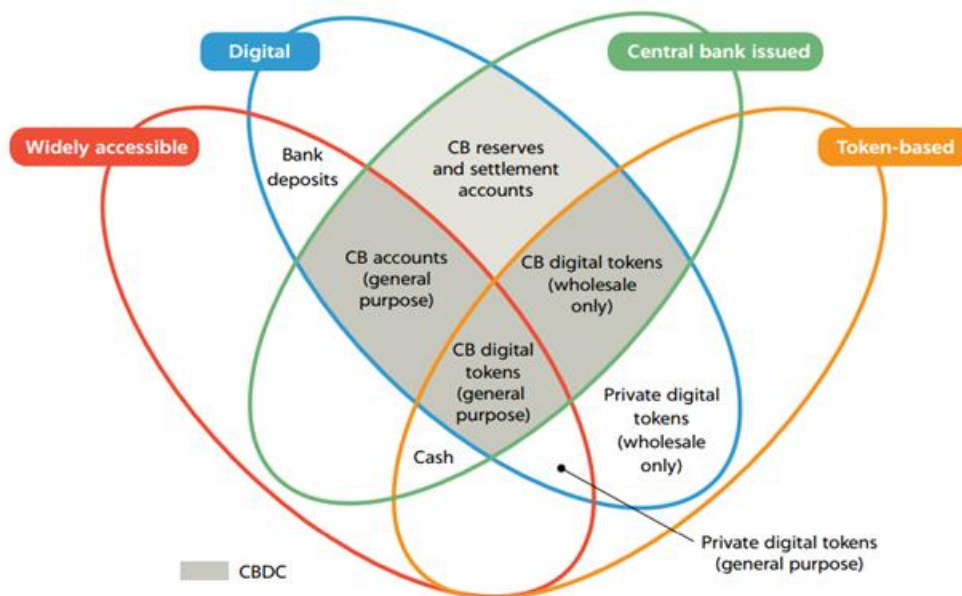


Chart 1 Money Flower (World Bank Group, 2021)

Chart 1 consists of three distinct components illustrating the various roles that CBDC can undertake (World Bank Group, 2021).

- Firstly, we have retail accounts managed by the central bank. These accounts are specifically created for general use and are intended to cater to the needs of the public at large.
- Secondly, we have reserves and other accounts maintained by the central bank.
- Lastly, there are retail digital tokens, which serve as universal digital tokens, with a primary focus on retail payments. Additionally, wholesale digital tokens come into play, specifically designed to facilitate large-scale payments and transactions.

In terms of availability, CBDC can be categorized into two segments: retail and wholesale. Retail forms of money primarily facilitate transactions between households or businesses and are relatively accessible to the general public. On the contrary, wholesale forms of money are predominantly utilized for large-scale transactions among financial institutions such as insurance companies, banks, and funds, as well as large international corporations. These forms of money are therefore accessible to a limited number of users. The key distinction between money on accounts and tokens lies in the verification process during exchanges (Fung, B. S. C., 2016). The validity of tokens relies on the payer's ability to demonstrate the authenticity of the payment method, whereas for an account, the system focuses on confirming the account holder's identity (Bech, M., 2017). The main focus of the work will revolve around the CBDC group, which is accessible to the general public. Specifically, it will concentrate on CBDC in the form of retail deposits on central bank accounts or digital tokens. It is worth noting that this analysis will exclude reserves and other wholesale deposits, as these types of CBDCs are already in existence.

3. Cryptocurrency

Cryptocurrency is a digital asset that utilizes decentralized technology specifically blockchain, to facilitate secure transactions without the dependence on intermediaries such as banks. (Hardle W., 2020). The operation of cryptocurrencies is completely independent from any central bank intervention. These digital currencies rely on encryption techniques for both regulation and security purposes. By being decentralized in nature cryptocurrencies enable direct transactions to take place without requiring intermediaries such as central banks. (Shiraji, S. 2020) Usman define cryptocurrency as a digital asset designed to serve as a medium of exchange. It is grounded on the technology of cryptography which enables the secure flow of the transactions and regulates the formation of new units of the currency (Usman W. Chohan, 2022). The raise of cryptocurrencies gives growth to an approaching threat to many traditional functions in finance. Cryptocurrencies adapt decentralized mechanism thereby reducing the role of distributors such as financial institutions. For instance, cryptocurrencies allow individuals to plan peer to peer transaction without relying on traditional banking system or credit card. By engaging a cryptocurrency wallet user may securely store their digital assets. This innovative technology brings extensive potential in remodel financial inclusion. Notably for more than two billion unbanked individuals across the globe. By engaging cryptocurrency wallet user may securely store their digital assets (Global Findex,2017). Cryptocurrencies are acknowledged as a kind of digital money that carries intrinsic value extending beyond mere supply and demand dynamics. The foundations of this value include intellectual capacity, time, knowledge and resource allocated in their creation process (Batiuk Laris, Olha Kravchenko, 2021).

3.1 Blockchain

Blockchain is used to establish trust among relevant stakeholders in distribution system. This technology plays a crucial role in promoting trust and facilitating seamless information sharing among participants (Hakkarainen, T, 2023). It is based on cryptography decentralized system including of an ongoing directory of digital records shared inside peer to peer network (Peres et.al., 2022). Blockchain is built upon distributed ledger technology that is decentralized, immutable and transparent. (Dwivedi et al., 2023; Tapscott and Tapscott, 2016; Treiblmaier and Garaus, 2023; Vergne, 2020; Wang et.al., 2022) Blockchain is decentralized database that operates without the need for an intermediary. Though the implementation of cryptography, consensus mechanism, and smart contracts to ensure efficiency and safety (Drljevic et al., 2020). This developing machinery may bring huge changes to many industries (Bumblauskas et al., 2020). As far as data management and transaction are concerned blockchain represents an innovative decentralized approach. In contrary cryptocurrency operates as a digital or virtual currency which heavily relies on cryptography for ensuring secure transactions (Garriga – et.al., 2018).

4. CBDC versus Cryptocurrency

With increasing awareness about the eventual risks associated with central bank digital currencies a certain level of confusion has arisen among individuals in regards the distinction between CBDCs provided by governments and cryptocurrencies offered by the market. Admittedly at first glance these conceptions might appear perplexing. However, it is imperative to acknowledge that cryptocurrencies and CBDCs represents contrasting ideas. It is crucial to identify that the rise of CBDCs has widely been a retaliation to cryptocurrencies. (Anthon, N., 2023). The main point to summon up about CBDC is that it is not cryptocurrency (Vexanium, 2023). CBDCs are expressed as either substitutes or complements to decentralized peer-to-peer exchange tokens (cryptocurrencies). Even if they share some fundamentals of the virtual architecture with cryptocurrencies (Khan et.al., 2020), the CBDCs are far

remote from what we consider as cryptocurrencies due to end goals they look for (Ng and Griffin, 2018). There is an ongoing endeavour to introduce virtual renditions of traditional currencies that operate under the supervision of a sovereign monetary authority while also ensuring constant monitoring of their movement across users (Usman W. Chohan, 2022). In this regard these digital forms of money are inherently ingrained in the modern landscape governed by surveillance mechanisms within the sphere of finance. It is vital to recognize that while both cryptocurrencies and central bank digital currencies may adopt comparable approaches towards achieving their goals their ultimate intentions diverge considerably. Chohan (2022) in his studies discovered that they closely align with the established models of value creation seen in traditional public administration. Unlike cryptocurrencies, which are often seen as disruptive citizen driven innovations. CBDCs demonstrate characteristics that are more in line with conventional approaches to generating value. Regulatory acceptance of cryptocurrencies as a vital financial tool differs across the board (Gil-Cordero et al., 2020), but as a disruptive mechanism (Mäntymäki et al., 2020), they perceived as a potential threat to conventional financial systems. This is also a mixed blessing as the emergence of such innovations can potentially disrupt international order in the 21st century. This disruption has the potential to transform these innovations into economic weapons (Smith, 2019). For any sovereign monetary authority examining the rise of cryptocurrencies the concept of Central Bank Digital Currencies holds great allure (Chohan, 2022). This attraction can be attributed to a range of factors, including social control and the potential for stimulating innovation expanding credit and consumption, as well as disintermediating banks through the central bank. CBDC serves as a digital rendition of traditional money, where the personal information and transactions of users are connected to their assets. However only the sender, recipient, and bank have access to these transaction details (Vexanium, 2023). This sets CBDC apart from cryptocurrencies, which publicly reveal transaction information without revealing personal data like users' real identities. Cryptocurrencies and CBDC hold distinct values. Table 1 illustrates that while a Central Bank Digital Currency represents a prime instance of centralized money managed by the government. Bitcoin serves as the finest contemporary illustration of decentralized money facilitated by the market.

Table 1 illustrates that while a Central Bank Digital Currency represents a prime instance of centralized money managed by the government, Bitcoin or cryptocurrency serves as the finest contemporary illustration of decentralized money facilitated by the market.

CBDC	Bitcoin - cryptocurrency
Unclear and discretionary monetary policy	Clear and rules-based monetary policy
Government Provided	Market provided
Centralized	Decentralized
Censorable	Censorship resistant
Unlimited supply	Fixed supply
Closed and permissioned system	Open and permissionless system

Table 1 CBDC vs. Cryptocurrency differentiation (Anthony,2023)

Congressional members have acknowledged that there is a clear separation between CBDCs and cryptocurrencies. Representative Warren Davidson (R-OH) highlighted this distinction in a recent news interview expressed his opinion that, many tend to confuse Bitcoin or crypto with central bank digital currency, but the truth is they are polar opposites. Bitcoin operates without a central authority

meaning there is no entity to authorize transactions. Moreover. There is no central authority that can screen or nullify the currency (Bitcoin policy summit, 2023). In a similar vein Senator Ted Cruz (R-TX) expressed his viewpoint during the Bitcoin Policy Summit in Washington D.C, mentioned that, China is actively pursuing the implementation of CBDC with the aim to undermine Bitcoins' value and erode its anonymity and decentralization. Their goal is in direct contradiction to that of a decentralized ledger system. They instead seek a centralized ledger that offers the government unrestricted visibility and control (Bitcoin policy summit, 2023).

An interesting irony has emerged around the idea of a CBDC which even the White House has come to recognize, despite actively promoting its implementation. They acknowledge its centralized nature as contradictory. It stands contrary to one of the fundamental principles frequently attributed to crypto assets such as Bitcoin – creating decentralized currencies independent from any trusted central entity (Anthony, 2023). Consequently, it is truly paradoxical that at a juncture where greater efforts are being made towards decentralizing money and technology as a whole government are intensifying their pursuit for centralized monetary systems.

CBDCs can be considered as viable alternatives for both cryptocurrencies and physical cash. However, the idea of replacing traditional money with cryptocurrencies appears to be increasingly unlikely. Despite the continuous expansion of crypto adoption.

5. Conclusion

In conclusion the emergence of Central Bank Digital Currencies and cryptocurrencies has sparked significant debate and exploration in the realm of digital money. While CBDCs and cryptocurrencies share some similarities in their virtual architecture they represent distinct concepts and goals.

CBDCs have been introduced as a response to the rise of cryptocurrencies aiming to provide virtual renditions of traditional currencies under the supervision of sovereign monetary authorities. CBDCs demonstrate characteristics aligned with conventional approaches to generating value. Focusing on social control, innovation stimulation, and disintermediation of banks.

They serve as a digital representation of traditional money. Incorporating personal information and transaction details connected to users' assets while maintaining privacy for individuals. On the contrary, cryptocurrencies operate as decentralized digital assets independent from central authority enabling direct peer to peer transactions without intermediaries.

It is crucial to recognize the clear separation between CBDCs and cryptocurrencies as highlighted by policymakers and experts. CBDCs are centralized forms of money managed by governments while cryptocurrencies exemplify decentralized money facilitated by the market. The distinctions in their fundamental principles and goals are evident.

With CBDCs aiming for centralized control and constant monitoring. Whereas cryptocurrencies emphasize decentralization and anonymity. Despite the potential benefits and challenges associated with both CBDCs and cryptocurrencies replacing traditional money with cryptocurrencies seems unlikely.

CBDCs offer viable alternatives for digital transactions while cryptocurrencies continue to expand their adoption. The ongoing development and advancements in the digital monetary landscape shape the financial system prompting central banks to actively engage in research, partnerships, and proactive strategies. As a PhD candidate delving into the complexities of CBDCs and cryptocurrencies provides

valuable insights into the evolving landscape of digital currencies. The implications of these digital forms of money extend beyond economic considerations encompassing technological advancements privacy concerns competition dynamics and social impacts. Through understanding and analysing these emerging trends researchers and policymakers can contribute to the ongoing discourse and shape future of digital finance. While comprehending this notion might present difficulties for certain individuals. It is crucial to acknowledge the fact that every person holds their own exclusive perspectives and life journeys. Therefore, exhibiting a respectful approach during interactions becomes vital as it allows us to value the individuality of others. Through such an attitude. We can not only strengthen our connections but also create room for personal growth and enlightenment.

Conflicts of Interest

There are no conflicts to declare.

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