

# Cryptocurrency to CBDC: The Transition of Digital Currency

*Hardik Gupta\**

The global financial architecture has not been immune to the technological advancements of the 21st century. With the development of technologies like blockchain, the current financial system is witnessing the arrival of an entirely new class of assets while also exploring the potential scope for innovation in traditional structures. Cryptocurrency and CBDCs are the results of such developments. The motive of this paper is to explore the current literature on these two subsets of digital currencies and narrow down on the interlinkages behind their characteristics. Moreover, the rationality behind the introduction of CBDCs, even with the presence of fiat currency and the rise of cryptocurrency, is also explored to highlight the need gaps that CBDCs attempts to fulfill. The paper concludes that the two digital currencies have very little in common due to the primary structural differences. Additionally, the introduction of CBDCs attempts to take advantage of the digitization of money in critical areas ranging from monetary policy transmission to financial inclusion, which isn't possible with Cryptocurrency due to its various limitations.

## I. Introduction

THE space for alternative currencies is one area that the arrival of blockchain technology has completely revolutionized with the rise of digital currencies (Bordo and Levin, 2017). They opened new possibilities for the introduction of money with different design choices and trade-offs between various factors. This has also raised questions about their impact on the economy, the cautionary areas, and the correct way of implementing or regulating it. The origin of this interest can be traced back to the white paper by Satoshi Nakamoto published in 2008, which led to the formation of Bitcoin in 2009, the first digital currency backed by cryptography and based on the blockchain platform. It quickly gained acceptability amongst the

masses, increasing its value and kickstarting the creation of other cryptocurrencies, which started flooding the market and establishing their names with their unique value propositions. It can be argued that this was one of the reasons that the underlying technology also gained sudden momentum despite being found in 1991 (Haber and Sornetta, 1991). Taking note of the benefits associated with blockchain-based platforms, the central banks and national governments took a keen interest in exploring the digitization of fiat currency and evolving their country's financial structures for better efficiency and safety. Central Bank Digital Currency (CBDC) is the result of these exploration efforts. Kristalina Georgieva, IMF Managing Director, highlighted the extent of this interest in CBDCs by pointing out that more than half of the global central banks are looking into

introducing CBDCs in their economic systems.

There lies massive governance potential upon integrating traditional fiat money with technology (Engert and Fung, 2017; Cukierman, 2020; Prasad, 2021). From more efficient disbursement of development aid to direct money transfers to infrastructure investments, a CBDC can assist the government efforts in multifarious ways. In international settlement mechanisms, the induction of CBDCs can directly impact the global financial architecture and transaction mechanisms acting as the modern lubricant for greater economic integration of the global economy. Due to its portability, a currency not limited by borders can significantly impact how wealth is transferred across borders. Development aid for developing countries can be directly disbursed and monitored through the digital

---

\* Research Scholar, Indian Institute of Foreign Trade, New Delhi.

wallets of the recipient country's population. However, greater centralization of financial systems and severe security concerns can be seen as the danger areas that need further exploration (Liu *et al.*, 2018).

Another critical factor attracting government attention to blockchain-backed digital currencies is the relative absence of regulatory mechanisms in the cryptocurrency market. With the increasing market capitalization and an exponential rise in the number of people exposed to the valuation fluctuations, this vacuum can lead to similar loopholes as seen in other capital markets prior to the establishment of regulatory mechanisms. The high degree of risk associated with these unregulated digital currencies also carries risks of illicit cross-border transactions and stores of value. This highlights the need for new governance structures with such digital currencies under their purview.

## II. Research Methodology

Digital currency, as a topic, can be explored from multiple dimensions, discussing each of its subsets ranging from cryptocurrency to in-world gaming money. However, this paper intends to explore the digital currency types that are being explored for their potential to undertake the three functions of money, i.e., act as a medium of exchange, store of value, and unit of account. Accordingly, Cryptocurrency and CBDCs have been recognized as prime contenders for fulfilling this function in the near future. The study would discuss the current

academic discourse on Cryptocurrencies and CBDCs by focusing primarily on the similarities and differences between the two digital currencies exploring the nature of their relationship as complimentary or competitive in terms of functionality for involved stakeholders. The paper uses a narrative literature review method to summarize this body of knowledge on Cryptocurrency and CBDCs. The same has been selected to provide a comprehensive overview of the topic to establish connections between the two digital currency types based on observations from the current literature.

The paper's third section focuses on defining the terms and understanding their position in the generally accepted Chart of digital currency subsets. Due to the two terms developing into buzzwords in the last decades and a multitude of design differences present in any two Cryptocurrencies or CBDCs, it is essential to establish a definition based on their key features that'll allow for an accurate description of the term throughout the paper. The fourth and fifth sections aim to discuss the Cryptocurrency and CBDC currency designs to explore the motivation behind their formation, the distinctive features of their designs, and the value propositions they offer.

## III. Taxonomy

Digital currency is the umbrella term used to refer to various sub-categories of alternative currencies that have emerged in the previous decade. It is often used to refer to blockchain-

backed alternative currencies due to the sudden attention received by Cryptocurrency during the last decade. To gain a clear understanding of the current academic discourse on digital currencies and their various sub-parts, it is important to dive deeper into the terminology of what is covered under the umbrella of each term. One of the earliest attempts to provide specific and clear definitions of "Digital Currency" was the Financial Action Task Force (FATF). This independent inter-governmental body develops and promotes policies to protect the global financial system against money laundering, terrorist financing, and the financing of proliferation of weapons of mass destruction. The following are the definitions provided by FATF (*June 2014 Report*)<sup>1</sup>:

*Virtual Currency*: "digital representation of value that can be digitally traded and functions as (1) a medium of exchange; and/or (2) a unit of account; and/or (3) a store of value, but does not have legal tender status (i.e., when tendered to a creditor, is a valid and legal offer of payment) 6 in any jurisdiction. 7 It is not issued nor guaranteed by any jurisdiction, and fulfils the above functions only by agreement within the community of users of the virtual currency. Virtual currency is distinguished from fiat currency (a.k.a. "real currency," "real money," or "national currency"), which is the coin and paper money of a country that is designated as its legal tender; circulates; and is customarily used and accepted as a medium of exchange in the issuing country. It is distinct from

e-money, which is a digital representation of fiat currency used to electronically transfer value denominated in fiat currency. E-money is a digital transfer mechanism for fiat currency – i.e., it electronically transfers value that has legal tender status.”

*Digital Currency:* “a digital representation of either virtual currency (non-fiat) or e-money (fiat) and thus is often used interchangeably with the term “virtual currency”.

Through the above definitions, the organization distinguished virtual currency (non-fiat) from e-money (fiat) while presenting digital currency as an umbrella term that can include both categories.

Committee on Payments and Market Infrastructures, Bank for International Settlements, through its report released in November 2015, attempted to ascertain the key features of “Digital Currency” while still not accepting a definition or defining the term itself. In agreement to the *FATF June 2014 Report*, the BIS commented that some forms of “Digital Currency” failed to fit in as

a form of “Electronic Money (e-money)” as defined under CPMI’s “A glossary of terms used in payments settlement systems” stating: “units of digital currencies in some schemes will not be considered e-money in a legal sense as they are not issued in exchange for funds (even though they can be subsequently bought and sold), and may not be issued by any individual or institution.”<sup>2</sup> This reaffirmed the presence of two distinct categories within the umbrella of “Digital Currency,” one being the non-fiat “Virtual Currency” while the other being the fiat “e-money.”

Further, the FATF report divided virtual currencies into two parts. First, convertible virtual currencies are formed to be exchangeable to and from fiat currency, while the second category is that of non-convertible virtual currencies, which are intended for specific virtual domains. Convertible Virtual currency is further divided into centralized and decentralized categories based on the presence of an administering authority.

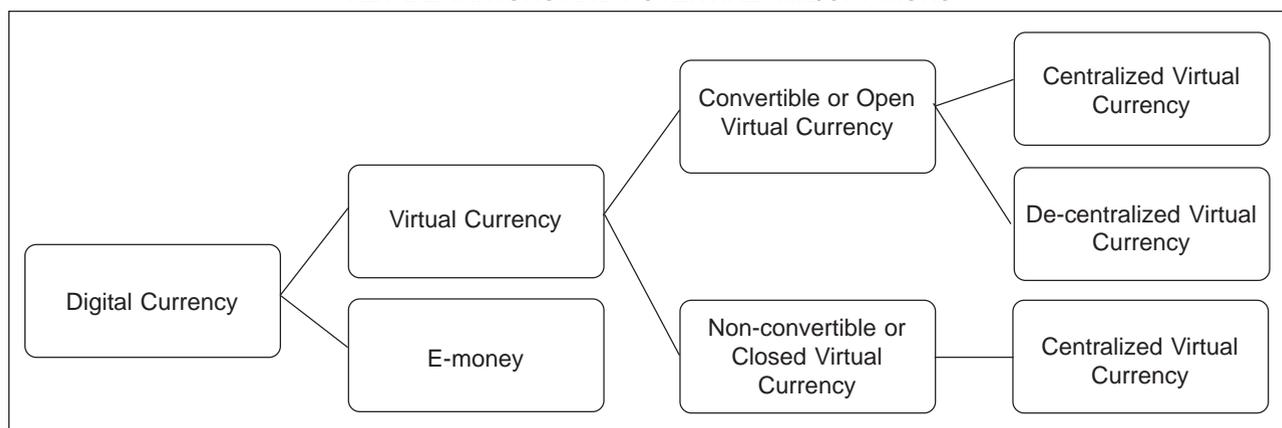
Digital currencies, relevant to the current discussion, are cryptocurrencies and central bank digital currencies (CBDCs). Through the distinctions mentioned above, cryptocurrency was put forward as a subset of virtual currency and labeled a decentralized virtual currency. Though the report lacked any reference to the CBDCs, it can be clearly seen that it would fit under the category of e-money, simplistically being a fiat even in a digital form.

#### IV. Cryptocurrencies

##### Background

The origin of cryptocurrency can be traced back to 31 October 2008, a white paper titled “Bitcoin: A Peer-to-Peer Electronic Cash System” was published by Satoshi Nakamoto (Nakamoto, 2008). The paper talked about the role of “trust” on financial institutions in the traditional system while also discussing the other inefficiencies that the system has. The paper proposed a form of electronic cash that circumvents this need of

**FIGURE 1**  
**BASED ON FATF JUNE 2014 REPORT, VIRTUAL CURRENCIES:**  
**KEY DEFINITIONS AND POTENTIAL AML/CFT RISKS**



“trust” by using proof alone as the basis of the transaction. The proposed electronic cash, Bitcoin, would function on p2p basis making direct transfers possible without the need of a financial institution. A system of digital signatures was suggested for underlying proof, which further used cryptography as the basis. In addition, blockchain technology was used to induct a decentralized system into the proposed p2p network addressing the risk of transaction fraud. Approximately two months later on 3 January 2009, the first cryptocurrency was born, Bitcoin.<sup>3</sup>

The motivation of this proposal was to address the inherent weaknesses of the traditional trust-based model. Another communication by Satoshi Nakamoto on 11 February 2009, was more explicit about the motivation behind this electronic currency.<sup>4</sup> He argued that the trust-based models relied on the central bank and other financial institutions’ ability not to make the wrong decisions regarding several aspects of currency and transaction management. However, time and again, several breaches of this trust have been observed, leading to catastrophic results for economies and, by extension, the general population. The paper proposed eliminating this trust-centric role through the formation of “a distributed ledger system with no single point of failure.” This will let the currency sustain itself even in the face of policy failure.

As of 3 November 2021, there are approximately 7,557 cryptocurrencies globally with slight variations in their features, making almost every cryptocurrency a

unique asset (Buterin, 2014; Schwartz *et al.*, 2014).<sup>5</sup> This also makes defining the term difficult, leading to synonymous use of terms that may not be accurate. There is no one generally accepted definition. However, various global policy-makers have agreed to the idea of cryptocurrency being a subset of Virtual Currency. In addition to FATF<sup>6</sup> and BIS<sup>7</sup>, these include ECB<sup>8</sup>, IMF<sup>9</sup>, EBA<sup>10</sup>, ESMA<sup>11</sup>, and the World Bank<sup>12</sup>. Keeping the stand of various such organizations in concern, a study by the Policy Department for Economic, Scientific, and Quality of Life Policies, European Parliament gave a summarized definition of cryptocurrency as “a digital representation of value that (i) is intended to constitute a peer-to-peer (“P2P”) alternative to government-issued legal tender, (ii) is used as a general-purpose medium of exchange (independent of any central bank), (iii) is secured by a mechanism known as cryptography and (iv) can be converted into legal tender and *vice versa*”. This put forward a clear definition of the term derived from the currency’s features.

### Cryptocurrency’s Value Proposition

Valuing such a currency has proved to be an entirely different matter. Satoshi Nakamoto compared the currency to the likes of precious metal.<sup>13</sup> The value would depend entirely on demand and supply. Unlike a currency, there would be a lack of central authority determining the value of Bitcoin by managing its supply in the market. Therefore, it will be the demand originating from user

interest that’ll drive its prices. Satoshi Nakamoto also counted on an increase in value to attract more users to the system to take benefit of valuation gains.

The initial predictions proved to be accurate as Bitcoin garnered massive attention worldwide, leading to exponential growth in users on the cryptocurrency network. Carrying a net market capitalization of US\$2,866.22 billion as of 3 November 2021, a huge number of people are now exposed to the advantages and disadvantages that the cryptocurrency market offers.<sup>14</sup> Steinmetz *et al.*, 2021 conducted a survey study to analyze the general level of information about cryptocurrency amongst the general population. Compared with previous such surveys, the study found the awareness and ownership rates to be significantly higher. The study also indicated that the knowledge and awareness of cryptocurrency was key driver of ownership. However, there is still a prominent debate about whether or not a cryptocurrency can establish itself as a medium of exchange and store of value in place of traditional government-backed fiat currency. Ciaian *et al.* (2016) discussed the possibility of Bitcoin to surface as a global currency and, as a result, a form of money. According to the paper, Bitcoin showed severe concerns as a medium of exchange, a unit of account, or a store of value. The results can be extended to the other cryptocurrencies in the market.

There has been substantial research on what drives the price of a cryptocurrency, the associated volatility and correlation to any

other asset classes (Gronwald, 2014; Cheah and Fry, 2015; Gupta, 2017; Sukamulja and Sikora, 2018; Zimmer, 2017; Malladi and Dheeriya, 2020; Cross *et al.*, 2021). Due to fundamental differences in the design of various cryptocurrencies, the rules regarding the supply of each one will vary. However, one common factor, the demand, is often solely based on the currency's acceptability among the investors or the public, i.e., the size of its user base. In contrast, more traditional assets derive their value from a utilitarian or value addition standpoint. Financial assets like shares and debentures gain their value from the underlying ownership of physical assets or a promise of future cashflows. Metals and oil derive as raw materials for industrial or domestic use. Similarly, precious metals or gems have a hedonic value associated with their ownership. Fiat currency gains its value from its acceptability from a country's national government and the public trust in that government along with the economic condition of that country. As stated by Ciaian *et al.* (2016), cryptocurrencies lack such a value proposition which is the more accepted argument amongst the scholarly community.

The cryptocurrency's current demand in the market can also be broken down into two main components. The first component is the demand emerging from its potential to act as a prospective medium of exchange (Plassaras, 2013; Luther and White, 2014; Folkinshteyn, 2015). Though still not extremely popular, especially in developing economies,

cryptocurrency has gained at least some level of acceptability amongst businesses and consumers alike in more developed nations. Major businesses (like Tesla, Microsoft, and Amazon) are now accepting payments in terms of cryptocurrencies, and the number is expected to rise.<sup>15</sup> On the other hand, while agreeing with the lack of value proposition for cryptocurrency, other studies indicate towards its existence as a purely speculative instrument (Hanley, 2015). García-Monleón *et al.* (2021) attempted to suggest a valuation model for cryptocurrencies based on intrinsic value suggesting the categorization of cryptocurrencies in two broad categories, ICOs (Initial Coin Offers), single/multi-layered models. The authors suggested that ICOs be valued in consistency with the models designed for IPOs and the single/multi-layered models for the network effect they entail.

It is also important to note that the cryptocurrency market is characterized by high volatility in addition to a high prevalence of significant price overreaction in both negative and positive directions (Bogards and Czudaj, 2020; Bogards and Czudaj, 2021). Further, Enoksen *et al.* (2020) confirmed the formation of price bubbles in the market while also discussing the uncertainties originating from the lack of financial regulations in the cryptocurrency market. Several other scholars have also affirmed this while trying to find the impact of various economic variables and such speculative price bubbles (Cross *et al.*, 2021; Chowdhury *et al.*, 2021; Wei and Dukes, 2020).

### Regulatory Issues in Cryptocurrency Market

The issues related to regulatory mechanisms in the cryptocurrency market have also invited significant scholarly attention. There are different schools of thought on whether the cryptocurrency market should be regulated and to what extent government interference is needed (Bryans, 2014; Auer and Claessens, 2018; Feinstein and Werbach, 2021). Here, it is essential to acknowledge that financial markets play a vital role in the economic development of a nation (Garcia *et al.*, 1995; Stoica, 2002; BIS, 2019<sup>16</sup>). Due to this, governments spend significant time and resources for policy formulation for domestic and global capital markets to safeguard the interest of all involved stakeholders (Isaeva and Leshchenko, 2019). An unregulated market can lead to the exploitation of loopholes by individuals or firms, leading to erosion of investor confidence, compromising a vital development support system. On the other, over-regulation can lead to bottlenecks compromising the overall effectiveness of the financial systems. Therefore, a delicate balance needs to be maintained that protects different stakeholders and allows for a liberal functioning of the market, inviting domestic and global firms to participate (Zingales, 2004; Posner and Weyl, 2014).

Even though it is well established that such an asset class will also impact the critical macro-economic variables, impacting government policy implementation and effectiveness, the

complete extent of this impact is unknown. Cryptocurrency presents governments with an entirely new set of challenges. Due to its recent origin, the policy-makers deal with an asset's market with a much lower level of academic research than other more traditional asset forms. As pointed out by Matei and Baks (2019), this may cause information gaps in policy design that may lead to unintended results from government implementation of monetary or fiscal policies. The existence of a systemized body of accepted scientific knowledge helps the government to take informed decisions.

Due to being based on a p2p network and the absence of any intermediary in most cryptocurrency networks, monitoring or controlling the asset movement becomes virtually impossible. The existence of digital currency wallets that can completely escape any government scrutiny raises concerns over its application in illicit activities such as money laundering or terrorism funding. González-Gallego and Pérez-Cárceles (2021) discovered that "high-quality law enforcement and financial checks" foster the adoption of cryptocurrency, directly highlighting the malintent that can be associated with such use. The platform's anonymity also makes cryptocurrencies ideal tax havens (Gruber, 2013).

These impediments like lack of any underlying utility value proposition, high volatility, lack of substantial regulatory frameworks, and possible application in illegal transaction settlements have become major obstacles in

cryptocurrencies bid to act as "money" instead of traditional fiat currency. However, it also needs to be noted that the underlying platform offers several key advantages that can and need to be leveraged for their application in traditional financial systems. The same can be done by addressing two key weaknesses of a cryptocurrency. *First*, a fiat currency in digital form would be able to leverage the benefits associated with blockchain technology while also allowing it to derive inherent value from the trust in national governments and domestic economies. *Second*, an overseeing authority would allow the use of technology but can also interfere as and when needed. The CBDCs are essentially based on these two factors.

## V. Central Bank Digital Currencies

### Background

BIS (2021) defines CBDC as "central bank-issued digital money denominated in the national unit of account, and it represents a liability of the central bank". It can be seen as an attempt by the central banks to inculcate the advantages of technological progress in traditional fiat money, innovating to make the transaction processes more efficient. The current research also advocates the introduction of CBDCs into the economic systems (Bordo and Levin, 2017; Engert and Fung, 2017; Cukierman, 2020; Prasad, 2021). Several countries are actively exploring the various dimensions of CBDCs, ranging from the optimal design, economic implication, impact on financial

institutions, and the future of monetary policy with CBDCs in the picture. As per the 2021 BIS Survey, "Ready, steady, go? – Results of the third BIS survey on central bank digital currency", 86 per cent of central banks have active research on the feasibility of CBDCs for their economy, with 60 per cent moving towards the proof-of-concept experimentation. 14 per cent of central banks were already in the process of deploying pilot projects (BIS, 2021). China is already aiming to launch Digital Yuan or e-CNY by February 2022, coinciding with the timings with the Winter Olympics that is to be held in Beijing.<sup>17</sup> Considering this, it would be reasonable to say that the world financial markets will be introduced to CBDCs in the coming years.

### CBDC's Value Proposition

Bordo and Levin (2017), along with Engert and Fung (2017), says that CBDC can serve as a practically costless medium of exchange, secure store of value, and a stable unit of account. This will enable it to gain recognition and acceptability as "money" even in a purely digital form. Also, this is in stark contrast with cryptocurrency, which has not been entirely successful in performing the three functions showing signs of concern on the possibility (Ciaian, 2016). Mancini-Griffoli *et al.* (2018) discussed the possible gaps that the CBDC might fill felt even with the presence of cash, cryptocurrency, private e-money and commercial bank deposit. The authors focused on the benefits offered by CBDCs in terms of almost nil transaction cost and zero

associated default risk. The paper concluded that the design choices would highly impact the demand and utility for CBDC. Additionally, the authors stated that the CBDCs would be more readily acceptable in cash-based economies where the banking or digital payment systems would not be competing with the currency, allowing CBDC to present itself as an upgradation to cash. This thought was also seconded by Khiaonarong and Humphrey (2019).

Being a legal tender, a CBDC would act as a liability of the nation's central bank. Even though the idea is widely researched in both academic and policy spheres, the optimal design choices regarding CBDCs are still being explored (Chaum *et al.*, 2021; BIS, 2021; Zhang and Huang, 2021). However, the consensus in the current literature points towards introducing two parallel CBDCs for an economy (Prasad, 2021). The first type is a general purpose or retail currency aiming to complement or substitute the functionality of physical banknotes. This would allow the users to maintain accounts with the central bank or enable direct transfers, eliminating the need for commercial banks that currently facilitate cashless transactions between two users. However, the central bank may opt for a two-tier structure that gives the commercial banks the transaction processing role as proposed in European Central Bank's EURO chain (ECB, 2019; Chaum *et al.*, 2021). Accounts with the central bank would also eliminate any risks associated with the failure or inefficiencies of the commercial banks. Retail CBDCs

can be revolutionary developments in encouraging financial inclusion by increasing the overall efficiency of the payment systems (Fonseca, 2019). The second type would be a wholesale counterpart to facilitate the interaction among financial institutions. This will increase the efficiency of the settlement mechanisms already established for large ticket transactions (Prasad, 2021).

### Key Design Choices for CBDCs and their Impact

Design specification would also include choosing between an account-based or value/token-based CBDC, which, in turn, will have a different set of implications for the government's future economic policy (Bindseil, 2019; Prasad, 2021). An account-based system would rely on identity-based accounts set up with central banks where the transaction would be carried out by crediting and debiting two ledgers corresponding to the receiver and payee. The second choice would be based on value-based digital tokens that can be locally stored, allowing the users to possess currency without giving up their privacy entirely. Another critical question explored by Chaum *et al.* (2021) and Zhang and Huang (2021) was the utilization of blockchain technology for distributed ledger systems. While the former rejected the idea entirely, the latter advocated using permissioned (private and consortium) blockchain for CBDC. Both, however, agreed on the challenges associated with the application, such as increased transaction cost and limited

scalability. The Chinese government rejected the idea of due to technology's "immaturity, performance and scalability shortfalls."<sup>18</sup>

The traditional fiat currency is characterized by third-party risk originating from both the Central Banks as well as the financial institutions acting as intermediaries in a transaction. The fundamental motivation behind cryptocurrency is to eliminate this risk (Nakamoto, 2008). CBDCs meet this aim halfway by essentially eliminating the role of financial intermediaries by connecting the wallets directly to the nation's central bank (Cukierman, 2020). Through this, the CBDC can essentially give the Central Bank of a nation, the capability to process and monitor any transaction. Additionally, removing layering in the current transaction process is also expected to make the process faster and more efficient (Qian, 2019).

Another key impact it is supposed to have would be on cash economies when central banks push for more significant CBDC usage in the payment settlement mechanisms. Depending on the currency's design, an account-based CBDC that compromises privacy for greater control can directly bring the untapped sections of the economy to the government's notice addressing the issue of information asymmetry in policy formulation. Such CBDC designs can also play a crucial part in AML and CFT operations by giving the government the ability to track transactions and detect red flags in real-time (BIS, 2018; Engert and Fung, 2017; Ballaschk and

Paulick, 2021). On the other hand, this will also raise severe privacy concerns and would directly risk greater scrutiny by the government. According to González-Gallego and Pérez-Cárceles (2021), such policies can act as a catalyst for people to adopt cryptocurrency that offers anonymity to its users. This, in turn, will have an impact on the public's adoption of CBDCs. As Ballaschk and Paulick (2021) discussed, privacy remains one of the primary concerns associated with CBDCs. They advocated independence in central banks' functioning as the optimal way of addressing such concerns.

### Impact of CBDC Introduction on Government Policy Decisions

CBDCs can also have significant implications for stimulus or aid package disbursement to the people during a crisis. Adams *et al.* (2021) talks about the simplification and expedition of the disbursement process through identity-specific accounts or digital wallets. It is interesting to note that Digital Dollar as a CBDC was first proposed during the COVID-19 pandemic during the discussion on stimulus package disbursement throughout the economy.<sup>19</sup> Prasad (2021) also discusses the possibility for monetary policy implementation through non-distortionary means by helicopter drop of money through CBDC. He also insists that it'll open effective channels for quick injections of money in situations where commercial banks fail in this function. However, he also warns about the issues related to the

pressure by national governments that can force central banks to monetize fiscal deficits. Such policies can prove to be counter-productive for the value of a CBDC and the economy, leading to erosion of confidence in the currency.

Another key question that naturally arises is the supposed impact of CBDC on the current financial institution, their bottom lines, and renewed functionality in the absence of sight deposits. This is where another important design choice will come into play. Central banks can provide interest on account deposits to incentivize the transition into CBDC from physical cash. Though expected to be lower than standard deposit rates, this will carry zero default risk making it a popular alternative to commercial bank deposits. Bindseil (2019) and Engert and Fung (2017) discussed this, stating that bank funding costs will increase due to a fall in expected sight deposits pushing up the average cost of capital. The banks may have to rely on more expensive sources of finance in such a situation, like bonds or central bank credit. The central bank will have to make its lending operations cheaper by reducing policy rates in order to compensate for the increased average cost of commercial banks. Andolfatto (2021) also affirmed that interest-bearing CBDCs increase the market deposit rate, negatively impacting a bank's profitability. It also suggests that the main benefit of CBDC will accrue to depositors in jurisdictions where banks use their market power to keep deposit rates depressed relative to what would

prevail in a more competitive setting.

## VI. Conclusion

Cryptocurrency's underlying concept aims to eliminate the role of financial intermediaries in a transaction process, addressing the entirety of the third-party risk. CBDC, on the other hand, is now being explored with the purpose of reducing the layering in the transaction process, essentially addressing a part of the third-party risks. However, CBDC also implicitly gives more control to the central bank through the centralization of authority. As pointed out by Chaum *et al.* (2021), although fiat money is a liability of the country's central bank, its value is derived from the monetary policy that the central banks maintain and the trust in the system that it can develop. Inherently, even the current fiat currency can also have no intrinsic value. Therefore, even further centralization of authority with the central bank and by extension, the governments carry its own set of risks ranging from more significant ramifications for economic growth due to wrong economic policies to compromised privacy of the currency users. On the other hand, cryptocurrency focuses on a decentralized ledger and complete anonymity in transactions diluting the government's economic control. The CBDCs and cryptocurrencies present two opposite points of view regarding the control that they think the central bank should retain.

CBDCs rely on central banks to play a pivotal role post-issuance of the currency (Bindseil, 2019;

Fonseca, 2019; Chaum *et al.*, 2021). The inclusion of the government in the digital currency system goes against the very idea proposed in the 2008 white paper (Nakamoto, 2008). However, it is essential to explore the introduction of technology to our current financial system rather than jumping straight to the replacement/elimination of critical components of the financial system, as proposed by cryptocurrency. Currently, CBDC addresses the key disadvantages associated with cryptocurrency while also using the benefits that the digitization of currency offers. Cryptocurrency exhibited the practical application of blockchain technology and cryptography, bringing the advent of digital currency to the forefront. Despite blockchain being introduced in 1991 (Haber and Sornetta, 1991) and cryptography being suggested as a currency solution in 1998 (Dai, 1998), it was a cryptocurrency that solely brought the advances to the forefront of modern finance, kickstarting the discussion on digitization. Even though the CBDC may not include blockchain or cryptography into their design choices, they remain an important benchmark against which the costing, privacy, and other indicators will be compared.

#### NOTES

<sup>1</sup> <https://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf>

<sup>2</sup> <https://www.bis.org/cpmi/publ/d137.pdf>

<sup>3</sup> <https://www.wired.com/2011/11/mf-bitcoin/>

<sup>4</sup> <https://satoshi.nakamotoinstitute.org/posts/p2pfoundation/1/>

<sup>5</sup> <https://www.statista.com/statistics/863917/number-crypto-coins-tokens/>

<sup>6</sup> <https://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf>

<sup>7</sup> <https://www.bis.org/cpmi/publ/d137.pdf>

<sup>8</sup> [https://www.ecb.europa.eu/pub/pdf/other/virtualcurrency\\_schemes201210en.pdf](https://www.ecb.europa.eu/pub/pdf/other/virtualcurrency_schemes201210en.pdf)

<sup>9</sup> <https://www.imf.org/external/pubs/ft/sdn/2016/sdn1603.pdf>

<sup>10</sup> <http://www.eba.europa.eu/documents/10180/2151635/Andrea+Enria%27s+speech+on+FinTech+at+Copenhagen+usiness+School+090318.pdf>

<sup>11</sup> [https://www.esma.europa.eu/sites/default/files/library/esma50-164-1284\\_joint\\_esas\\_warning\\_on\\_virtual\\_currenciesl.pdf](https://www.esma.europa.eu/sites/default/files/library/esma50-164-1284_joint_esas_warning_on_virtual_currenciesl.pdf)

<sup>12</sup> <http://documents.worldbank.org/curated/en/177911513714062215/pdf/122140-WP-PUBLIC-Distributed-Ledger-Technology-and-Blockchain-Fintech-Notes.pdf>

<sup>13</sup> <https://satoshi.nakamotoinstitute.org/posts/p2pfoundation/3/>

<sup>14</sup> <https://www.statista.com/statistics/730876/crypto-currency-maket-value/>

<sup>15</sup> <https://www.euronews.com/>

[next/2021/12/04/paying-with-cryptocurrencies-these-are-the-major-companies-that-accept-cryptos-as-payment](https://www.bis.org/publ/cgfs62.pdf)

<sup>16</sup> <https://www.bis.org/publ/cgfs62.pdf>

<sup>17</sup> <https://member.fintech.global/2021/09/20/china-set-to-introduce-digital-yuan-by-early-2022-in-regtech/>

<sup>18</sup> <https://member.fintech.global/2021/09/20/china-set-to-introduce-digital-yuan-by-early-2022-in-regtech/>

<sup>19</sup> <https://apps.npr.org/documents/document.html?id=6817441-House-Democrats-Counterproposal-For-Stimulus>

#### REFERENCES

1. Adams, M., Boldrin, L., Ohlhausen, R. and Wagner, E. (2021), An Integrated Approach for Electronic Identification and Central Bank Digital Currencies, *Journal of Payments Strategy & Systems*, Vol. 15 No. 3, AUTUMN/FALL 2021, pp. 287-304(18).
2. Andolfatto, D. (2021), Assessing the Impact of Central Bank Digital Currency on Private Banks, *Economic Journal*, 2021, Vol. 131, Issue 634, pp. 525-540.
3. Auer, R.A., and Claessens, S. (2018), Regulating Cryptocurrencies: Assessing Market Reactions, *BIS Quarterly Review Special Features Series*.
4. Ballaschk, D. and Paulick, J. (2021), *Journal of Payments*

- Strategy & Systems*, Vol. 15 No. 3, AUTUMN/FALL 2021, pp. 277-286(10).
5. Bindseil, U. (2019), Central Bank Digital Currency - Financial System Implications and Control. Available at SSRN: <https://ssrn.com/abstract=3385283> or <http://dx.doi.org/10.2139/ssrn.3385283>
  6. BIS (2018), Central Bank Digital Currency, Committee on Payments and Market Infrastructures Markets Committee. <https://www.bis.org/cpmi/publ/d174.pdf>
  7. BIS (2019), Establishing Viable Capital Markets, Committee on the Global Financial System, CGFS Papers, No 62. <https://www.bis.org/publ/cgfs62.pdf>
  8. Borgards, O., and Czudaj, R.L. (2020), The Prevalence of Price Overreactions in the Cryptocurrency Market, *Journal of International Financial Markets, Institutions and Money*, 65, 101194.
  9. Borgards, O., and Czudaj, R.L. (2021), Features of Overreactions in the Cryptocurrency Market, *The Quarterly Review of Economics and Finance*, 80, pp. 31-48.
  10. Boar, C., and Wehrli, A. (2021), Ready, steady, go? - Results of the Third BIS Survey on Central Bank Digital Currency, *BIS Papers*, No 114.
  11. Bordo, M., and Levin, A. (2017), Central Bank Digital Currency and the Future of Monetary Policy, *International Political Economy-Monetary Relations eJournal*.
  12. Bryans, D. (2014), Bitcoin and Money Laundering: Mining for an Effective Solution, *Indiana Law Journal* 89, pp. 440-472.
  13. Chaum, D., Grothoff C. and Moser T. (2021), How to Issue A Central Bank Digital Currency, Swiss National Bank.
  14. Chowdhury, M.S., Damianov, D., and Elsayed, A.H. (2021), Bubbles and Crashes in Cryptocurrencies: Interdependence, Contagion, or Asset Rotation? *Finance Research Letters*.
  15. Cheah E., Fry, J. (2015), Speculative Bubbles in Bitcoin Markets? An Empirical Investigation into the Fundamental Value of Bitcoin, *Economics Letters*, Sheffield.
  16. Ciaian, P., Rajcaniova, M. and Kancs, d. (2016), The Digital Agenda of Virtual Currencies: Can BitCoin become a Global Currency?, *Information Systems and e-Business Management* 14, pp. 883-919. <https://doi.org/10.1007/s10257-016-0304-0>
  17. Cukierman, A. (2020), Reflections on Welfare and Political Economy Aspects of a Central Bank Digital Currency, *The Manchester School*, 88, pp. 114-125. <https://doi.org/10.1111/manc.12333>
  18. Cross, J.L., Hou, C., and Trinh, K. (2021), Returns, Volatility and the Cryptocurrency Bubble of 2017-18, *Economic Modelling*.
  19. Dai, W. (1998), *B-Money*.
  20. ECB (2019), Exploring Anonymity in Central Bank Digital Currencies, *IN FOCUS*, No. 4. <https://www.ecb.europa.eu/paym/intro/publications/pdf/ecb.mipinfocus191217.en.pdf>
  21. Engert, W., and Fung, B. (2017), Central Bank Digital Currency-Motivations and Implications, *Monetary Economics: Central Banks-Policies & Impacts eJournal*.
  22. Enoksen, F.A., Landsnes, C.J., Lucivjanská, K., and Molnár, P. (2020), Understanding Risk of Bubbles in Cryptocurrencies, *Journal of Economic Behavior and Organization*, 176, pp. 129-144.
  23. Feinstein, B.D., and Werbach, K. (2020), The Impact of Cryptocurrency Regulation on Trading Markets, *Journal of Financial Regulation*, 2021, 7, pp. 48-99. doi: 10.1093/jfr/fjab003
  24. Fonseca, G. (2019), An Analysis of the Legal Impact of Central Bank Digital Currency on the European Payments Landscape, *Journal of Payments Strategy & Systems*, Vol. 13, Issue 4.
  25. Folkinshteyn, D., Lennon, M.M., and Reilly, T. (2015), The Bitcoin Mirage: An Oasis of Financial Remittance, *Innovation Law & Policy eJournal*.
  26. Garcia, M., Bekaert, G. and Harvey, C.R. (1995), The Role of Capital Markets in Economic Growth.
  27. García-Monleón, F., Danvila-del-Valle, I., and Lara, F.J. (2021), Intrinsic Value in Cryptocurrencies,

- Technological Forecasting and Social Change*, Vol. 162, 120393.
28. Gupta, R. (2017), Future of Bitcoins - A Study, *Journal of Internet Banking and Commerce*, 22 (3), pp. 1-12.
  29. González-Gallego N. and Pérez-Cárceles M.C. (2021), Cryptocurrencies and Illicit Practices: The Role of Governance, *Economic Analysis and Policy*, Vol 72, pp. 203-212.
  30. Gronwald, M. (2014), The Economics of Bitcoins - Market Characteristics and Price Jumps.
  31. Gruber, S. (2013), Note, Trust, Identity, and Disclosure: Are Bitcoin Exchanges the Next Virtual Havens for Money Laundering and Tax Evasion?, 32 *Quinnipiac L. Rev.* 135
  32. CESifo Group Munich, Munich Working Papers.
  33. Haber, S., Stornetta, W.S. (1991), How to Time-stamp a Digital Document. *Journal of Cryptology* 3, pp. 99-111. <https://doi.org/10.1007/BF00196791>
  34. Hanley B.P. (2014), The False Premises and Promises of Bitcoin. arXiv:1312.2048, Cornell University Library.
  35. Isaeva E.A. and Leshchenko J.G. (2019), Evaluation of the Effectiveness of Modern Models of Regulation of Financial Markets, *Journal of Creative Economy*, 13. 10.
  36. Khiaonarong, T. and Humphrey D.B. (2019), Cash Use Across Countries and the Demand for Central Bank Digital Currency. [Washington, DC]: International Monetary Fund.
  37. Luther, W.J., and White, L.H. (2014), Can Bitcoin Become a Major Currency? *Cyberspace Law eJournal*.
  38. Liu, Y., and Tsyvinski, A. (2018), Risks and Returns of Cryptocurrency, *Risk Management & Analysis in Financial Institutions eJournal*.
  39. Mancini-Griffoli, T., Peria, M., Agur, I., Ari, A., Kiff, J., Popescu, A. and Rochon, C. (2018), Casting Light on Central Bank Digital Currencies, *Staff Discussion Notes*, 18. 1. 10.5089/9781484384572.006.
  40. Malladi, R.K., and Dheeriyaa, P.L. (2020), Time Series Analysis of Cryptocurrency Returns and Volatilities, *Journal of Economics and Finance*, 45, pp. 75-94.
  41. Matei, I. G. And Baks, E.W. (2019), Acta Universitatis Danubius, *Oeconomica*, Issue 15(3), pp. 232-241
  42. Nakamoto, S. (2008), Bitcoin: A Peer-to-Peer Electronic Cash System, Cryptography Mailing List. Metzdown.com
  43. Prasad, E.S. (2021), The Case for Central Bank Digital Currencies, *Cato Journal*, Vol. 41, No. 2 (Spring/Summer 2021). DOI:10.36009/CJ.41.2.5
  44. Posner, E.A. and Weyl, E.G. (2014), Benefit-Cost Analysis of Financial Regulation: A Conference Funded by the Alfred P. Sloan Foundation and Supported by the Coase-Sandor Institute for Law and Economics, June, *The Journal of Legal Studies*, Vol. 43, No. S2, pp. S1-S34
  45. Plassaras, N.A. (2013), Regulating Digital Currencies: Bringing Bitcoin, *CHICAGO Journal of International Law* 14 (1), pp. 377-407.
  46. Steinmetz, F., Meduna, M.V., Ante, L. and Fiedler, I. (2021), Ownership, Uses and Perceptions of Cryptocurrency: Results from a Population Survey, *Technological Forecasting and Social Change*, Vol. 173. <https://doi.org/10.1016/j.techfore.2021.121073>.
  47. Stoica, O. (2002), The Role of the Capital Market in the Economic Development. *SSRN Electronic Journal*. 10.2139/ssrn.951278.
  48. Sukamulja, S. and Sikora, C.O. (2018), The New Era of Financial Innovation: The Determinants of Bitcoin's Price, *Journal of Indonesian Economy Business*, 33 (1), 46-64.
  49. Qian, Y. (2019), *China Economic Journal* 2019, Vol. 12, No. 1, pp. 1-15. <https://doi.org/10.1080/17538963.2018.1560526>
  50. Wei, Y., and Dukes, A.J. (2021), Cryptocurrency Adoption with Speculative Price Bubbles. *Mark. Sci.*, 40, pp. 241-260.
  51. Zhang, T. and Huang, Z. (2021), Blockchain and Central Bank Digital Currency, *ICT Express*. <https://doi.org/10.1016/j.icte.2021.09.014>
  52. Zingales, L. (2004), The Costs and Benefits of Financial Market Regulation, *ECGI Working Paper Series in Law*.
  53. Zimmer, Z. (2017), Bitcoin and Potosi Silver, *Technol. Cult.* 58 (2), pp. 307-334. ●