

*Martin KÁLMÁN**
Faculty of Law, University of Pécs

CBDC – THE FUTURE OF MONEY?

Central Bank Digital Currencies (CBDCs) hold the potential to renew the centralised financial system while introducing additional risks. Central banks, holding a monopoly on definitive money issuance, can use CBDCs to drive financial reforms and maintain monetary policy efficiency amidst economic innovation. Key factors driving CBDCs include the rise of crypto-assets, the social impacts of COVID-19, and the decline in cash usage. Cryptocurrencies challenge central banks' roles by enabling quasi-instant cross-border payments, prompting a response in the form of CBDCs. CBDCs lack a universally accepted definition, with various interpretations by institutions, and they can be classified based on form, issuer, settlement technology, and accessibility. Over 100 countries are involved in CBDC projects, from research to active implementation. Despite their potential, CBDCs differ significantly from both fiat money and cryptocurrencies in issuance, backing, denomination, and functionality. This research aims to provide information about the new level in the history of money, the potential to fulfil traditional monetary functions, and the definition of CBDCs. snapshot of the legal issues and advancements in CBDC adoption, highlighting key regulatory characteristics worldwide and drawing useful conclusions for both theory and practice.

Keywords: Money, Blockchain, CBCD, Legal Tender, Regulation

1. INTRODUCTION

In the centralized financial system (CeFi system), the money necessary for the functioning of the economy is issued by two institutions: on one hand, the central bank or national bank, and on the other hand, commercial banks. The central bank issues what is known as definitive money, which serves as the legal tender of a country, while commercial banks issue non-definitive money, which essentially represents a depositor's claim to central bank money (portfolio.hu, 2017). In the CeFi system, the central bank holds a monopoly position due to the right to issue money conferred upon it by the state.

* PhD, ORCID: 0009-0006-7459-1271, e-mail: martin.kalmanka@gmail.com

On one hand, CBDC can be a tool for realizing the aforementioned reform efforts targeting the entirety of financial services. On the other hand, CBDC can also be a means for the central bank to maintain its monopoly position and sustain the "matured" efficiency of monetary policy developed over centuries in the hotbed of economic innovation (Bujtár, 2022). This underlying motivation of central banks is reflected in the fact that, prior to the conceptual fixation of CBDC, they showed keen interest in central bank cryptocurrencies (CBCC) (Bech & Garratt, 2017).

There are several factors driving the push for introducing CBDC, and in this case, I would highlight three main external circumstances independent of the central bank. Firstly, the spread of crypto-assets based on distributed ledger technology, the social impacts of the COVID period, and the decline in using cash transactions in the economy. Independently of these factors, the potential applications of digital central bank money had already attracted the attention of several central banks earlier. According to a 2019 report by the Bank for International Settlements (BIS), 70% of the world's central banks are actively exploring the introduction of digital central bank money (Barontini & Holden, 2019).

A 2022 report by the BIS presents the results of a survey conducted in 2021, which reveals that 90% of the world's central banks are now actively interested in the future introduction of digital central bank money (Kosse & Mattei, 2021). Another report from 2023 discusses relevant regulatory perspectives on the ongoing CBDC developments (BIS, 2024). As of May 2024, 134 central banks representing 98% of the world's GDP (Atlantic Council, 2025) were already exploring the possibility of introducing central bank digital currency.

This study aims to present the current advancements of CBDCs globally by showcasing the most successful initial implementations and highlighting the key attributes and legal challenges associated with this form of digital money. It will examine case studies of countries that have made significant progress and explore the regulatory frameworks being established to govern their use. Additionally, the study will address the role of CBDCs in the broader financial ecosystem, providing a comprehensive overview of the state of CBDCs around the world.

2. A BRIEF HISTORY OF MONEY

Throughout history, various goods have been used as a means of purchasing goods and services and paying public dues. Items such as barley or wheat grains in ancient Near Eastern cultures, cowrie shells in the Far East, cattle in medieval Europe, and emergency money printed by the Red Army in Eastern Europe have all served this role. This flexible practice made people less sensitive to the intrinsic value of money, accepting any intermediary that fulfilled the functions of payment, value measurement, wealth storage, and exchange (Szilovics, 2021).

There have been periods where monetary systems were based on money with intrinsic value. In the 7th-6th centuries BC, coins in the Hellenic world were often made of precious metals, and the Roman denarius introduced in 214 BC was minted from silver (Andreau,

1999). However, until the 18th century, even the most developed economies lacked a unified and predictable monetary policy, with the value of coins solely ensured by their gold and silver content. The ruling elite often exploited the economic significance of coinage, leading to a deliberate debasement of national currencies. Only in exceptional moments did some currencies become universally accepted stable measures of value, such as the Byzantine solidus, the Hungarian gold forint, or the British pound.

In the 18th century, monetary policy evolved to ensure the stability of national economies and currencies through precious metals accumulated in banks. The gold standard, introduced in England in 1717, was adopted by European powers in the 19th century, leading to the belief that only money backed by precious metals could be effective. This mindset changed in the mid-20th century, with economist John Maynard Keynes calling the gold standard a “barbarous relic”. The end of gold-based monetary systems came on August 15, 1971, when U.S. President Richard Nixon ended the dollar's convertibility into gold (Ferguson, 2019).

The late 20th century saw the renewal of money usage with introducing hybrid or digital currencies, driven by digitalisation, global trade development, and human ingenuity. Cryptocurrencies and CBDCs the latest type of these currencies, have quickly spread for investment purposes. Their creation and acceptance were facilitated by digital advancements and historical monetary practices.

As we are examining the development of money, we see that money initially belonged to the category of real goods as commodity money, whose value was given by the value of the commodity functioning as money. Thanks to its physical properties, utility, and the material, technique, and labour required for its production, commodity money had intrinsic value. Subsequently, money backed by commodities appeared, whose value was given by the trust that the bank issuing the banknote had sufficient backing, meaning it could be exchanged for valuable goods (such as gold) at any time as commodity backing. Although money backed by commodities is worthless in itself, it embodies a claim to a valuable commodity, which lends its value. In the next stage of the development of money, when the commodity backing remained only at the macroeconomic level as general economic backing, money gradually lost its tangible nature, and its physical nature became secondary. Money transformed from a tangible asset belonging to the category of real goods into a financial instrument, which either does not appear in physical form or, if it does, its value is not given by its physical characteristics and production costs. The typical form of money today is account money, which does not have intrinsic value but holds value because members of society trust the given bank, and in a broader context, the safe operation of the entire banking system and economy. Cryptocurrencies represent a novel form of money that relies on digital technology, cryptographic security, and decentralised networks. Their value is primarily based on user trust and the utility they provide within the digital economy.

3. THE MEANING OF CBDCs

Despite strong efforts to regulate CBDCs, there is currently no universally accepted definition of digital central bank money, leading to heterogeneous approaches (Kóczyán *et al.*, 2022).

Before examining the definitions, it is important to highlight the key difference between CBDCs and crypto-assets. CBDCs are similar to crypto-assets (especially stablecoins) in that both are digital forms of currency created to be used as a means of payment (Kecskés & Bujtár, 2019). However, the major difference is that crypto-assets are not issued by a central bank, and their purchasing power is not guaranteed by any central bank or centralized authority. This lack of backing contributes to the extreme volatility in the value of crypto-assets. In contrast, CBDCs issued by central banks would essentially represent the digital form of legal tender, with the central bank responsible for ensuring the stability of their purchasing power (Király, 2023).

The BIS definition offers a broad interpretation, viewing CBDCs as a new form of central bank money, which represents a central bank liability denominated in an existing unit of account, fulfilling both the functions of a medium of exchange and a store of value (BIS, 2018). It is worth noting that the BIS Committee on Payments and Market Infrastructures (CPMI) relatively early recognised the long-term transformative potential of digital currencies based on distributed ledger technology on the centralised financial system and financial services (Committee on Payments and Market Infrastructures, 2015). The Reserve Bank of India (2022) considers the BIS definition of digital central bank money as the guiding principle for the Digital Rupee.

The Bank of England defines CBDCs based on four conceptual criteria. According to their approach, CBDCs are characterized by their wider accessibility compared to current central bank deposits, greater efficiency in use for retail transactions compared to cash, operation within a different system than other central bank monies which allows for flexible usage, and the ability to pay interest at a rate different from that of deposits. These criteria highlight the unique features and potential advantages of CBDC over traditional forms of central bank money (Kumhof & Noone, 2018).

The European Central Bank (ECB) uses the following definition for introducing the digital euro as a CBDC: "The term digital euro refers to a liability of the Eurosystem recorded in digital form, complementing cash and central bank deposits". In the ECB's interpretation, the digital euro would be a CBDC usable by the general public — citizens and non-commercial bank enterprises — for retail transactions. This would enable the central bank-managed payment system to be accessible not only to traditional participants, typically commercial banks but also to a broader range of users (European Central Bank, 2022). According to the definition provided by the U.S. Federal Reserve, digital central bank money is a digital form of a claim against the central bank that is accessible to a broad range of citizens (Federal Reserve Board, 2022).

4. COMPARING THE FUNCTIONS OF FIAT MONEY AND CBDCs

For modern currencies to fulfil their role in the economy, they must meet four key monetary functions: serving as a means of payment, a medium of exchange, a unit of account, and a store of value. Since fiat currencies possess all four functions, and sometimes even serve as global currencies, it is important to examine to what extent and how a digital central bank currency (CBDC) would be capable of fulfilling these functions. Regarding the function of serving as a means of payment, means payment is defined as the act of settling an obligation, during which one party transfers a quantifiable product of comparable value to the other party, in accordance with their mutual agreement (Polányi, 1984). A medium of exchange means an important characteristic of money that can be effectively used as a means of payment is its ability to facilitate the exchange of various types of products over time. This is because money is easily divisible, stable in value, uniform, easily transportable, universally recognised, and possesses a value that is either intrinsically inherent or guaranteed by a legitimate external source. As a unit of account, the essence is that money introduces an arithmetic, quantitative way to make the prices of offered goods and services, as well as market processes, comparable and acceptable to everyone involved in the transaction. This facilitates the exchange of products by providing a common measure of value between the items being traded. The practical application of the store of value function means that investors aim to accumulate high-value assets, which are capable of preserving their value over the long term, creating a reserve for future consumption.

In the case of digital central bank money, all four payment functions can be achieved, whether the central bank issues the new money directly (centralized CBDC) or indirectly (decentralized CBDC). Trust in these digital currencies can be further bolstered by the central bank guaranteeing full convertibility, similar to fiat money. Unlike private money, central banks have the authority to elevate a private currency to the status of digital central bank money through mandatory convertibility. However, this approach lacks the central bank's *de facto* monopoly on money issuance, which is why almost all central banks have rejected this type of CBDC issuance (Bujtár, 2021).

In a centralized CBDC system, market participants can only be involved in operating the intermediary system, alongside commercial banks, as additional service providers in the payment system (such as crypto-asset wallet providers and exchanges), but not as potential issuers. The global currency function is relevant due to the international nature of both digital central bank money and crypto-assets. The role of the USD as a global reserve currency could be challenged by the successful introduction of a CBDC by a central bank with significant economic power or by the international acceptance of a private crypto-asset as a stablecoin (e.g., Facebook's Diem). This ambition is particularly evident in the case of the Chinese CBDC, driven by the economic competition between China and the United States.

5. IMPLEMENTATION OF CBDCs – A GLOBAL ANALYSIS

The commitment to creating central bank digital currency is illustrated by the fact that only small economies have already started experimenting with introducing new types of official currencies - not really prepared (the Marshall Islands in 2018, followed by Jamaica and Nigeria) and El Salvador - with the adoption of bitcoin in 2021 - as official currency (Renterina, Wilson & Strohecker, 2021; Bujtár, 2024).

Beyond pilot projects, the Bahamas and Nigeria have already introduced digital central bank money, known as the Sand Dollar (Central Bank of the Bahamas, 2019) and eNaira, (Central Bank of Nigeria, 2021) respectively. The Sand Dollar is one of the first fully operational CBDCs, launched by the Central Bank of The Bahamas. It aims to increase financial inclusion, particularly in remote islands where access to banking services is limited. The Sand Dollar's implementation provides valuable insights into the challenges and successes of deploying a CBDC in a small island economy. Additionally, a pilot program is currently underway to test the first CBDC used within a currency union. The Eastern Caribbean Currency Union (ECCU) has successfully tested the DCash digital currency through multiple phases, making it a key element in the union's digital transformation.

Among the countries with advanced CBDC projects, China stands out as an example. The development of the digital yuan (e-CNY) began in 2014, and since then, it has undergone testing and is now accepted as an official means of payment in several offline stores and online shops (Fullerton & Morgan, 2022).

In Sweden, the central bank, Riksbank, announced the development of the digital Swedish krona (e-krona) in 2017. This initiative was primarily driven by the decline in cash usage, which fell to a third between 2010 and 2018, and the increasing shift towards digitalization in society, exemplified by the widespread use of the Swish payment application. The e-krona is based on distributed ledger technology and has gone through three development phases, although a decision on its official introduction has yet to be made (Sveriges Riksbank, 2023).

The United States has shown openness to the concept of digital central bank money, with the conceptual U.S. CBDC potentially serving as a tool to maintain the long-term hegemony of the U.S. dollar (FED, 2022).

The People's Bank of China has been at the forefront of CBDC development with its Digital Currency Electronic Payment (DCEP) initiative. This project aims to enhance the efficiency of the payment system, reduce transaction costs, and provide the government with a better oversight of financial transactions. The DCEP has been piloted in several cities, showcasing its potential for widespread adoption and integration into the existing financial ecosystem.

A complex legislative package, the Digital Euro Package, was proposed by the European Commission in June 2023 to allow the legislator to create the legal framework for introducing central bank digital currency. In October 2023, the Governing Council of the European Central Bank announced that, after a two-year assessment phase, it would launch a preparatory period for a further two years. In June 2024, the European Central Bank published the first progress report on the development of the digital euro.

6. FURTHER THOUGHTS ON SOVEREIGNTY, INTEROPERABILITY AND LEGAL STATUS

Regarding monetary sovereignty, CBDCs can enhance a central bank's ability to implement monetary policy by providing real-time data on money supply and demand, which could lead to more effective monetary interventions. Additionally, CBDCs may alter the traditional banking system by reducing the reliance on commercial banks for deposits, potentially leading to a disintermediation effect. Furthermore, the introduction of CBDCs could create competition with private cryptocurrencies and foreign digital currencies, impacting a nation's control over its monetary system. Changes to the banking system may occur as CBDCs could alter how banks operate by reducing the need for commercial banks to hold deposits, potentially disrupting traditional banking. Additionally, the launch of CBDCs could create competition with private cryptocurrencies and foreign digital currencies, which may affect a country's control over its own monetary system (Chu & Rathbun, 2025).

Cross-border interoperability is crucial for the effectiveness of CBDCs in international transactions. There needs to be a set of technical standards to ensure compatibility between different countries' digital currencies. Additionally, countries must collaborate on regulatory frameworks to facilitate the use of CBDCs in international trade and finance, which may require complex negotiations. Without proper interoperability, there is a risk that the global financial system could become fragmented, resulting in inefficiencies and increased costs for cross-border transactions (BIS, 2022).

The legal status of CBDCs must be clearly defined within existing financial regulations, including whether they are considered legal tender and how they integrate into the current financial infrastructure. Legal frameworks will also need to address consumer rights, privacy concerns, and security measures to protect users of CBDCs. Furthermore, the legal implications of CBDCs may extend beyond national borders, causing coordination with international law and regulations (BIS, 2024).

7. CONCLUSION

To sum up, CBDCs hold the promise of transforming the financial landscape by combining the stability and trust of central bank-issued money with the efficiency and innovation of digital currencies. As more countries explore and implement CBDCs, they will need to navigate regulatory challenges and ensure that these digital currencies can effectively fulfil traditional monetary functions. The global interest in CBDCs underscores their potential to shape the future of money, offering a new level of security, efficiency, and inclusivity in the financial system.

CBDCs could provide central banks with new tools to implement and fine-tune monetary policy more effectively, as real-time data on money flows could enhance decision-making and policy adjustments. Additionally, CBDCs have the potential to bring financial services to unbanked and under-banked populations, providing them with access to secure and efficient payment systems. The digital nature of CBDCs can lower transaction costs and increase the speed of payments, benefiting both consumers and

businesses. The traceability of CBDC transactions could help combat money laundering, tax evasion, and other illicit activities, enhancing financial system integrity.

However, introducing CBDCs could disrupt traditional banking models, as individuals and businesses might prefer holding digital currency directly with central banks, potentially reducing the role of commercial banks in the financial system. The successful implementation of CBDCs by major economies could shift global currency dynamics, challenging the dominance of existing reserve currencies like the U.S. dollar. The traceability of CBDC transactions raises concerns about privacy and data security, making it crucial to balance transparency with privacy protections. Furthermore, the implementation of CBDCs will require robust technological infrastructure and cybersecurity measures to prevent fraud, hacking, and other cyber threats.

In conclusion, while CBDCs offer significant benefits and opportunities for the future of money, their successful implementation will require careful consideration of regulatory, technological, and societal factors. Central banks and policymakers must work collaboratively to address these challenges and harness the full potential of CBDCs to create a more secure, efficient, and inclusive financial system.

LIST OF REFERENCES

- Andreau, J. 1999. *Banking and Business in the Roman World*. Cambridge: Cambridge University Press, pp. 11-12.
- Atlantic Council. 2025. *Central Bank Digital Currency Tracker – Scroll to Explore*. Available at: <https://www.atlanticcouncil.org/cbdctracker> (15. 5. 2025).
- Bank for International Settlements (BIS). 2023. Central bank digital currencies: ongoing policy perspectives. Available at: <https://www.bis.org/publ/othp65.pdf> (23. 6. 2024).
- Barontini, C. & Holden, H. 2019. Proceeding with caution – a survey on central bank digital currency. *BIS Papers*, 101, pp. 1-20.
- Bech, M. & Garratt, R. 2017. Central bank cryptocurrencies. *BIS Quarterly Review*, 5, pp. 55-62.
- BIS: Central bank digital currencies. 2018. Committee on Payments and Market Infrastructures, Markets Committee. Available at: <https://www.bis.org/cpmi/publ/d174.pdf> (17. 6. 2023).
- BIS. 2024. Legal aspects of retail CBDCs. Available at https://www.bis.org/publ/othp88_legal.pdf (20. 4. 2025).
- BIS. 2022. Options for access to and interoperability of CBDCs for cross-border payments. Available at: <https://www.bis.org/publ/othp52.pdf> (18. 4. 2025).
- Bujtár, Zs. 2021. A digitális jegybankpénz kihívásai a monetáris politika területén. In: Bujtár, Zs. et al. (eds.). *Kriptoeszközök világa a jog és gazdaság szemszögéből: Konferenciakötet - Válogatott tanulmányok*. Pécs: Magyarország, Pécsi Tudományegyetem Állam- és Jogtudományi Kar, pp. 123-135.
- Bujtár, Zs. 2022. Central bank-issued digital currencies and their characteristics in light of security. In: Kózhalmi L. et al. (eds.), *Biztonság és jog: Konferenciakötet*. Magyarország, Pécs: PTE ÁJK Kriminológiai és Büntetés-végrehajtási Jogi Tanszék, pp. 49-61.

- Bujtár, Zs. 2024. The future of central bank digital currency in the European Union and Hungary. In: Kostić, J. *et al.* (eds.), *Regional Law Review*. Belgrade, Institute of Comparative Law, pp. 195-205. https://doi.org/10.56461/iup_rlr.2024.5.ch15
- Chu, Y. & Rathbun, N. S. 2025. Monetary Sovereignty and Central Bank Digital Currencies: Competing Models for Future Cross-Border Payment Platforms. *Global Policy*, Early view, pp. 1-12. <https://doi.org/10.1111/1758-5899.13495>
- Central Bank of the Bahamas. 2019. Project Sand Dollar: A Bahamas Payments System Modernisation Initiative. Available at: <https://www.centralbankbahamas.com/viewPDF/documents/2019-12-25-02-18-11-Project-Sanddollar.pdf> (22. 9. 2023).
- Central Bank of Nigeria. 2021. Design paper for the eNaira. Available at: <https://www.enaira.gov.ng/about/design> (21. 8. 2023).
- Committee on Payments and Market Infrastructures (CPMI). 2015. Digital currencies. Bank for International Settlements. Available at: <https://www.bis.org/cpmi/publ/d137.pdf> (19. 6. 2023).
- European Central Bank. 2022. Report on Digital Euro. Available at: https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf (15. 4. 2024).
- Federal Reserve Board (Fed). 2022. Money and Payments: The U.S. Dollar in the Age of Digital Transformation. Board of Governors of the Federal Reserve System. Research & Analysis. Available at: <https://www.federalreserve.gov/publications/files/money-and-payments-20220120.pdf> (19. 8. 2024).
- Ferguson, N. 2019. *A pénz felemelkedése*. Budapest: Scolar.
- Fullerton, E. J. & Morgan, P. J. 2022. The People's Republic of China's Digital Yuan: Its Environment, Design, and Implications. *ADB Discussion Paper Series*, 1306, pp. 9-14. <https://doi.org/10.2139/ssrn.4204153>
- Kecskés, A. & Bujtár, Zs. 2019. Felvetések a kriptó eszközök szabályozása terén. *Controller Info*, 7(2), pp. 49-53.
- Kóczyán, B. *et al.* 2022. Digitális jegybankpénz: a monetáris politika új eszköze. *Pénzügyi Szemle*, 67(4), pp. 522-525. https://doi.org/10.35551/PSZ_2022_4_3
- Kosse, A. & Mattei, I. 2021. Gaining momentum – Results of the 2021 BIS survey on central bank digital currencies. *BIS Papers*, 125, pp. 1-23. <https://doi.org/10.5089/9781513589039.007>
- Kumhof, M. & Noone, C. 2018. Central bank digital currencies — design principles and balance sheet implications. In: *Staff Working Paper*, 725, Bank of England, pp. 1-53. <https://doi.org/10.2139/ssrn.3180713>
- Polányi K. 1984. *Kereskedelem, piacok és pénz az ókori Görögországban*. Budapest: Gondolat Kiadó.
- Portfolio.hu. 2017. Szabó Gergely – Kollarik András: Mi is az a digitális jegybankpénz? Available at: <https://www.portfolio.hu/uzlet/20171105/az-mnb-elmagyarazaza-mi-is-az-a-digitalis-jegybankpenz-266855#> (22. 12. 2024).
- Renterina, N., Wilson, T. & Strohecker, K. 2021. *In a world first, El Salvador makes Bitcoin legal tender*. Reuters. Available at: <https://www.reuters.com/world/americas/el-salvador-approves-first-law-bitcoin-legal-tender-2021-06-09/> (24. 6. 2024).

- Reserve Bank of India. 2022. Concept Note on Central Bank Digital Currency. Available at: <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?Url-Page=&ID=1218#FN2> (19. 7. 2023).
- Sveriges Riksbank. 2023. E-krona pilot, phase 3. E-krona Report. Available at: <https://www.riksbank.se/en-gb/payments--cash/e-krona/e-krona-reports/e-krona-pilot-phase-3/> (22. 9. 2024).
- Szilovics, Cs. 2021. A kriptovaluták pénzfunkciójáról és gazdasági, társadalmi jelentőségéről. In: Bujtár, Zs. *et al.* (eds.). *Kriptoeszközök világa a jog és gazdaság szemszögéből: Konferenciakötet - Válogatott tanulmányok*, Pécs: Magyarország, Pécsi Tudományegyetem Állam- és Jogtudományi Kar, pp. 26-31.
- The Federal Reserve (FED). 2022. Money and Payments: The U.S.Dollar in the Age of Digital Transformation. Research & Analysis. Available at: <https://www.federalreserve.gov/publications/files/money-and-payments-20220120.pdf> (20. 8. 2024).