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# Central Bank Digital Currencies: Financial Stability Perspective

**Abstract**: Digitalization of the global economy, catalysed by advancements in blockchain technology and the rise of cryptocurrencies, has led to a paradigm shift in the monetary landscape. Central Bank Digital Currencies (CBDCs) have emerged as a transformative force with the potential to revolutionize financial systems and enhance stability. CBDCs represent a pivotal development in the evolution of monetary systems, holding the potential to enhance financial stability across various dimensions. The transformational impact of CBDCs on the banking landscape, whether through direct customer distribution or intermediation via commercial banks, underscores the need for thoughtful design and consideration of their distribution method. Careful planning can mitigate risks associated with deposit outflows, ensuring financial stability. This paper examines the multifaceted impact of CBDCs on financial stability, focusing on key dimensions such as their role in reshaping the banking sector, mitigating bank runs, influencing monetary policy, and addressing trust and privacy concerns. We discuss the importance of striking a balance between privacy and transparency. Through a comprehensive exploration of these dimensions, we assess how CBDCs can contribute positively to financial stability and provide a roadmap for their effective implementation.

**Keywords**: central bank digital currencies, CBDCs, financial stability, central bank

**JEL Classification:** E58, E42, G21.

## Introduction

The global economy is experiencing a shift towards complete digitalization. The proliferation of digital technologies has transformed nearly every aspect of modern life, especially commerce, finance, and business. Consequently, money must adapt to the digitalized world, and its physical form is gradually losing significance. The monetary evolution has been powerfully influenced by the development of blockchain technology, and more precisely, by the development of cryptocurrencies based on it. Blockchain brings decentralization, anonymity and enhanced security of transactions through the use of cryptography. This leads to the independence of market participants from any intermediaries and any transaction costs (Kosanović, Božović, & Kosanović, 2021). However, taking cryptocurrencies into account, transaction anonymity can increase the risk of financial crimes. Also, due to their volatility, traditional cryptocurrencies are not suitable as a means of payment and a store of value. The rapidly changing and unpredictable prices make cryptocurrencies less practical in their day-to-day transactions, as users are unwilling to trade currencies that can fluctuate widely in value over short periods of time. Furthermore, limited acceptance by businesses and retailers limits the usefulness of cryptocurrencies for everyday transactions. Also, the speculative nature of cryptocurrencies is often more attractive to investors than to everyday users, contributing to price shocks and speculative behaviour.

In response to these challenges, stablecoins were designed to minimize price fluctuations by being pegged to a specific asset (such as fiat currency or other cryptocurrencies). For example, a dollar-based stablecoin is pegged to the U.S. dollar and is intended to reflect its price. There are a variety of approaches stablecoins can take to match the price of the currency they are pegged to consistently, such as collateralization with external assets or algorithmic mechanisms that leverage dynamically adjusting supply in relation to demand (Chainlink Labs, 2023). We can distinguish among centralized and decentralized stablecoins. The former are usually tied to fiat currencies and, because of centralization, require a significant level of trust in the custodian. Unlike centralized stablecoins, which are issued and managed by a central authority or organization, decentralized stablecoins operate on blockchain networks and rely on smart contracts to maintain their stability. Users looking to create stablecoins are required to lock up a specific amount of cryptocurrency or other assets as collateral, serving as a security measure for the stablecoin's valuation. Smart contracts play a pivotal role in these systems by overseeing the stablecoin's supply and ensuring it remains pegged to the selected reserve asset. These contracts automatically make adjustments to the stablecoin supply in response to changes in demand and collateral worth. When the stablecoin's price falls below its peg, built-in mechanisms encourage users to

create new stablecoins by adding more collateral. Conversely, if the price exceeds the peg, mechanisms incentivize users to redeem stablecoins, reducing the supply and restoring stability.

Central Bank Digital Currencies (CBDCs) are similar to centralized stablecoins as they are issued by central banks and, as such, do not necessarily need to be backed by fiat money. CBDCs are a completely logical next step in this process of money evolution (Fabris, 2019). CBDCs can be defined as a form of digital money, denominated in the national unit of account, which is a direct liability of the central bank (Group of Central Banks, 2020; BIS, 2020), or as a fiat currency issued in a digital form and has the same value as the fiat currency (Deloitte, 2022), due to its stablecoin characteristics. So, as fiat currency, CBDCs are the legal tender issued by a central bank in a digital form as a medium of exchange, store of value and unit of account. On the other hand, as a digital liability of the central bank, CBDCs could become a new instrument for settlement between financial institutions. CBDCs differ from cashless payment instruments as they represent a direct claim on the central bank, not a commercial bank liability. The benefits of using such a digital currency are faster and more secure payments, efficient cross–border transfers, accelerated digitization, better mitigation for clearing and settlement risks, and financial inclusion. With increasing globalization and digitization of financial services, CBDCs have the potential to create a Future of Value Transfer platform that contributes to a more resilient, innovative, and competitive payment system for households, businesses and economies (Deloitte, 2022). Payments made using CBDCs are real–time and final. Therefore, transactions are executed with significantly reduced settlement risk, making them more efficient and without intermediaries.

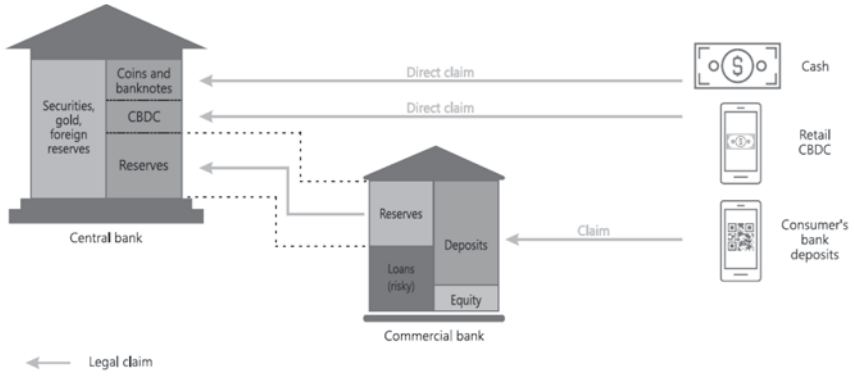
Technological development and monetary evolution have made CBDCs a main topic of interest for central banks, financial institutions, and academics. Also, the increasing presence of big tech companies in the fintech industry poses a significant threat to traditional payment systems and financial institutions. These tech giants, with their vast resources, advanced technology, and large user bases, have the potential to disrupt the financial sector. While Fintech supports financial inclusion, creates new jobs, inspires innovation and simplifies access to financial services, it also exposes people, systems and authorities to new risks that could jeopardize smooth functioning of processes and existing policies (Vučinić & Luburić, 2022). In response to these challenges, central banks have intensified their efforts to explore the possibilities and methods of introducing CBDCs, while also considering the potential implications for financial stability.

According to the CBDC Tracker[1], as of September 2023, 98 central banks are in the "research" phase (country has conducted first explanatory CBDC research), 14 are in the "pilot" phase (country has developed a CBDC that is tested in a real environment), while only three CBDCs have been officially fully launched. In the Western Balkan region, the Central Bank of Montenegro is the only one in the "research" phase since April 2023.

## Reshaping the Banking Landscape

The launch of CBDC transforms the financial system, from eliminating the use of physical money to changing the role of banks. The extent of this transformation and its impact on banks will largely depend on the method chosen for CBDC distribution. Depending on whether CBDCs are distributed directly to consumers or primarily through commercial banks, the role of banks in financial intermediation could shift significantly. Distribution of CBDC can be classified as either One–tier or Two–tier, depending on how the particular CBDC is circulated within the financial system. In the One–tier approach (Figure 1), distribution of CBDCs is done by the central bank directly to customers. This approach requires the development of information technology infrastructure and the expansion of the central bank's capacity. In the Two–tier approach, the central bank issues CBDC, but the distribution lies with financial institutions (most likely banks). The process is similar to the current banking system.

**Figure 1: The Monetary System With a Retail CBDC**




Source: Auer and Böhme (2021, p. 6)

[1] CBDC Tracker is an open–source project aimed at providing a comprehensive information resource for world CBDC initiatives (Mikhalev, Burchardi, Struchkov, Song, & Gross, 2021).

If CBDCs are primarily distributed through banks, they may continue to play a central role in the financial ecosystem, but with adaptation of the business model. On the other hand, if CBDCs are predominantly distributed directly to consumers, it could lead to a more substantial change in the banking landscape, potentially diminishing the traditional intermediation functions of banks. Thus, the method of CBDC distribution is a critical determinant of how banks will adapt to this new financial paradigm. The One–tier approach may have implications on the deposits of the bank. Customers may prefer to open accounts directly with central bank (especially if it comes with remuneration) and potentially, a significant amount of deposits may potentially flow out of commercial banks. Therefore, the transformation of non–interest–bearing assets (funds in bank accounts without interest) into highly liquid assets with a return will impact the withdrawal of deposits from commercial banks and their conversion into CBDC, posing a threat to financial stability. The narrowing of the banks' deposit potential caused by introducing the CBDC would harm the volume of bank loans and, consequently, the economic activity level (Lukić, Popović, & Janković, 2023). However, a CBDC improves payment efficiency, so that runs will be less disruptive to the overall economy (Auer et al., 2022). With the introduction of a CBDC, digital payments and transfers can be executed quickly and efficiently. This means that even during periods of uncertainty or financial stress, individuals and businesses can access their funds or make payments without the need for physical cash or facing significant delays. As a result, the risk of a bank run causing a broader economic crisis is reduced because people have confidence in their ability to access and use their funds digitally.

In Ben Souissi & Nabi (2023) model, CBDC issuance does not exist initially but CBDC is issued at the end of the first period. They show that avoiding the run from commercial banks due to the conversion of deposits to CBDC is possible if the central bank [1] transfers the CBDC into loans for commercial banks, or [2] intervenes by restricting the access to CBDC accounts (by limiting the available amount or by imposing a substitution fee), or [3] suspends the convertibility of bank deposits into CBDC. In the first approach, the central bank decides to inject the newly issued CBDC directly into the banking system by providing loans to commercial banks. The key idea is to increase the liquidity available to banks. These loans are typically collateralized by assets held by the banks, such as government bonds or other securities. By taking these CBDC loans, commercial banks can supply their reserves and meet the withdrawal demands of depositors without liquidating their assets or experiencing a cash shortage. As a result, depositors no longer have the incentive to convert their deposits into CBDC because they see that the banking system is adequately supported by the central bank's lending facility. In the second approach, the central bank introduces re-

strictions on CBDC accounts, such as setting a maximum balance that can be held in CBDC or limiting the frequency and amount of CBDC withdrawals. By implementing these measures, the central bank aims to reduce the attractiveness of CBDC as an alternative to bank deposits during times of crisis. In the third approach, the central bank temporarily suspends the convertibility of bank deposits into CBDC, meaning that bank deposits cannot be instantly transformed into CBDC during the crisis period. While this measure may frustrate some depositors, it is intended to stabilize the banking system by preventing a sudden and massive outflow of funds.

Similarly to the first approach, Kim and Kwon (2019) saw the introduction and expansion of CBDC as a factor that increases the likelihood of a bank panic by reducing the supply of loans, raising interest rates, and decreasing deposits in commercial banks' reserves. Increased supply of CBDC can enhance financial stability by mitigating the risk of bank panic. This is achieved through the central bank's ability to utilize CBDC funds for lending to commercial banks. As a result, there is a greater infusion of liquidity into the financial system. This surplus liquidity acts as a buffer against situations where individuals might hastily withdraw their deposits from banks due to concerns about a financial crisis. Consequently, this reduced risk of bank runs contributes to a more stable banking environment. Moreover, the augmented availability of funds in the system can bolster increased lending activities by commercial banks, further fortifying overall financial stability.

On the other hand, if banks wish to retain deposits, they must raise interest rates on them. With the introduction of CBDC, the central bank pressures banks to become more attractive by increasing interest rates. Monnet, Petursdottir & Rojas-Breu (2021) consider how introducing a CBDC would modify the way banks fund their investments. This is crucial in terms of the impact of a CBDC on financial stability. It demonstrates that banks have the ability to offset the increased funding costs resulting from CBDC issuance by restructuring their assets and then passing the benefits on to depositors. This strategy aims to maintain depositors' indifference between holding a CBDC and keeping their funds in bank deposits. By aligning the interests of depositors with the changes brought about by CBDC issuance, banks can mitigate potential disruptions in the banking sector and maintain depositor confidence. This balancing act between CBDCs and traditional bank deposits is a critical aspect of financial stability in a landscape where digital currencies are gaining prominence. It underscores the need for banks to remain flexible and responsive to evolving financial technologies while safeguarding the overall stability of the financial system. Keister and Monnet (2022) investigate the liquidity characteristics of CBDC when used for payments.

In situations where the financial health of individual banks and their depositors is not public information, the introduction of CBDC as a secure payment alternative to bank deposits, immune to the risk of bank runs (since central banks don't engage in maturity transformation), prompts depositors to move their funds from banks to CBDC during periods of financial stress. This inflow of funds into the digital currency can serve as an indicator for the central bank to gauge the financial conditions of banks. Such insights can be pivotal in devising an appropriate policy response during times of financial turmoil, especially when a swift response is necessary for effectiveness. Keister and Monnet (2022) also argue that by appropriately choosing the interest rate on CBDC to make it more attractive in times of stress, the central bank can infer the state of the financial system more quickly and respond more effectively.

The introduction of CBDC can have positive effects on lending. Increase in deposit and CBDC interest rates will attract larger deposits, leading to an expansion of lending. Higher interest rates incentivize people to keep their money in the banking system rather than hold cash. This increased flow of deposits into banks provides them with more funds to lend out to borrowers. Increased lending can stimulate economic activity, support investment, and promote economic growth. Evidence suggests that a properly–designed CBDC is not likely to threaten financial stability (Andolfatto, 2020). This implies that if the CBDC is implemented with careful consideration of its design, regulatory framework, and integration into the existing financial system, it should not destabilize the financial sector. In fact, it can contribute to a more stable and efficient financial ecosystem.

Central banks may choose to design a financial ecosystem with different categories of CBDC wallets with varying transactions, balance and also time limits. This strategic approach serves the purpose of mitigating the risk of mass withdrawals of bank deposits during periods of financial stress and contributes to the preservation of economic stability. By introducing a spectrum of CBDC wallet types, central banks can effectively manage the behaviour of depositors and ensure a balanced distribution of funds within the financial system. On the other hand, imposing limits on wallet balances can discourage excessive hoarding of CBDC, thereby encouraging continued participation in the broader financial ecosystem. Furthermore, the introduction of time restrictions on CBDC transactions can play a crucial role in maintaining economic stability. These limitations on the holding period of CBDCs in specific wallet types can discourage speculative behaviour and promote the intended usage of CBDCs for everyday transactions rather than as a store of value.

## Impact of CBDCs on Financial Stability: Other Aspects

CBDC carries the potential to exert influence on central banks' broader monetary policy objectives. This influence may manifest in two primary ways: first, by serving as an innovative tool for monetary policy management, and second, by shaping the investment choices of households and altering the likelihood of bank runs. In its capacity as a monetary policy tool, CBDC offers central banks a fresh instrument to fine–tune their monetary policies. By directly controlling the issuance and circulation of CBDC, central banks can exercise greater precision in managing money supply, interest rates, and overall economic stability. Bordo and Levin (2017) argue that the CBDC interest rate could serve as the main tool for conducting monetary policy. This newfound capability may enable central banks to achieve their monetary policy objectives more effectively and respond promptly to evolving economic conditions. Crucial to these mechanisms is the flexibility provided by CBDC in responding to macroeconomic shocks (Carapella & Flemming, 2020). These shocks encompass a wide range of unexpected events or developments that can significantly impact an economy. They can include sudden changes in inflation rates, fluctuations in economic growth, shifts in exchange rates, or unexpected financial crises. CBDC as policy instrument becomes especially effective in response to shocks to private money demand and private money creation (Barrdear & Kumhof, 2016). They are often challenging to predict and can have far–reaching consequences. CBDC's flexibility comes into play by providing central banks with a versatile tool to respond to such shocks. Unlike traditional forms of money, which may have limited adaptability, CBDC can be swiftly adjusted in terms of issuance, interest rates, and other parameters. This adaptability allows central banks to implement timely and targeted measures to stabilize the economy, counter the effects of macroeconomic shocks, and maintain overall economic stability.

However, research results regarding the macroeconomic impact of CBDC are not straightforward. On one hand, Ferrari, Mehl and Stracca (2020) find, using a two–country dynamic stochastic general equilibrium model, that the presence of a CBDC amplifies the international spillover of shocks. However, the way CBDCs are designed and implemented can be crucial in minimizing any negative consequences on the broader macroeconomic and financial landscape. In essence, CBDCs can enhance the interconnectedness of international economies, and careful planning and design can help manage the potential risks associated with this increased interconnectedness. Barrdear and Kumhof (2016) also use a dynamic stochastic general equilibrium model with sticky prices and adjustment costs to study the long–run and cyclical effects of CBDC for the macroeconomy. Assuming that CBDC is introduced in a way that is directly convertible

with government debt, research shows that this introduction can have several positive effects. It leads to a decrease in interest rates and reduces distortionary taxes, ultimately resulting in higher long–term GDP. Additionally, during economic fluctuations or business cycles, if CBDC issuance is adjusted in response to changing economic conditions, it can help mitigate the decline in GDP when faced with a sudden increase in liquidity demand, such as during a financial crisis. Fernandez–Villaverde, Sanches, Schilling and Uhlig (2022) highlight an important trade-off: in the event of a run on CBDCs, the central bank faces the consequence of impacting prices and, consequently, real consumption when it sells its assets to compensate depositors. To counteract runs, the central bank may raise the price level, effectively diminishing the real worth of withdrawals and preventing bank runs. This increase in the price level, however, comes at the cost of sacrificing inflation targeting.

In a traditional banking system, when there is a panic or suspicion of financial instability, depositors may rush to withdraw their funds from banks, potentially leading to a bank run. This can have detrimental effects on stability of the financial system. CBDCs, being digital instruments, can offer a unique advantage in this context. Since CBDC transactions are recorded electronically and in real–time, the central bank can have immediate visibility into the flow of funds. If a significant and sudden increase in CBDC withdrawals is detected, it could serve as an early warning signal that a bank run might be underway. This early detection can be crucial for central banks to take timely and appropriate measures to address the situation, such as providing liquidity support to banks, implementing monetary policy measures, or communicating with the public to restore confidence in the banking system. In essence, CBDCs have the potential to enhance the central bank's ability to monitor and respond to financial crises, ultimately contributing to greater financial stability.

The improvement of financial stability can occur due to the reduction in the significance of systemic important banks, often referred to as “too big to fail”. This reduces the negative externalities that the financial instability of banks has on society. In addition, by providing a genuinely risk–free alternative to bank deposits, a shift from bank deposits to digital cash reduces the need for government guarantees on deposits, eliminating a source of moral hazard from the financial system (Dyson & Hodgson, 2016). In practical terms, when individuals have the option to shift from traditional bank deposits to digital cash, they are less likely to rely on government guarantees to safeguard their savings. This shift reduces the burden on governments to provide deposit insurance and decreases the moral hazard associated with banks taking excessive risks, knowing that government guarantees will backstop their activities. Consequently, the financial system be-

comes more resilient and less prone to systemic instability, benefiting both the economy and society as a whole.

In addition to its direct impact on financial stability, CBDC also carries other risks that affect it indirectly. The introduction of CBDC into the financial landscape has ignited discussions not only about their potential benefits but also about the paramount importance of trust and privacy. Trust is a fundamental pillar of any financial system, and CBDCs are no exception. For CBDCs to thrive and fulfil their intended role, they must inspire trust among users, which encompasses not only trust in the issuing central bank but also trust in the digital infrastructure supporting these currencies. One of the core elements contributing to this trust is the privacy features of CBDCs. Users must feel confident that their financial transactions and personal information are safeguarded against unauthorized access and misuse. Privacy in CBDC transactions is not just about protecting individual users' data; it also plays a pivotal role in upholding financial stability. Collecting large amounts of data can provide deep insights into individuals' behaviour, beliefs, and habits. A lack of privacy can expose individuals and businesses to risks such as identity theft, fraud, and unwarranted surveillance. In this context, CBDCs must strike a delicate balance between providing privacy to users while ensuring that transactions remain transparent and compliant with regulatory requirements. Without adequate privacy protections, users may become reluctant to use CBDCs, fearing their financial activities may be exposed to third parties. This reluctance can hinder the adoption of CBDCs, potentially limiting their effectiveness as a tool for central banks to manage monetary policy and financial stability.

The introduction of CBDC can have a transformative role in society as a whole. By reducing manipulation and corruption, democratizing the financial system through decreased market concentration, and introducing a more efficient and secure payment system, CBDC makes the national currency more competitive globally. CBDC, being digital and traceable, can enhance transparency and accountability in financial transactions, making it more difficult for illicit activities to go unnoticed. This increased scrutiny and transparency can discourage fraudulent practices, thereby fostering a more reliable financial environment. Another transformative feature of CBDCs is their ability to democratize the financial system. Traditional financial systems generally have a high market core, with a small number of elites dominating the business. CBDCs, by providing digital and convenient funds, can open up financial services to a wider range of individuals and businesses. This increased inclusion can empower previously underserved populations, boost economic growth and reduce inequality.

CBDC has the potential to revolutionize the financial landscape, but they may fail to achieve their full potential if they do not implement and benefit from arguably the most revolutionary aspect brought by bitcoin and blockchain technologies: decentralization (Burchardi & Mikhalev, 2020). It refers to the absence of a central authority or intermediary controlling the currency, such as a central bank or a financial institution. Instead, transactions are verified and recorded on a distributed ledger, often referred to as a blockchain, by a decentralized network of participants. Guo, Kreitem, & Moser (2024) show that a CBDC issued on a fully public distributed ledger technology is the best way to achieve the full scope of functionality offered by decentralized technology, allowing for better interoperability, faster cross-border payments, and greater adaptability to an increasingly digitized global economy. Decentralization makes the network more robust and resistant to attacks. There is no single point of failure, making it extremely difficult for malicious actors to compromise the system. Transactions on a decentralized network are transparent and publicly recorded on the blockchain. This transparency builds trust among users as they can independently verify transactions without relying on a central authority. Decentralization gives users greater control over their funds and financial transactions. Users are not beholden to intermediaries and can transact directly with one another. Therefore, it is crucial for CBDCs to recognize that the true potential of digital currencies lies in decentralization. While central banks may still play a pivotal role in issuing and regulating CBDCs, embracing the principles of decentralization can enhance security, trust, and the overall effectiveness of these digital currencies. By doing so, CBDCs can not only keep pace with the rapidly evolving financial landscape but also address some of the limitations associated with centralized financial systems.

## Discussion

As of September 2023, according to the CBDC Tracker, there were only three launched CBDCs (Table 1) – Sand Dollar (The Bahamas), e–Naira (Nigeria) and JAM–DEX (Jamaica). The main motivation for these central banks in issuing CBDCs is to enhance financial inclusion, modernize the financial system, and improve payment efficiency. For developed countries, the most significant motivations are payment safety/robustness, financial stability, domestic and cross–border payment efficiency, and to a lesser extent, monetary policy implementation and financial inclusion (Boar, Holden and Wadsworth, 2020; Boar and Wehrli, 2021). On the other hand, financial inclusion is the crucial goal for emerging market economies and emerging countries like Nigeria (146$^{th}$ on the

list of countries by nominal GDP per capita) and Jamaica (100th on the same list) (World Bank, 2023).

**Table 1: Currently Issued Central Bank Digital Currencies (According to the CBDC Tracker)**

| Country | Digital Currency | Year | Main motivation | Availability | Number of Wallets Holders |
|---|---|---|---|---|---|
| The Bahamas | Sand Dollar | 2017 | modernisation of the financial system costs reduction; increase transactional efficiency; improve financial inclusion | $1.1M* | 107,755* |
| Nigeria | e–Naira | 2021 | efficiency in cross-border payments; financial inclusion; facilitate remittances | $3.3M** | 2,232,066** |
| Jamaica | JAM–DEX | 2023 | financial inclusion, improving management processes and costs; transition to a digital economy | --- | --- |

Source: Author, * (Central Bank of The Bahamas, 2023), ** (Central Bank of Nigeria, 2022)

The Central Bank of The Bahamas launched the first ever nationwide CBDC in the world in 2017 – the Sand Dollar. The primary objectives of the Sand Dollar digital currency were to modernize the nation's financial system, lower the costs associated with service delivery, enhance transaction efficiency, and promote financial inclusion. Tourism is a major driver of the Bahamian economy, contributing significantly to GDP and employment. Visitors to The Bahamas often need to make various payments during their stay, e.g. for accommodations, dining, and activities. The Sand Dollar can facilitate these transactions, making them more efficient and convenient for both tourists and local businesses. Many Bahamians work abroad and send remittances back home to support their families. The Sand Dollar provides a more cost–effective and faster way to receive these remittances, improving financial inclusion and reducing the reliance on expensive remittance services. As mentioned earlier, the Sand Dollar aims to promote financial inclusion by reaching underserved populations. It can be used by individuals who do not have access to traditional banking services, allowing them to save, transact, and participate in the formal financial system.

The Central Bank of Nigeria issued the second nationwide CBDC called the "e–Naira" with the aim to increase efficiency in cross-border payments, increase financial inclusion, facilitate remittances, and reduce informality. It differs from Bitcoin because the it features stringent access right controls by the central bank. Second, the e–Naira is not a financial asset in itself but a digital form of a national currency and draws its value from the physical naira, to which it is pegged at parity (Ree, 2021). The e–Naira wallet is a digital storage that holds the e–Naira, while e–Naira is a unit of account, a store of value and a medium of exchange (Central Bank of Nigeria, 2023).

The Jamaican Digital Exchange (JAM–DEX) is a digital currency exchange platform based in Jamaica. It facilitates the trading and exchange of digital assets, including cryptocurrencies like Bitcoin and the Jamaican CBDC. The JAM-DEX serves as a marketplace where users can buy, sell, and trade various digital currencies, offering Jamaican residents and businesses access to the emerging world of digital finance. It plays a significant role in enabling the adoption and use of digital currencies within Jamaica's financial ecosystem. The JAM–DEX CBDC was launched in 2023 with the aim of financial inclusion, reduction of costs, and commitment to Jamaica's transition to a digital economy.

Thus the aforesaid three CBDCs serve as substitutes for physical cash and aim to include in the financial system as much of the population as possible. Nigeria and Jamaica are emerging economies, where the availability of traditional banking products to the population is limited. Empowering financial inclusion should reduce the inequality, which positively impacts economic development. However, obstacles to the widespread use of CBDCs may include the unavailability of mobile or other electronic devices for storing digital wallets, underdeveloped infrastructure, or a lack of identification documents if the system relies on identification. CBDCs have a positive effect on financial inclusion: a proportion of consumers who do not have bank accounts could use it without incurring the cost of holding bank accounts (Panetta, 2018). In many cases, individuals without bank accounts may face various barriers to entry, such as account maintenance fees, minimum balance requirements, or lack of access to banking infrastructure. CBDCs can be more accessible and convenient for such individuals, allowing them to participate in the formal financial system, make payments, and access a broader range of financial services. With CBDCs, anyone with a smartphone can store and transfer value securely, reducing the financial exclusion gap. This increased financial inclusion can contribute to greater economic participation and empowerment for underserved populations. The data on the increase in the number of registered mobile money agent outlets speaks to the improvement of financial inclusion. These outlets typically serve as intermediaries for facilitating various financial transactions, such as deposits, withdrawals, and transfers, using mobile money platforms or services. In Nigeria, the number of these outlets increased nearly 3.8 times in 2021 when e–Naira was introduced, rising from 129,154 to 620,178 and further increasing by 1.4 times in 2022, to 1.47 million (IMF, 2023).

Therefore, based on the examples of these three countries, we can conclude that CBDCs have a positive impact on financial inclusion, fostering digital transformation of the economy. However, these countries may not serve as a perfect model for assessing the potential effects of CBDC introduction in developed na-

tions. Firstly, there is a difference in the primary goal of introducing the digital currency itself – financial inclusion vs. payment system efficiency, especially in cross-border transactions. In both types of countries, the effectiveness of CBDC implementation will depend on trust and the integrity of the central bank. If a transparent central bank introduces a digital currency, providing a high level of transaction security with anonymity and decentralization, along with clear protective measures (such as conversion limitations or other constraints) and the potential for lending to commercial banks, financial stability may not be compromised. On the contrary, an increase in interest rates can lead to an expansion of the deposit base, subsequently boosting credit activity.

## Concluding Remarks

Central Bank Digital Currencies (CBDCs) represent a pivotal development in the evolution of monetary systems, holding the potential to enhance financial stability across various dimensions. The transformational impact of CBDCs on the banking landscape, be it through direct customer distribution or intermediation via commercial banks, underscores the need for thoughtful design and consideration of their distribution method. Careful planning can mitigate risks associated with deposit outflows, ensuring financial stability.

CBDCs offer an effective tool for monitoring and responding to financial crises, with real-time transaction tracking capabilities that provide early warning signals of bank runs. This enhanced visibility empowers central banks to take timely measures to restore confidence in the banking system.

The introduction of CBDCs has broader implications for monetary policy, enabling central banks to fine-tune their approaches, particularly in responding to macroeconomic shocks. However, the macroeconomic impact of CBDCs is complex and requires a nuanced understanding of their design and implementation.

Trust and privacy concerns are critical considerations for CBDCs. Striking the right balance between transparency and individual privacy is essential to inspire trust and encourage adoption. Transparency of CBDC transactions can discourage illicit activities, fostering a more reliable financial environment. Additionally, CBDCs have a potential to democratize financial systems, reduce market concentration, and enhance financial inclusion.

Nevertheless, for CBDCs to unlock their full potential, embracing decentralization is paramount. Decentralization can enhance security, transparency, and

user control, making CBDCs more robust and resilient. Central banks should recognize this revolutionary aspect of blockchain technology and leverage it to ensure the success of CBDCs in an increasingly digitalized world. Ultimately, CBDCs have the capacity to contribute positively to financial stability, provided that they are designed and implemented with a strategic and forward-looking perspective.

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