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RESEARCH ARTICLE / ARAŞTIRMA MAKALESİ

Feasibility of adopting a Central Bank Digital Currency (CBDC) as a country's primary currency

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Abstract

The emergence of Central Bank Digital Currencies (CBDCs) has provoked significant interest among policymakers, economists, and financial institutions worldwide. As digital transformation reshapes the global economy, CBDCs offer a potential pathway for central banks to modernize monetary systems, enhance financial inclusion, and improve payment efficiency. This article explores the feasibility of CBDCs becoming the primary form of money in a country, examining their potential benefits, challenges, and implications for financial stability, monetary policy, and economic sovereignty. Drawing on empirical research, including stability metrics such as Z-scores, the findings suggest that CBDCs can coexist with existing financial systems without causing significant disruption. However, their successful implementation requires robust technological infrastructure, adaptive regulatory frameworks, and widespread public trust. The discussion highlights opportunities for CBDCs to enhance financial inclusion, streamline cross-border payments, and provide central banks with innovative policy tools. At the same time, challenges such as cybersecurity risks, potential disintermediation of commercial banks, and privacy concerns must be carefully addressed. Policymakers must adopt tailored strategies to balance innovation with stability, ensuring that CBDCs serve as a secure, efficient, and inclusive monetary tool. This article concludes with recommendations for phased implementation, public-private collaboration, and global coordination to maximize the benefits of CBDCs while minimizing risks. By addressing these critical factors, CBDCs have the potential to revolutionize the financial landscape, offering a modern alternative to traditional cash and commercial bank deposits while supporting long-term economic resilience and growth.

Keywords: CBDCs, Z-Score, Bank Stability, Financial Stability, Primary Money

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1. INTRODUCTION

The global financial system is undergoing a digital revolution, with Central Bank Digital Currencies (CBDCs) emerging as a potential replacement for traditional cash and commercial bank deposits. CBDCs, as government-backed digital currencies, promise to combine the security of cash with the efficiency of digital payments. They offer opportunities to enhance financial inclusion, modernize payment systems, and provide central banks with innovative monetary policy tools. However, the transition to CBDCs as the primary form of money raises critical questions about financial stability, economic sovereignty, and public trust.

This article explores the feasibility of CBDCs becoming the dominant medium of exchange in a country. Drawing on empirical research, including stability metrics like Z-scores, the analysis reveals that CBDCs can coexist with existing financial systems without causing significant disruption. However, their success depends on robust technological infrastructure, adaptive regulatory frameworks, and widespread public acceptance. Challenges such as cybersecurity risks, potential disintermediation of commercial banks, and privacy concerns must also be addressed.

By examining case studies from countries like China, Sweden, and Nigeria, this article highlights the opportunities and risks of CBDC adoption. It concludes with recommendations for policymakers to ensure that CBDCs enhance the financial ecosystem while maintaining stability and inclusivity. As the world moves toward a digital economy, CBDCs represent a transformative tool for reshaping the future of money.

2. LITERATURE REVIEW

2.1. Central Bank Digital Currency Adoption

Scholars have deeply examined the progress of CBDC development and adoption, emphasizing on the varying motivations and challenges faced by central banks worldwide. Barontini and Holden (2019) conducted a global survey on CBDC adoption, revealing that most central banks are still in the early stages of conceptualizing CBDCs. Their findings indicate that while many central banks are exploring the potential of digital currencies, few have moved beyond the research phase. Auer et al. (2020) further elaborated on this trend, noting that countries with strong innovative capacities, such as advanced economies with robust technological infrastructures, are more inclined to explore CBDCs. In contrast, retail CBDCs those designed for use by the general public have gained traction in countries with large informal economies, where digital currencies can address gaps in financial inclusion and payment efficiency. nBoar et al. (2020) observed that emerging market economies show a higher motivation to develop CBDCs compared to advanced economies. This is often driven by the need to modernize payment systems, enhance financial inclusion, and reduce reliance on cash. For instance, countries like Nigeria and the Bahamas have launched CBDCs to provide their populations with secure and accessible digital payment options. However, despite the growing interest, many central banks remain cautious, with some having no immediate plans to issue CBDCs. The COVID-19 pandemic, however, has acted as a catalyst, encouraging several central banks to reconsider their stance. The pandemic highlighted the limitations of cash-based systems and accelerated the change toward digital payments, pushing central banks to explore CBDCs as a great alternative. Nevertheless, the development and adoption of CBDCs are not without challenges. Nabilou (2020) pointed out that legal constraints, such as the lack of clear regulatory frameworks and concerns over monetary sovereignty, pose significant issues. Additionally, the design and implementation of CBDCs require careful consideration of technological, economic, and social factors. For example, central banks must address issues related to cybersecurity, data privacy, and interoperability with existing payment systems. These challenges underscore the complexity of CBDC development and the need for a balanced approach that prioritizes innovation while ensuring stability and inclusivity. In summary, the literature on CBDC development highlights a growing interest

among central banks, particularly in emerging markets, to explore digital currencies as a means of modernizing financial systems. While the COVID-19 pandemic has accelerated this trend, challenges such as legal constraints and technological complexities remain significant barriers. As central banks continue to navigate these challenges, the adoption of CBDCs is likely to evolve, shaping the future of money and payments in the digital age.

2.2. CBCD, Monetary Policy and Financial Stability

The potential impact of CBDCs on monetary policy and its transmission mechanisms has been a focal point of scholarly debate. Mancini-Griffoli et al. (2018) argue that CBDCs may not significantly change existing monetary policy transmission channels, as central banks can integrate digital currencies into conventional frameworks without disrupting the flow of credit or interest rate adjustments. They emphasize that CBDCs could function as a complementary tool, preserving the role of commercial banks as intermediaries. However, Meaning et al. (2018) counter this view, suggesting that CBDCs could improve monetary policy transmission by enabling central banks to implement measures more directly. For instance, CBDCs could facilitate the distribution of stimulus payments or negative interest rates with greater precision, bypassing delays caused by traditional banking systems. Bordo (2021) supports this perspective, noting that CBDCs could enhance monetary policy efficiency by improving the speed and transparency of transactions. Meanwhile, Lee et al. (2021) take a forward-looking stance, proposing that CBDCs could become central to monetary policy in fully digital economies. They highlight the potential for programmable features, such as expiration dates on digital currency to stimulate spending during recessions or automated tax collection. These diverging views underscore the need for adaptable frameworks that allow CBDCs to evolve alongside emerging economic needs.

The relationship between CBDCs and financial stability has generated considerable discussion, particularly regarding their impact on banking systems. Kumhof and Noone (2021) warn that widespread CBDC adoption could destabilize banks by encouraging a shift of deposits from commercial banks to central bank accounts. This disintermediation might reduce banks' liquidity, reducing their ability to lend and potentially leading to credit shortages. Juks (2018) and Mancini-Griffoli et al. (2018) further caution that non-interest-bearing CBDCs designed primarily for transactions could exacerbate financial instability during crises. For example, in times of economic uncertainty, households and businesses might rapidly convert bank deposits into CBDCs, triggering bank runs or liquidity crunches. Conversely, Chiu et al. (2019) and Andolfatto (2020) identify potential benefits for financial stability. They argue that CBDCs could nurture competition in the banking sector, incentivizing commercial banks to innovate and improve services to retain customers. Additionally, CBDCs could enhance financial inclusion by providing underserved populations with access to secure digital payment systems, thereby stabilizing informal economies and reducing systemic risks associated with cash dependency. These contrasting perspectives highlight the dual nature of CBDCs as both a risk and an opportunity for financial stability, necessitating careful design to balance innovation with safeguards against unintended consequences.

2.3. Other Studies

Beyond monetary policy and financial stability, scholars have explored additional societal and economic impacts of CBDCs. Williamson (2022b) argues that CBDCs could enhance overall welfare by introducing competition to private payment systems, which are often dominated by a handful of large firms. By offering a public, low-cost alternative, CBDCs could pressure private providers to innovate, reduce fees, and improve service quality, ultimately benefiting consumers. For example, in regions where private payment platforms charge high transaction fees or exclude marginalized populations, CBDCs could level the playing field and expand access to affordable financial services.

Williamson (2022b) also highlights the potential

for CBDCs to reallocate safe assets within the financial system. Traditionally, commercial bank deposits have been perceived as low-risk holdings, but CBDCs as direct liabilities of central banks could become the ultimate safe asset. This shift might encourage households and businesses to hold more CBDCs, reducing their reliance on commercial bank deposits. While this could weaken banks' deposit base, Williamson suggests it might also incentivize banks to focus on higher-value services, such as lending to productive sectors or developing innovative financial products, thereby fostering a more dynamic and resilient financial ecosystem. Other studies echo these themes, emphasizing CBDCs' broader societal implications. For instance, research by Fernández-Villaverde et al. (2021) finds that CBDCs could reshape the competitive landscape of financial intermediation, compelling banks to adapt their business models to retain customers. Additionally, by providing a transparent and traceable payment infrastructure, CBDCs could help combat illicit activities such as money laundering or tax evasion, indirectly improving public trust in financial systems (Schilling et al., 2020). However, these benefits must be weighed against risks such as reduced privacy and the concentration of financial power in central banks.

In summary, the literature on CBDCs' «other influences» underscores their potential to drive competition, reallocate financial resources, and address systemic inefficiencies. While these effects could improve economic welfare, they also necessitate careful design to avoid unintended consequences, such as private sector innovation or exacerbating inequalities. Policymakers must consider these multifaceted impacts to ensure CBDCs contribute positively to the broader economic and social fabric.

3. THE STUDY

3.1. Aim of the Study

This article aims to evaluate the feasibility of Central Bank Digital Currencies (CBDCs) serving as the primary form of money in a country. It seeks to analyze their impact on financial stability, monetary policy effectiveness, and economic inclusivity, while addressing challenges such as cybersecurity risks, banking sector disintermediation, and public trust.

3.2. Research Questions

This research will provide answers to :

RQ1 What is the impact of CBDC on bank stability ?

RQ2 Can a CBDC as be used as primary money ?

3.3. Population and Sample

The key independent variable in this study, CBDC Adoption, is derived from the CBDC Tracker, a comprehensive database that monitors the progress of digital currency initiatives globally. This resource provides up-to-date information on the status of CBDC projects, enabling accurate tracking of adoption trends. Financial stability is assessed using Z-scores, obtained from the World Development Indicators (WDI) database, covering the period from 2010 to 2021. The start year, 2010, was chosen to exclude the immediate aftermath of the 2008-2009 Global Financial Crisis and to align with the increasing prominence of cryptocurrencies, particularly Bitcoin. The endpoint, 2021, ensures that the most recent and reliable macroeconomic and banking data are included in the analysis.

To maintain consistency and comparability, the study excludes investment and private banks due to their distinct balance sheet structures and revenue models, which could introduce inconsistencies in the analysis (Davis et al., 2022). The final dataset consists of 225 countries that are recorded in both the CBDC Tracker and the World Development Indicators database, ensuring a broad and representative sample for assessing the relationship between CBDC adoption and financial stability.

To be more precise, the choice of focus was the 21 countries which are either in pilot phase or have fully launched . It makes sense to focus on those countries and their banks since they will provide more understanding on the impact of CBCDs. 17 of those countries are in Pilot stage and 4 of them have fully launched a crypto. As a note, some countries like France, UAE or China are working

on multiple forms of CBDCs.

3.4. Method of Analysis

Banks play a crucial role in regulating monetary policies, making them an essential focus for assessing financial stability. While various methodologies exist to evaluate bank soundness, this study employs the Z-score, a widely recognized and straightforward metric for determining a bank's financial health. The Z-score is calculated by combining a bank's return on assets (ROA) with its capital-to-total-assets ratio and then standardizing the result using the volatility of the ROA. This approach helps measure the likelihood of a bank's insolvency, offering valuable insights into overall financial stability.

Specifically, for a bank i in country j during year t, the Z-score is computed as follows:

$$ZScore_{ijt} = (Return\ of\ Assets_{ijt} + Capitalization_{ijt}) / stdROA_{ijt}$$

A higher Z-score signals greater financial stability, implying that a bank is at a lower risk of failure, whereas a lower Z-score indicates increased vulnerability to financial distress (Houston et al., 2010; Laeven & Levine, 2009; Lambert et al., 2017). Since Z-scores often exhibit high skewness, researchers frequently apply the natural logarithm of the Z-score to achieve a more normalized and precise measure of bank stability. This approach has been widely endorsed in financial studies, including those by Goetz (2018) and Bilgin et al. (2021), to enhance the accuracy and comparability of stability assessments across different banking institutions.

3.5. Limitations of Research

This study has several limitations that warrant consideration. First, the analysis relies heavily on early-stage CBDC pilot data, which may not fully capture long-term systemic impacts or unintended consequences of large-scale adoption. Second, the focus on countries with advanced digital infrastructures (e.g., China, Sweden) limits the generalizability of findings to nations with weaker technological frameworks or less stable financial systems. Third, while Z-scores provide insights into banking stability, they do not account for behavioral factors, such as public sentiment or shifts in consumer preferences, which could influence CBDC adoption. Finally, the rapid evolution of CBDC policies and technologies means that some conclusions may become outdated as new developments emerge. These limitations highlight the need for ongoing research to refine CBDC frameworks in diverse economic contexts.

4. FINDINGS

4.1. Impact of CBDC on Bank Stability

The following table resumes the impact of CBDC on bank stability with Z-score as the standard:

Table 1. Z-score Variation

CBDC	Country	Status of the CBCDs	Year of Announcement/ Launch	Average Z Score before announcement	Average Z score after announcement	Variation
Digital Tenge	Kazakshtan	Pilot	2020	1.066345	1.082037	+1%
Digital Rupee	India	Pilot	2020	2.83073659	2.967234029	+5%
e CNY/ mBridge	China	Pilot	2014	2.976903	3.162178	6%
Digital Lira	Turkey	Pilot	2018	2.411001634	2.181172503	-10%
Digital Ruble	Russia	Pilot	2019	1.928628957	1.928994599	+0.02%
mBridge/Aber	UAE	Pilot	2019	3.239687512	3.100677253	-4%
mBridge	Thailand	Pilot	2020	2.029731157	2.0648137	+2%
mBridge	Hong Kong	Pilot	2022	2.930094571	N/A	N/A
Helvetia	Switzerland	Pilot	2020	2.73995676	2.730375787	-0.35%
E-Cedi	Ghana	Pilot	2018	2.57793715	2.643895606	+3%
Digital Won	South Korea	Pilot	2020	2.442203626	2.32172769	-5%
French Wholesale CBCD/ Project Prosperus	France	Pilot	2021	2.905713768	2.994605139	+3%
Hungary CBCD	Hungary	Pilot	2020	2.083454	1.956462	-6%
Project Ubin+	Singapore	Pilot	2022	3.444460634	N/A	N/A
Project Prosperus	Tunisia	Pilot	2021	3.451244	3.655361	+6%
Aber	Saudi Arabia	Pilot	2019	3.059008	3.139648	+3%
e-Peso	Uruguay	Pilot	2014	1.806573498	1.920887	+6%
JAM-DEX	Jamaica	Launched	2023	N/A	N/A	N/A
e-Naira	Nigeria	Launched	2020	2.778208589	2.500839	-9.98%
ZiG	Zimbabwe	Launched	2020	1.714969	2.090009	+21.87%
Sand Dollar	Bahamas	Launched	2017	2.805831	2.71206	-3.34%

The dataset includes information on 21 CBCDs with the following structure:

Categories:

- Status: Mostly pilot programs, with a few launched CBCDs.
- Year of Announcement/Launch: Ranges from 2014 to 2023.
- Variation (%): Indicates the change in average Z-scores post-announcement.
- Summary Statistics:

Average Z Score Before: Mean = 2.56, ranging from 1.07 to 3.45.

Average Z Score After: Mean = 2.51, ranging from 1.08 to 3.66.

Variations range from -10% (Digital Lira) to +21.87% (ZiG).

- Missing Data : some CBCDs lack post-announcement Z-scores or percentage variations (e.g., mBridge in Hong Kong and Project Ubin in Singapore).

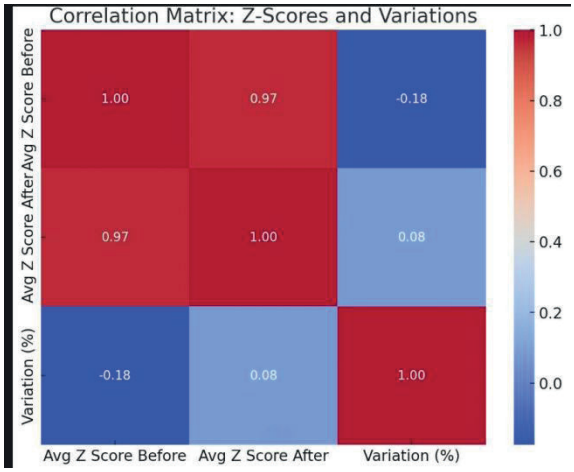

Figure 1. Correlation Matrix

The correlation coefficient quantifies the strength and direction of the relationship between two variables.The high correlation (0.97) between Avg Z Score Before and Avg Z Score After indicates that bank stability remained largely unchanged following the introduction of CBDCs. This suggests that the fundamental mechanisms of monetary policy, such as interest rate adjustments and liquidity management, continued to function effectively. In other words, central banks retained their ability to regulate the economy using traditional tools, and financial stability did not experience significant shifts due to CBDC adoption. Conversely, the weak correlations for Variation (%) (0.18 and 0.08) suggest that the introduction of CBDCs did not cause notable fluctuations in bank performance. The limited percentage changes in Z-scores indicate that CBDCs did not significantly alter financial risk factors or disrupt the stability of banks. This reinforces the idea that central banks can continue using conventional monetary policy tools, such as controlling money supply and managing inflation, without major concerns about instability arising from CBDCs. Overall, the findings highlight that CBDCs, in their current form, have not fundamentally reshaped the banking system or central banking operations. Banks that were financially stable before the introduction of CBDCs maintained their stability afterward, while those with weaker positions saw no dramatic improvements or declines. This consistency suggests that CBDCs do not introduce volatility into financial markets, allowing central banks to experiment with digital currencies without fearing large-scale disruptions. However, it also implies that CBDCs may not yet be transformative enough to significantly alter the financial landscape or improve the efficiency of monetary policy beyond existing frameworks.

4.2. Can a CBDC Become the Primary Money of a Country?

The possibility of a Central Bank Digital Currency (CBDC) replacing traditional cash and commercial bank deposits as the primary form of money in a country is both promising and complex. CBDCs, as government-backed digital currencies, offer several advantages that align with the needs of modern economies, such as faster transactions, lower costs, and broader financial inclusion. However, their success as the dominant medium of exchange depends on addressing technical, social, and regulatory challenges while ensuring they complement rather than destabilize existing financial systems.

For CBDCs to become the primary money,

widespread accessibility is fundamental. This requires robust digital infrastructure, including reliable internet connectivity and affordable devices, to ensure all citizens especially those in rural or underserved areas can use CBDCs effectively. Without universal access, CBDCs risk deepening existing inequalities, leaving behind populations reliant on cash or lacking digital literacy. Countries like Sweden and China, where digital payment systems are already prevalent, may transition more smoothly, whereas nations with fragmented infrastructure face significant hurdles. Public trust is equally critical. Trust in central banks and the security of CBDCs is essential for adoption. In regions with histories of hyperinflation, banking crises, or government overreach, skepticism toward centralized digital currencies may slow acceptance. Transparent communication about data privacy protections, safeguards against cyberattacks, and clear rules limiting government surveillance can help build confidence. From a regulatory perspective, CBDCs must strike a balance between innovation and control. Regulations need to prevent illicit activities like money laundering without stifling financial innovation or infringing on user privacy. For instance, tiered systems where small transactions remain anonymous but larger ones require verification could address privacy concerns while ensuring compliance. Additionally, central banks must collaborate with commercial banks to mitigate risks of disintermediation. If too many individuals and businesses shift deposits to CBDC accounts, commercial banks could lose liquidity, reducing their ability to lend and support economic growth. Solutions like limiting CBDC holdings or offering interest on bank deposits could help maintain a stable banking sector. CBDCs also present unique opportunities. They can enhance financial inclusion by providing unbanked populations with direct access to digital wallets, bypassing traditional banking barriers. In Ghana, for example, the e-Cedi pilot enabled farmers and small businesses to engage in digital transactions, fostering economic participation. CBDCs could also streamline cross-border payments, reducing reliance on costly intermediaries and strengthening global trade. Furthermore, programmable features such as expiration dates on stimulus funds or automatic tax deductions could revolutionize fiscal policy, enabling more precise and timely economic interventions. But, significant risks remain. Cybersecurity threats are a major concern, as centralized digital systems are attractive targets for hackers. A successful attack could undermine trust and destabilize the economy. Central banks must invest in advanced encryption, real-time monitoring, and contingency plans to address breaches. Privacy is another challenge: while traceable transactions deter fraud, excessive transparency may deter users wary of government oversight. Striking the right balance between transparency and anonymity will be crucial. The feasibility of CBDCs as primary money also varies by economic context. Advanced economies with strong institutions and digital readiness are better positioned to adopt CBDCs, while developing nations may struggle with implementation costs or political instability. Global coordination is equally important, as inconsistent standards for cross-border CBDCs could create friction in international trade. Collaborative efforts, like the Bank for International Settlements' (BIS) multi-CBDC platforms, aim to harmonize frameworks and ensure interoperability. CBDCs really have the potential to become the primary money in a country, but their success hinges on inclusive design, adaptive regulation, and proactive risk management. Policymakers must prioritize public engagement, invest in digital infrastructure, and foster partnerships between central banks, commercial institutions, and tech providers. By addressing these challenges thoughtfully, CBDCs could redefine monetary systems, offering a secure, efficient, and equitable alternative to cash in an increasingly digital world. However, the transition will be gradual, requiring continuous evaluation and adaptation to ensure CBDCs enhance rather than disrupt economic stability and societal well-being.

5. CONCLUSION AND DISCUSSION

The exploration of Central Bank Digital Currencies (CBDCs) as the primary form of money reveals a nuanced landscape of opportunities and challenges. The empirical analysis, leveraging Z-scores to assess bank stability, demonstrates that CBDC adoption has not fundamentally disrupted existing financial systems. On average, bank stability metrics remained consistent pre- and post-CBDC implementation, with variations ranging from -10% to +21.87% across countries. This suggests that CBDCs, in their current pilot stages, neither significantly destabilize nor dramatically enhance financial resilience. However, the mixed outcomes exemplified by Ghana's e-Cedi improving inclusion and Nigeria's e-Naira correlating with a decline in Z-scores highlight the importance of contextual factors such as technological readiness, regulatory frameworks, and public trust.

CBDCs hold transformative potential to modernize monetary systems by enhancing financial inclusion, streamlining cross-border payments, and enabling innovative policy tools like programmable money. Countries with advanced digital infrastructures, such as China and Sweden, are better positioned to integrate CBDCs seamlessly, while nations with fragmented systems face hurdles in accessibility and equity. Nevertheless, the risks of disintermediation, cybersecurity threats, and privacy erosion necessitate careful design. For instance, tiered anonymity systems and caps on CBDC holdings could mitigate liquidity risks for commercial banks while safeguarding user privacy.

The study's findings align with existing literature, which underscores CBDCs' dual role as both a stabilizing force and a potential disruptor. While scholars like Bordo (2021) emphasize CBDCs' efficiency gains, others like Kumhof and Noone (2021) caution against destabilizing bank liquidity. The weak correlation between CBDC adoption and Z-score variations supports the view that central banks retain conventional policy efficacy, but it also implies that CBDCs have yet to unlock their full transformative potential. Key limitations, such as reliance on pilot-phase data and exclusion of behavioral factors, call for studies across diverse economic contexts. Future research should address the long-term systemic impacts of CBDCs, particularly in developing economies, and explore mechanisms to harmonize global standards for cross-border interoperability. Policymakers must prioritize inclusive digital infrastructure, public-private collaboration, and adaptive regulations to balance innovation with stability.

In conclusion, CBDCs represent a viable pathway toward modernizing monetary systems, but their success as primary money depends on addressing technical, social, and regulatory complexities. A phased, context-sensitive approach coupled with global coordination will be critical to realizing CBDCs' promise of a secure, efficient, and inclusive financial future.

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