

TRANSFORMATIVE IMPACTS OF CENTRAL BANK DIGITAL CURRENCIES: RETHINKING MONETARY POLICY TRANSMISSION AND GLOBAL FINANCIAL STABILITY

<https://doi.org/10.5281/zenodo.17204626>

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Introduction

The global financial landscape undergoes continuous transformation, driven by technological advancements and evolving societal needs. A prominent development in this evolution is the emergence of central bank digital currencies (CBDCs). These digital representations of sovereign currency, issued by central banks, are gaining considerable attention from monetary authorities worldwide [56371582]. The motivation for their exploration stems from diverse factors, including the desire to enhance payment system efficiency, address declining cash usage, counter the rise of private cryptocurrencies, and foster greater financial inclusion [30804880] [36278443]. As central banks progress from conceptualization to piloting and, in some cases, implementation, understanding the profound implications of large-scale CBDC adoption becomes imperative for policymakers and financial stakeholders [30804880].

Context and Rationale for Central Bank Digital Currencies

Central banks globally are evaluating CBDCs for several strategic reasons. Firstly, they offer a potential pathway to modernize payment systems, providing a secure, efficient, and potentially lower-cost alternative to existing methods [57278902] [302407149]. This efficiency is particularly relevant for cross-border transactions, which often suffer from high costs, slow speeds, and limited transparency within existing archaic infrastructures [30804880]. Secondly, CBDCs can serve as a sovereign response to the growth of private digital assets, such as stablecoins and cryptocurrencies, ensuring that the central bank retains control over monetary sovereignty and financial stability [57278902]. Thirdly, for many developing economies, CBDCs are viewed as a tool to expand financial inclusion, providing access to digital financial services for unbanked and underbanked populations by reducing transaction costs and increasing accessibility [30956836] [104113710] [302407149]. Countries like Kazakhstan exemplify this objective with their "Digital Tenge" initiative [30956836]. Moreover, the declining use of physical cash in many regions necessitates a digital equivalent issued by the central bank to maintain a public option for central bank money [36278443].

Research Objectives and Structure of the Paper

This inquiry scrutinizes the potential ramifications of widespread CBDC adoption on monetary policy transmission mechanisms and global financial stability. Specifically, this work aims to dissect how CBDCs might alter the effectiveness of conventional and unconventional monetary policy tools, reshape financial intermediation, and induce cross-border spillovers that influence the

international monetary order. The subsequent sections unfold as follows: The Methodology section details the analytical approach. The Thematic Literature Review synthesizes existing scholarship on CBDC design, monetary transmission, financial intermediation, and global stability. The Analysis and Discussion section critically examines the identified opportunities and challenges across these dimensions. Finally, the Conclusion summarizes the principal insights and outlines policy considerations and avenues for further investigation.

Methodology

Analytical Framework and Sources

The research employs a comprehensive analytical framework drawing from established economic theories in monetary policy, banking, and international finance. This framework integrates insights from New Keynesian models, theories of financial intermediation, and principles of international economics to assess the multifaceted effects of CBDC implementation. The primary data sources include peer-reviewed academic articles, working papers from central banks and international financial institutions, and policy reports. These sources encompass both theoretical models and empirical observations from countries piloting or implementing CBDCs. The selection prioritizes recent publications to capture the evolving understanding of CBDC dynamics, given the nascent stage of their development.

Thematic Synthesis Approach

A thematic synthesis approach was utilized to systematically review and integrate findings from the selected literature. This involved several stages: initial screening of abstracts and full texts for relevance to monetary policy transmission, financial intermediation, and global financial stability; extraction of key arguments, findings, and policy implications; and subsequent categorization into overarching themes. This iterative process allowed for the identification of recurring patterns, divergent perspectives, and critical gaps in the current discourse. The synthesis prioritized studies that offer robust theoretical underpinnings or present empirical evidence from ongoing CBDC initiatives, ensuring a balanced and rigorous analysis of the subject matter.

Thematic Literature Review

Conceptual Foundations and Design Architectures of CBDCs

CBDCs represent a digital form of central bank money accessible to the general public or wholesale institutions [56371582]. Conceptually, they differ from commercial bank deposits, which are liabilities of private banks, and from cryptocurrencies, which are typically decentralized and not backed by a sovereign entity. Various design architectures exist for CBDCs, generally categorized as retail (general purpose) or wholesale. Retail CBDCs are intended for broad public use, while wholesale CBDCs are restricted to financial institutions for interbank settlements [57278902]. Design choices, such as whether a CBDC is account-based or token-based, offers interest, and its level of anonymity, carry significant implications for its impact [13888663]. For example, an interest-bearing CBDC can directly influence deposit rates in commercial banks [13888663] [85109679].

Countries like Ghana and Nigeria have adopted distinct, yet similar, design frameworks, emphasizing financial inclusion within their specific contexts [189249821]. The underlying technology often involves distributed ledger technology (DLT), though not exclusively [56371582].

CBDCs and the Monetary Policy Transmission Mechanism

The introduction of CBDCs can fundamentally alter the channels through which monetary policy operates. An interest-bearing CBDC could become a new policy instrument, directly affecting interest rates across the financial system [85109679] [109388385]. This direct influence could strengthen the central bank's control over short-term interest rates and enhance the effectiveness of monetary policy [57278902]. Conversely, if a CBDC is non-interest-bearing or less attractive than bank deposits, its impact on the monetary transmission might be more limited. The elasticity of demand for CBDC relative to bank deposits determines the extent of its influence on banks' funding costs and, consequently, their lending rates [85109679]. The ability of agents to shift funds between commercial banks and CBDC can create a more direct link between central bank policy rates and retail interest rates, potentially bypassing traditional banking intermediation [57278902].

CBDCs, Financial Intermediation, and Disintermediation Dynamics

One of the most widely debated implications of CBDCs relates to their potential for financial disintermediation. A widely adopted CBDC, especially an interest-bearing one, could attract deposits away from commercial banks, reducing their funding base [13888663] [36278443] [157890234]. This "deposit migration" could constrain banks' ability to provide credit, affecting economic growth [13888663]. The extent of disintermediation depends on factors such as the CBDC's design, interest rate, and perceived safety compared to bank deposits [57278902] [109388385]. During periods of financial stress, a CBDC could exacerbate bank runs by providing a safe haven for funds, potentially increasing financial instability [57278902]. Conversely, some argue that CBDCs could promote a more efficient allocation of capital by shifting safe assets from the private banking sector to a narrow banking facility, thus utilizing aggregate collateral more efficiently [109388385]. Policymakers grapple with balancing the benefits of a CBDC with the need to preserve the stability and functionality of the commercial banking system [157890234].

CBDCs in the Context of Global Financial Stability and Policy Spillovers

CBDCs extend their influence beyond domestic monetary policy and banking to encompass global financial stability. The introduction of CBDCs, particularly by major economies, could induce cross-border spillovers. A foreign CBDC, if widely adopted by residents in a small open economy, could lead to a structural reduction in economic activity, especially if it closely resembles domestic deposits [56788973]. This scenario raises concerns about currency substitution, capital flow volatility, and potential challenges to the reserve currency status of existing fiat currencies [157890234]. Managing such outflows might necessitate capital flow management measures or macroprudential policy adjustments [56788973]. Furthermore, the increased presence of non-bank financial institutions (NBFIs) in cross-border

finance, alongside CBDCs, could amplify spillovers through currency and liquidity mismatches [18877663]. The potential for enhanced cross-border settlements through CBDCs could overcome long-standing hurdles of speed and cost, but also demands careful international coordination to mitigate risks of financial contagion and ensure resilience [30804880].

Analysis and Discussion

Monetary Policy Transmission: Opportunities and Challenges in a CBDC-Driven System

The advent of CBDCs presents both significant opportunities for refining monetary policy transmission and complex challenges requiring careful navigation. A well-designed CBDC can enhance the central bank's influence over the economy, yet improper implementation risks unintended consequences.

Direct Transmission Channels and Interest Rate Mechanisms

CBDCs, particularly those that are interest-bearing, could establish a direct and powerful channel for monetary policy transmission. By setting an interest rate on the CBDC, central banks could directly influence the cost of money for households and firms, bypassing the commercial banking system to some extent [85109679]. This direct linkage could improve the speed and precision of policy impulses, especially in economies where traditional bank-based transmission is impaired. Modeling suggests that a CBDC rate cut not only affects the CBDC's own rate but also induces adjustments in commercial banks' deposit spreads, amplifying the aggregate effects of the policy [85109679]. This mechanism could prove particularly effective in situations requiring rapid economic stimulus or contraction. However, the extent of this amplification depends on the competitive structure of the deposit market; less competitive markets might weaken the intended effects on the banking sector [85109679]. The ability of the central bank to remunerate CBDC holdings offers a novel tool for managing aggregate demand and inflation, providing granular control over liquidity across the financial system.

Implications for Unconventional Monetary Policy Tools

CBDCs extend the toolkit for unconventional monetary policy. In environments with a zero lower bound on nominal interest rates, an interest-bearing CBDC with a negative rate could allow central banks to implement deeply negative rates, potentially increasing the efficacy of such policies [57278902]. This direct pass-through mechanism could stimulate spending and investment more effectively than traditional methods during severe downturns. Moreover, CBDCs facilitate targeted interventions, allowing for direct transfers to specific segments of the population, thereby enhancing the precision of fiscal-monetary coordination in crisis times. This capability could be instrumental in addressing specific economic challenges, such as promoting financial inclusion or delivering emergency aid [302407149]. The direct accessibility of central bank money to the public also offers a fallback option in scenarios where commercial banking systems face severe disruptions, thereby bolstering financial stability.

Financial Disintermediation, Banking Sector Evolution, and Systemic Risk

The potential for CBDCs to alter the landscape of financial intermediation is a central concern. The scale of this impact depends critically on the design and adoption rate of the CBDC.

Deposit Shifts, Bank Funding, and Credit Provision

A significant risk associated with CBDCs is the potential for substantial deposit shifts from commercial banks to the central bank. If a CBDC is perceived as a safer or more attractive alternative to bank deposits, particularly an interest-bearing one, it could reduce banks' stable funding sources [13888663] [36278443] [157890234]. Such a shift would necessitate banks relying more on wholesale funding or central bank liquidity facilities, potentially increasing their funding costs and exposure to market volatility. A reduction in readily available retail deposits could constrain banks' capacity for lending, impacting credit availability for businesses and households [13888663]. This scenario could lead to a contraction in credit, negatively affecting economic activity [13888663]. The equilibrium between maintaining a robust commercial banking sector and introducing a public digital currency requires careful balancing.

Mitigating Disintermediation Risks: Policy Design Options

Policymakers possess several tools to mitigate the risks of financial disintermediation. One approach involves setting limits on CBDC holdings or transaction volumes to prevent large-scale migration of deposits [57278902]. Another is to design CBDCs to be non-interest-bearing or to offer interest rates below market rates, reducing their attractiveness relative to bank deposits, except for payment convenience [13888663]. Moreover, a two-tiered system, where commercial banks serve as intermediaries for CBDC distribution, can preserve their customer relationships and roles in credit provision [189249821]. The central bank could also adjust its liquidity provision frameworks to ensure banks have adequate access to funding, compensating for any deposit outflows. Policy decisions concerning the optimal design of a CBDC must weigh the social value of maintaining diverse payment instruments against the potential for bank disintermediation [13888663].

Cross-Border Effects, Spillovers, and the International Monetary Order

The international dimension of CBDCs introduces complex dynamics for global financial stability and the existing monetary order.

Currency Substitution, Capital Flows, and Reserve Currency Competition

The availability of foreign CBDCs could accelerate currency substitution, especially in smaller economies with less stable domestic currencies [56788973]. Residents might opt to hold a more stable foreign CBDC, leading to capital outflows and increased exchange rate volatility in the domestic economy. This phenomenon could challenge monetary sovereignty and complicate macroeconomic management. Furthermore, the introduction of CBDCs by major reserve currency issuers could intensify competition for global reserve status. While improved cross-border payment efficiency is a stated goal for many CBDC initiatives [30804880], it simultaneously presents risks of exacerbating capital flow

volatility and financial contagion if not managed through robust international frameworks.

Financial Contagion, Resilience, and Macroprudential Coordination

Increased interconnectedness through cross-border CBDC channels could heighten the risk of financial contagion. A shock in one jurisdiction might propagate more rapidly across borders if digital currency flows are frictionless and large. Enhancing resilience necessitates robust macroprudential policy coordination among nations. Measures like capital flow management on outflows, relaxing macroprudential policy, or selling foreign reserves can help smooth transitions in the face of foreign CBDC adoption [56788973]. The existing evidence on non-bank financial institutions and their role in cross-border spillovers suggests a need for careful monitoring of liquidity and currency mismatches within the evolving CBDC ecosystem [18877663]. Developing coherent international standards for CBDC interoperability, data sharing, and regulatory oversight becomes critical to harness the benefits while mitigating systemic risks.

Financial Inclusion, Regulatory Considerations, and Public Trust

CBDCs offer a powerful instrument for advancing financial inclusion, but their successful deployment depends on thoughtful design and effective regulatory frameworks that foster public confidence.

Inclusive Design Choices and Implementation Case Studies

CBDCs present a significant opportunity to extend financial services to underserved populations globally [30956836] [104113710] [302407149]. By reducing transaction costs and increasing accessibility, particularly in remote areas, CBDCs can facilitate economic empowerment [104113710] [302407149]. Case studies from countries like Kazakhstan, which launched the "Digital Tenge," demonstrate a strategic focus on expanding financial services to marginalized communities [30956836]. Similarly, Ghana's eCedi and Nigeria's eNaira frameworks prioritize financially inclusive policy goals [189249821]. The design of an inclusive CBDC must consider factors such as offline capabilities, ease of access for individuals with limited digital literacy, and integration with existing payment infrastructures [101646494]. Successful implementation often involves investments in digital infrastructure and targeted financial literacy programs [224478145].

Regulatory Challenges and Institutional Trust in CBDC Adoption

The widespread adoption of CBDCs hinges on robust regulatory frameworks and a high degree of public trust [297214465] [302407149]. Key regulatory challenges include ensuring data privacy, combating illicit finance, and establishing clear legal tender status. The absence of detailed legal and regulatory environments for CBDCs in some pilot countries, such as Ghana and Nigeria, underscores this ongoing challenge [189249821]. Public trust is paramount and is built upon transparent governance, strong cybersecurity measures, and clear communication regarding the CBDC's attributes [297214465] [302407149]. Perceived security and user-friendliness are crucial determinants of adoption [297214465]. Policymakers must balance innovation with regulatory oversight, developing adaptive legal and

policy frameworks to address the uncertainties inherent in CBDC deployment [189249821] [302407149].

Conclusion

Synthesis of Key Findings

The large-scale adoption of central bank digital currencies stands to profoundly reshape both monetary policy transmission and global financial stability. Regarding monetary policy, CBDCs offer a potential enhancement of central banks' control over interest rates and liquidity, particularly through interest-bearing designs that create direct transmission channels to the broader economy [85109679]. They also introduce new avenues for unconventional policies, such as negative interest rates and targeted transfers, extending the central bank's toolkit [57278902]. However, this comes with the challenge of potential financial disintermediation, where commercial banks might experience significant deposit outflows, impacting their funding and credit provision capacities [13888663] [36278443]. Internationally, CBDCs could facilitate more efficient cross-border payments but also introduce risks of currency substitution, capital flow volatility, and shifts in the international monetary order, particularly if major economies introduce widely adopted CBDCs [56788973] [30804880]. Simultaneously, CBDCs offer a powerful mechanism for advancing financial inclusion, especially for unbanked populations, as evidenced by initiatives in various developing countries [30956836] [104113710]. Their success, however, is contingent upon the establishment of robust regulatory frameworks, strong cybersecurity, and the cultivation of public trust [297214465].

Policy Recommendations and Future Research Directions

Effective navigation of the CBDC landscape requires a multifaceted policy approach. Central banks should meticulously design CBDCs to balance monetary policy effectiveness with financial stability, considering features like interest remuneration, holding limits, and interoperability with existing payment systems to mitigate disintermediation risks [13888663]. International cooperation and the development of common standards are essential to manage cross-border spillovers, prevent financial contagion, and foster a stable global financial ecosystem [30804880].

For fostering financial inclusion, policy decisions should prioritize:

- Inclusive design choices that cater to diverse user needs, including offline capabilities and accessibility for digitally less literate populations [101646494].
- Investment in digital infrastructure to ensure broad access [224478145].
- Robust legal and regulatory frameworks that instill public trust through strong privacy protections and cybersecurity measures [297214465].

Future research could further explore the long-term effects of CBDC interest rate mechanisms on bank profitability and lending behavior, particularly in varying competitive environments [85109679]. Additionally, comparative studies on the macroprudential implications of different CBDC design choices in diverse economic contexts would be beneficial. Investigating the optimal policy responses

to manage cross-border capital flows and potential currency substitution in a CBDC-driven world also remains a critical area for scholarly inquiry. The evolving nature of CBDCs necessitates ongoing vigilance and adaptable policy frameworks.

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