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The Impact of CBDCs on Traditional Financial Systems and Regulatory Landscapes- Global Case Studies

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Abstract:
The current study investigates the manner in which decentralized technologies, specifically asset tokenization and Central Bank Digital Currencies (CBDCs), affect traditional financial systems and global currency dynamics. The fundamental purpose of this research is to understand how newly created technologies impact regulatory frameworks, market liquidity, and financial stability. This study delves into how tokenization revolutionizes payment processing by boosting liquidity, enhancing market efficiency, and ensuring tighter regulatory compliance, the major findings show that tokenization improves market liquidity by allowing fractional ownership and reducing reliance on intermediaries that use blockchain technology. Subsequently increases market efficiency and regulatory compliance through automation and transparency. CBDCs, while potentially beneficial for financial inclusion and efficiency, pose significant threats to the dominance of traditional currencies such as the US dollar, which could have an impact on global economic stability.
The analysis demonstrates an inconsistent regulatory framework, with varied levels of tolerance and concern for specific technologies. Major challenges include coordinating policies across borders and addressing concerns about financial stability and security.This study offers crucial insights for regulators, financial institutions, and investors as they adapt to the rapidly evolving landscape of digital finance.

Kyewords: Central Bank Digital Currencies, CBDC, Digital Currency, Digital Fiat Currency, Blockchain Technology, Cryptocurrency.
JEL CLASSIFICATION: E42, E58, O33, O42, P43.

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1. Introduction.

The accelerating development of financial technologies has resulted in significant changes in how assets and currencies are managed, with the rise of blockchain technology and the introduction of Central Bank Digital Currencies (CBDCs), the financial landscape is undergoing a transformation. Tokenization—the process of converting physical assets into digital tokens on a blockchain—alongside CBDCs, is redefining the way we perceive and conduct financial transactions, which are digital representations of national currencies issued by central banks, are at the forefront of this change. This paper delves into these developments to better understand their implications for global financial systems and regulatory frameworks.

Research Problem

Despite the promising potential of tokenization and CBDCs to enhance market liquidity, efficiency, and security, these technologies pose substantial challenges to existing financial systems and regulations. The primary issue lies in how traditional financial structures, with their deeply rooted regulatory frameworks and established power dynamics, will adapt to blockchain's decentralized nature and the possible negative impacts of CBDCs.

Research Importance

Tokenization and CBDCs carry substantial implications for policymakers, financial institutions, and investors. These technologies could reshape financial markets, alter global currency dominance, and influence economic stability. A thorough analysis of their effects on regulatory frameworks and global financial stability is essential to develop well-informed policies and strategic responses.

Aim and Objectives

The primary aim of this study is to assess how tokenization and CBDCs influence today's financial and regulatory landscapes. The objectives are:

1. Examining how tokenization is transforming traditional financial markets.

2. Evaluating the development and potential impacts of CBDCs on global currencies.

3. Analysing the regulatory responses of major economies to these technological advancements.

4. Identifying challenges and opportunities arising from the adoption of these technologies.

Research Question(s)

1. How does tokenization affect the liquidity and efficiency of financial markets?

2. How might CBDCs influence the dominance of traditional currencies, especially the US dollar and the euro?

3. How are different economies and regulatory bodies responding to the rise of tokenization and CBDCs?

4. What are the main challenges and opportunities associated with the implementation of tokenization and CBDCs?

Research Motivations

The motivation for this research stems from the need to address gaps in understanding how emerging financial technologies interact with established systems. As tokenization and CBDCs gain prominence, it is essential to assess their effects on financial stability, regulatory compliance, and global economic dynamics. This study aims to provide a comprehensive analysis to support informed decision-making and strategic planning within the financial sector.

Key Findings

Initial findings indicate that while tokenization offers significant advantages in terms of market liquidity and efficiency, it also raises concerns about regulatory compliance and financial stability. Similarly, CBDCs have the capacity to alter the global currency power balance, posing serious implications for traditional financial systems. Regulatory responses differ widely across countries, reflecting varying degrees of openness and caution regarding these emerging technologies.

2. The theoretical framework for the study.

This section explores the various definitions of Central Bank Digital Currencies (CBDCs) and the distinct forms they can take, focusing on two main categories: retail CBDCs, aimed at individuals and businesses, and wholesale CBDCs, tailored for interbank settlements. It also discusses various CBDC design models, including direct issuance, two-tiered issuance, and hybrid approaches. Furthermore, it examines concerns about the possibility of deposits shifting from banks to CBDCs, as well as its ensuing influence on monetary policy.

2.1. Central bank digital currencies (CBDCs).

2.1.1. Defining Central bank digital currencies (CBDCs).

Central Bank Digital Currencies (CBDCs) are widely defined in a similar manner across much of the research. A joint report by seven central banks, in collaboration with the Bank for International Settlements (BIS), describes CBDCs as "a digital payment instrument, denominated in the national unit of account, that represents a direct liability of the central bank". Interestingly, many central banks highlight the retail and consumer-facing aspects of CBDCs—after all, these digital tools could soon transform everyday transactions. For example, The Riksbank and the National Bank (2020) highlight this aspect in their reports, stressing its significance within the broader financial landscape.

Similarly, the Bank of England (BoE), the Bank of Canada (BoC), and the European Central Bank (ECB) have each outlined their definitions of CBDCs. The BoE envisions them as "an electronic form of central bank money which could be used by households and businesses to make payments and store value" (Bank of England, 2020); the BoC refers to them as "a digital form of central bank money that can be used for retail payments"; and the ECB describes them as "a central bank liability offered in digital form for use by citizens and businesses for their retail payments" (Chiu et al., 2019; ECB, 2020).

Alternatively, some analyses regard CBDCs solely as wholesale tools, highlighting their ability to streamline the execution and the settlement of international transactions among financial institutions (Bank of Canada & Bank of England, 2018).

The differences among CBDCs go beyond merely their retail and wholesale functions. In fact, one can distinguish between those that operate Without depending on central bank reserves—or on systems that broaden the reserve framework to cover the private sector—the concept of CBDCs takes on a unique character. The Committee on Payments and Market Infrastructures (CPMI, 2018) encapsulates this distinction by defining CBDCs as "a digital form of central bank money that is different from balances in traditional reserve or settlement accounts". This perspective is echoed by studies from Barrdear and Kumhof (2019) and Mancini-Griffoli et al. (2018), which suggest the introduction of a remunerated, or interest-bearing, CBDC that stands apart from conventional reserves. Moreover, Mancini-Griffoli et al. (2018) point out that CBDCs are fundamentally distinct from the traditional money forms issued by central banks—namely, cash and reserve balances.

In contrast, Meaning et al. (2018) offer a broader definition of CBDCs as "Any digital version of a central bank's fiat liability—capable of serving as a store of value or settling transactions—is not a futuristic concept but is already in operation as central bank reserves" This narrow framing

underlines the experimental phase of CBDC research, reflecting the evolving nature of our understanding in this domain.

Our first contribution to this thematic study of CBDC research is an expanded definition that encompasses the various interpretations found in the existing literature. Aligned with Kiff et al. (2020), we describe a CBDC as a digital liability issued by a central bank—or another authorized body—that enables the private sector to access a nation's sovereign currency.This definition is abstract and flexible, accommodating the full spectrum of potential CBDC uses. While a more inclusive definition is preferred, acknowledging that different jurisdictions will adopt distinct CBDC models to suit their specific needs and legal frameworks, it is possible that a dominant CBDC design may eventually emerge, as suggested by Boar and Wehrli (2021).

A CBDC differentiates itself from other forms of money in several key ways, as outlined by Dionysopoulos et al. (2024).

Central bank digital currencies (CBDCs) are typically classified into two primary types: retail and wholesale. Retail CBDCs, for instance, are designed to facilitate everyday transactions for both individuals and businesses. These digital currencies, fully supported by the central bank, provide a higher level of security compared to other digital payment methods such as cryptocurrencies. In practice, retail CBDCs enable users to access central bank funds directly for payments, saving, and other financial services, all without needing intermediaries like commercial banks.

In contrast, wholesale CBDCs are tailored for large institutional investors and businesses, primarily designed to settle interbank transactions using central bank reserves—resources not accessible to the general public—wholesale CBDCs enable secure, swift settlements and support large-scale transactions, enabling institutions to move funds without third-party involvement. Given the distinct characteristics and purposes of retail and wholesale CBDCs, it is expected that these two types will affect banks in different ways (Luu et al., 2023).

2.1.2. Top ten CBDC design principles.

- CBDC should take the form of digital tokens transferred directly from a payer's digital wallet into that of the recipient, rather than traditional central-bank reserves (book money).
- CBDC should function as unrestricted legal tender—ensuring that both access and usability are equally available to non-bank entities, banks, and other financial institutions, whether for private or business customers.
- Provision of CBDC based on market demand, with no administratively imposed quantity limits.
- CBDC should not be interest-bearing.
- As CBDC adoption expands, a gradual phase-out of government guarantees for bank-issued money would occur. Central banks and governments would cease supporting third-tier money surrogates and uncovered private currencies.
- Gradual expansion of CBDC use in payment transactions of state bodies and other institutions under public law.
- Substitutability of conventional reserves by CBDC in inter-bank transactions and at the central bank.
- Mutual convertibility of CBDC and bank money in non-bank transactions.
- Standing conversion guarantee by central banks to provide CBDC according to demand, especially in prevention of a possible bank run.

- CBDC issuance would not be limited to bank credit to non-banks or the exchange of bank money into CBDC. It might also happen—albeit to a limited degree—when the central bank engages in open-market purchases of government bonds or provides the government with overdraft facilities.
- Other proposals suggest that the central bank could directly finance a portion of new government bonds, or bolster public coffers using a debt-free, bona fide seigniorage process (Huber, 2023).

2.1.3. CBDC: possibilities, threats, and potential remedies.

The emergence of CBDCs still sparks debates over their potential upsides and downsides—each varying with its particular implementation. Although this overview isn't all-inclusive, some pivotal features warrant our attention. Studies generally classify CBDCs into two types: wholesale, which circulate indirectly via commercial banks, and retail, which are made directly available to households and the non-financial private sector.

CBDCs can be built on different structural frameworks, influenced by the roles of central and commercial banks and their interactions in currency management. Essentially, there are three core models: direct issuance, two-tiered issuance, and a hybrid approach. In the direct issuance model, the central bank takes the lead, establishing a centralized system with only minimal participation from other financial institutions.

Table 1. Properties comparison: Cash, Cryptocurrencies, Stablecoins, and CBDC.

PROPERTIES	Cash	Cryptocurrencies	Stablecoins	CBDC
Real-time settlement	Immediate	Immediate	Immediate	Instant or near-instant
Anonymity of payment	Yes.	Yes.	Yes.	Design choice: Token-based: Yes, Account-based: No.
Independence of central counterparties	Yes. Central authority is not responsible for bookkeeping. Ledger is distributed.	Yes. Central authority is not responsible for bookkeeping. Ledger is distributed.	Yes. Central authority is not responsible for bookkeeping. Ledger is distributed.	No. Central authority is responsible for bookkeeping. Ledger is centralised.
Asset, beyond instrument	Yes.	Yes.	Yes.	Yes.
Offline payments	Yes	Under proposal[a]	No.	Design Choice.
Counterfeitable	Possibly but very difficult. Non-counterfeit ability is tangibly based (*with machine-readable optical and electromagnetic security features).* Counterfeiting is extremely expensive.	No. Non-counterfeitability based on verified transaction records and double-entry bookkeeping.	No. Non-counterfeitability based on verified transaction records and double-entry bookkeeping.	No.
Legal Tender	Yes.	It can be: El Salvador*(and likely to be in 2022 in Panama, Paraguay and Guatemala).* Some countries banned cryptocurrencies, i.e. China, Qatar. Some countries allow them, i. e. the US.	It could be. (In the US, it can be considered "Convertible virtual currency" ("CVC"): either has an equivalent value in real currency or acts as a substitute for real currency. [FinCEN])	Yes.
Stability of Value	Subject to inflation and exchange rate variation.	Subject to exchange rate variation.	(Relatively stable) Pegged to a specified asset, or a pool or basket of assets.	Subject to inflation and exchange rate variation.
Remuneration	No interest rate remuneration.	No interest rate remuneration. Financial profit derived from revaluation.	No interest rate remuneration. Financial profit derived from revaluation.	Interest rate remuneration subject to design.
Risks	Loss, theft & fraud.	Loss, theft & fraud.	Loss, theft & fraud.	Token-based: theft, fraud & cyber risk. Account-based: fraud & cyber risk.

Source:(Bibi, 2023)

The central bank supplies the CBDC directly to end-users, oversees every transaction, and manages retail payments. In a way reminiscent of how banknotes are handled, all claims remain with the central bank. In this two-tier issuance framework, both the central bank and commercial banks play active roles: the central bank issues the CBDC, while commercial banks manage all consumer transactions. Think of it as a collaborative model where the state authority retains ultimate control, and private banks ensure the digital currency reaches everyday users. Moreover, the hybrid model integrates the core features of these two structures. In the direct setup, the central bank not only issues the CBDC but also serves as a backstop for the payment system and maintains a comprehensive record of all transactions, even as private financial institutions continue to support operations much like in the two-tier model.

Besides the benefits and potential challenges highlighted in academic literature and discussed in official central bank reports, One major challenge tied to launching a CBDC is the risk of sidelining traditional banks—a shift that could profoundly alter how monetary policy is executed.

Disintermediation describes the potential shift of deposits from commercial banks to CBDC accounts held by the central bank. Key issues include how CBDCs might interact with conventional bank deposits and what measures could be taken to mitigate this trend. The degree of disintermediation is closely linked to the selected system architecture and the CBDC's inherent features, especially regarding interest rate policies. It is more likely to occur if CBDC accounts offer attractive interest returns.

A CBDC that does not bear interest would not disrupt deposit holdings, as it would function similarly to cash. Such a CBDC, akin to e-cash, would only alter the composition of central bank liabilities Without triggering disintermediation or disrupting the transmission of monetary policy, an interest-bearing CBDC—offering payment services similar to bank deposits—could alter deposit allocation and reshape the traditional banking landscape. In this scenario, CBDC accounts at the central bank would directly compete with conventional bank deposits—potentially pushing commercial banks to increase deposit interest rates in order to keep funds on their balance sheets. Such adjustments could, in turn, affect credit costs, bank profitability, and the overall transmission of monetary policy.

Research shows that risks of disintermediation and challenges in bank management can be alleviated by adding specific frictions that discourage large-scale shifts from deposits to CBDCs. For instance, to counter these risks, authorities might require notice for significant CBDC withdrawals (a practice akin to current cash protocols), stop offering interest on CBDC balances above a set level, charge fees on balances that exceed certain limits, or enforce daily transfer caps.

Among the proposed strategies, the literature generally supports two approaches: One approach involves capping CBDC holdings and applying a negative interest rate to any amount beyond that limit; alternatively, a remuneration system could be introduced that offers a lower interest rate on CBDCs.These measures would help limit the extent of deposit migration to CBDCs, adjusting their attractiveness and leading to partial disintermediation. This, in turn, would minimize the impact on monetary policy transmission, allowing the central bank to maintain effective control over its monetary policy (Bibi, 2023).

2.2. Literature review.

The expanding body of research on Central Bank Digital Currencies (CBDCs) underscores their transformative potential while highlighting significant uncertainties surrounding their implementation. A significant portion of the debate centers on how CBDCs might reshape traditional banking and monetary policy. For example, Andolfatto (2021) argues that these digital currencies could lead to a shift in deposits away from private banks—a view that is further supported by Agur et al. (2022), who argue that the extent of this disruption depends heavily on the specific design of CBDCs, which could either mitigate or intensify these effects.

Conversely, Barrdear and Kumhof (2022) suggest that while CBDCs may enhance the effectiveness of monetary policy transmission, their broader macroeconomic implications, particularly concerning financial stability, remain uncertain. This divergence is further reflected in the works of Davoodalhosseini (2022) and Williamson (2022), who examine the welfare and policy consequences of CBDCs. Davoodalhosseini identifies potential advantages in improving monetary policy tools, whereas Williamson emphasizes the risks tied to bank disintermediation, underlining the challenges to financial stability.

Empirical studies offer valuable insights, such as Wang et al. (2022), who demonstrate that CBDC announcements significantly influence financial markets, particularly by increasing volatility. This volatility may signal either market adaptability or vulnerability. In contrast, Li et al. (2022) present a more nuanced reaction within the fintech sector, suggesting that the impact of CBDCs largely depends on the existing digital financial infrastructure.

Adding a global perspective, Lee et al. (2021) highlight the diverse motivations and implementation strategies adopted by different countries, emphasizing the absence of consensus on the optimal approach to CBDCs. Similarly, Náñez Alonso et al. (2021) explore the geopolitical and economic factors shaping CBDC adoption, shedding light on the varied outcomes such strategies may produce.

The literature also highlights significant gaps and challenges in understanding CBDCs. A key gap is the scarcity of empirical research on the long-term effects of CBDCs, particularly regarding financial inclusion and monetary sovereignty, as noted by Ozili (2022). Additionally, the compatibility of CBDCs with other digital currencies, such as cryptocurrencies and stablecoins, remains underexplored, raising concerns about future regulatory frameworks and international monetary cooperation, as discussed by Shen and Hou (2021).

Another critical area requiring further investigation is the environmental impact of CBDCs. Alonso (2023) emphasizes the need for deeper analysis, particularly concerning the design and operational frameworks of CBDCs, to assess their sustainability and ecological implications.

In summary, although research on CBDCs has advanced rapidly, it remains fragmented, with diverse theoretical and empirical findings highlighting the complexities and uncertainties surrounding their adoption. Looking ahead, research should aim to bridge these gaps by providing more expansive empirical analyses—drawing on diverse real-world examples—and by evaluating the lasting effects of CBDCs on the global financial system.

3. The applied framework for the study

This section delves into the environmental and technological repercussions of digital currencies, zeroing in on the architecture of CBDCs and their distinct characteristics compared to cryptocurrencies. It examines pivotal matters such as privacy and ethics in both the formulation and regulation of CBDCs, posing questions about the balance between innovation and responsibility. Ultimately, Ultimately, the discussion concludes by comparing how major economies are approaching the tokenization of currencies and assets.

3.1 Potential benefits of CBDCs.

This section delves into the potential benefits of CBDCs, providing an initial assessment of just how profoundly these advantages might impact the economies of Latin America and the Caribbean (LAC).

- **Ensure continued access to central bank money if cash use is declining**

  Several experts and policymakers argue that, as cash usage wanes in various settings, central banks should introduce a risk-free digital currency alternative.However, according to responses from LAC central banks to the BIS survey, cash usage has not significantly declined and does

not serve as a major impetus for adopting CBDCs. While the pandemic has led to a reduction in physical cash transactions in favor of digital and contactless payments, cash remains widely used in many LAC jurisdictions. In fact, during the Covid-19 pandemic, several Latin American economies experienced a decade-high surge in currency circulation, while only a few saw notable declines.

- **Reduce direct costs associated with physical cash**

In Norway, the costs tied to issuing and managing physical cash vary considerably, for instance, incurs costs as low as 0.2% of GDP, while other regions can exceed 1%. In principle, substituting a portion of cash with CBDCs might reduce expenditures for both central banks and businesses. Yet, as will be detailed later, any anticipated savings from less reliance on cash must be weighed against the investment required to develop and roll out a CBDC system. Although CBDCs can trim variable costs, like those linked to cash transportation and distribution, substantial savings are unlikely unless physical money is completely phased out, especially when fixed costs remain high.

Considering the widespread reliance on cash in Latin American and Caribbean jurisdictions, it is likely that the established infrastructure for cash payments will continue to prevail.This raises uncertainty about whether potential reductions in currency-related costs alone provide a strong justification for adopting CBDCs in these economies.

- **Reducing informality**

When compared to advanced economies (AEs) and several emerging and developing markets (EMDEs), LAC economies show a notably larger informal sector. While such unregulated activities are essential for supporting numerous families' livelihoods, they can also impede overall economic development and curb growth in several ways.These include depriving governments of essential tax revenues, limiting firms' ability and incentives to invest in long-term capital projects, and constraining firms' growth potential, which affects their ability to achieve economies of scale and drive innovation.

CBDCs have the potential to diminish the reliance on cash that is often associated with informal If widely adopted,CBDCs could prompt informal retailers to start accepting them as a payment method—much like private digital wallets, which are already popular among informal merchants in some regions.By lowering the fixed costs for informal firms and workers to accept digital payments—costs that are currently high in Latin America and the Caribbean (LAC)—CBDCs could incentivize businesses to transition into the formal sector.

The digital record provided by CBDCs could enhance access to credit for businesses, fostering innovation and financial inclusion. Once integrated into the formal sector, firms could benefit from reduced accounting costs and fewer legal requirements. On a broader scale, diminishing informality could broaden the tax base, strengthen social and regulatory safeguards, and enable businesses to expand and invest more effectively.

- **Promoting financial inclusion**

While cash drives many informal sectors, there exists a group of consumers who rely solely on physical banknotes and coins as their only financial assets. Isn't it striking that such reliance can impede economic progress? Limited access to formal financial services poses a significant barrier to prosperity in numerous countries—a challenge especially evident in the Latin America and Caribbean (LAC) region. In 2017, only 49% of adults in Latin America and the Caribbean had access to transaction services—while advanced economies reached 92%, emerging Asia 80%, and other emerging markets 70%. Consequently, the drive for financial inclusion has emerged as a key factor behind the growing interest in Central Bank Digital Currencies (CBDCs), as highlighted by the BIS survey.

CBDCs delivered via mobile phones might offer a viable solution to overcoming barriers to financial inclusion. Consider, for example, Kenya's M-Pesa—a private mobile banking and payments network whose success illustrates how digital transactions can lay the groundwork for broader financial services. In areas lacking private alternatives like M-Pesa, a CBDC could step in to offer essential digital payment options. Moreover, to ensure that the most vulnerable are not sidelined—especially when private mobile banking often targets wealthier demographics—access to CBDCs could be strategically focused on underserved groups. Additionally, the adoption of CBDCs may stimulate greater competition, a prospect particularly promising for Latin American and Caribbean economies, where such competition could reduce costs and drive private financial institutions to broaden their outreach. Ultimately, CBDCs might bolster current efforts to promote financial inclusion—consider subsidies that aim to motivate private banks to reach out to those without access to traditional banking services.

Nonetheless, various challenges could impede the widespread adoption of CBDCs. Considering that not everyone has access to smartphones, computers, or reliable internet, offering offline payment options—like smartcards or even basic mobile phones—might prove advantageous. Other challenges include low financial literacy, the difficulty less tech-savvy individuals may face in adapting to new technologies, and concerns about cyber fraud—a significant issue in LAC jurisdictions. Additionally, stringent know-your-customer (KYC) requirements could pose problems for individuals lacking proper identification or documentation, In LAC communities, skepticism of both financial and governmental institutions is notably widespread.

In the final analysis, fostering financial inclusion offers a compelling rationale for introducing CBDCs in the LAC region. Yet, this initiative demands a thoughtfully engineered design, targeted public education on how these digital currencies work, and mechanisms to ensure that every segment of society has access.

- **Improve resilience and safety of payment systems by backing up other electronic payments mechanisms in case of failure**

Private digital payment methods have, for the most part, supplanted cash, there remains a need for a secure, government-backed safety net if these private systems were to falter. Interestingly, this issue seems less acute in LAC regions—cashless transactions are still relatively uncommon in several of these countries, with Brazil's Pix standing out as an exception. Nevertheless, the pandemic sparked a notable surge in interest for cashless payments, hinting that as private electronic payment solutions become more widespread, a A backup solution like a CBDC could become increasingly appealing.

- **Provide mechanism for distributing funds to hard-to-reach individuals or locations**

  Envision a scenario where a CBDC network delivers substantial benefits to expansive or multi-island nations with scattered communities, hard-to-reach communities—a situation common in many Latin American and Caribbean countries. For example, when a natural disaster disrupts banking services and creates cash shortages, CBDCs could keep payment flows running. This potential was clearly illustrated after Hurricane Dorian hit the Bahamas in 2019; while rebuilding roads and buildings took months, Electricity and internet services were restored in just a fraction of the expected time. Meanwhile, the Bahamas' Central Bank launched the "Sand Dollar" because its island communities were too scattered to reap the full benefits of conventional banking. In a similar vein, the Eastern Caribbean Central Bank expanded its DCash pilot project to areas hit by a volcanic eruption in 2019, demonstrating how CBDCs can be a lifeline in times of crisis.

Moreover, central bank digital currencies (CBDCs) could simplify how fiscal transfers are distributed to households and businesses, especially in emergency situations. For instance, during

the Covid-19 pandemic, many governments faced delays in delivering relief payments—a process that might have been expedited with a well-designed CBDC network.

Yet, the success of CBDCs hinges on having solid mobile and internet infrastructure as well as a reliable electricity supply. Moreover, for fiscal transfers to be effective, CBDCs must integrate with a comprehensive social registry or digital ID system—an infrastructure that some LAC nations are still in the process of developing. Interestingly, during the same pandemic, certain LAC nations, such as Brazil, managed to expedite fund distribution without the aid of CBDCs. This shows that although CBDCs have the potential to enhance the efficiency of emergency financial aid, they must be accompanied by reforms in other governmental sectors to be fully effective.

- **Promoting openness and competition between private payments providers**

CBDCs might effectively tackle two prominent challenges within LAC financial systems—namely, the concerns regarding concentration and fragmentation.

Driven by network effects and the benefits of economies of scale, payment systems often consolidate. This concentration tends to stifle competition, push up costs, and ultimately degrade the quality of service.On the other hand, fragmentation occurs when payment providers offer services with insufficient interoperability, making it difficult for users to conduct, clear, and settle transactions across different systems. CBDCs could help address both issues by fostering competition and enhancing interoperability among payment systems.

A CBDC could mitigate concentration and fragmentation by providing a common, neutral platform for transferring funds. This platform would be accessible to all payment service providers, regulated to ensure fair competition, and designed to ensure full interoperability with private payment solutions. These features could be particularly beneficial in Latin American and Caribbean (LAC) jurisdictions, where high costs for end users and low interoperability in retail payment services are common.

Although alternative methods to promote competition and interoperability exist—such as retail fast payment systems (FPS) being developed or already in place in several LAC countries, and regulations like Transferencia 3.0 in Argentina, Designed to promote cost-effective real-time transactions, a CBDC offers extra benefits that we'll delve into further in the upcoming sections.

- **Further simplifying the financial system and fostering innovation**

A CBDC is deemed the most secure type of digital currency, guaranteeing finality in transactions and doing away with the need for intermediary credit. When adopted alongside a thoughtfully designed digital platform, the payment ecosystem becomes more efficient—especially through the integration of programmable, or "smart," contracts. These contracts can automate a range of transactions, from purchasing goods and acquiring assets to extending credit or buying insurance, ensuring that once parties sign, agreements are automatically enforced. This automation not only speeds up execution but also cuts down on costly reconciliations and human intervention, ultimately making transactions quicker and more cost-effective.

Programmable contracts are not limited to economies with advanced financial systems; they also hold potential for addressing inefficiencies in financial access in emerging markets and developing economies (EMDEs), including LAC. These contracts could be designed to improve financial inclusion by enabling access to credit and insurance for users who may not have traditional bank accounts but possess digital wallets on smartphones.The robust stability and security of a CBDC can significantly boost the appeal of programmable contracts. Users benefit from a consistent digital currency value—ensuring they face no worries about variations in funds held in escrow.

- **Support monetary sovereignty and financial stability**

Supported by robust institutions and prudent policies, the inherent safety and trust of a CBDC clearly outmatch those of private digital currencies—think stablecoins or bank-account-linked payment methods. Could a CBDC offer a secure, domestic alternative to foreign or privately issued digital money? Absolutely—it can help alleviate the risks tied to widespread adoption. For example, these risks may manifest as reduced control over national monetary policy and obstacles to effective financial oversight. This issue is especially critical for Latin American and Caribbean (LAC) jurisdictions, which have long battled challenges such as dollarization and capital flight. For further insight into these issues, see the section titled "Challenges Arising from International CBDCs and Other Digital Currencies."

- **Improve efficiency and lower the cost of cross-border payments**

One major challenge in the global monetary system is the steep fees, sluggish speeds, restricted access, and opaque nature of cross-border transactions. Although the G20 has advocated for solutions—such as implementing the ISO 20022 standard for electronic data exchange among financial institutions—much remains to be done. Enhancing the efficiency of these transactions and boosting financial inclusion are often cited as primary reasons for developing CBDCs. In this context, Latin American and Caribbean economies, which are major hubs for international remittances, could gain considerably from more cost-effective and rapid payment solutions.

CBDCs designed for cross-border interoperability, or to integrate seamlessly with private payment systems, could provide an alternative to the costly and slow correspondent banking networks that currently dominate cross-border payments. Recent research by central banks has emphasized the importance of CBDCs with cross-border compatibility.The BIS Innovation Hub has been investigating arrangements for "multiple CBDCs" (mCBDC) that enable the seamless exchange of digital currencies across various jurisdictions. For example, the "mCBDC Bridge" pilot—a joint effort by Hong Kong, Thailand, China, and the United Arab Emirates—serves as a prime illustration of such an initiative.

However, Building a CBDC with cross-border interoperability entails major technical hurdles. Additionally, there are legal and regulatory barriers to cross-border payments that CBDCs alone would not resolve. As such, expecting immediate improvements in cross-border payments from CBDCs might be unrealistic.

Interestingly, responses from LAC in the BIS survey do not emphasize cross-border payments as a major motivation for exploring CBDCs. Moreover, there is no positive correlation between interest in CBDCs and remittance flows. Nonetheless, crafting efficient cross-border CBDC systems may ultimately yield significant benefits for LAC economies.

- **Augmenting the channels of monetary policy transmission**

Advocates of CBDCs argue that these digital currencies could enable central banks to channel monetary policy measures straight into the economy. By enhancing financial inclusion and encouraging more households to engage with interest rate-sensitive financial instruments, CBDCs could improve the effectiveness of monetary policy transmission. Unlike cash holders, who can avoid negative interest rates, CBDC accounts could be subject to such rates. Additionally, central banks could implement expansionary monetary policies, such as "helicopter drops," by increasing the value of CBDC accounts, thereby directly influencing economic activity.

However, several of these arguments for CBDCs may be less relevant for most Latin American and Caribbean (LAC) jurisdictions compared to other, primarily advanced, economies. Negative interest rates are particularly effective in economies with low inflation, This practice remains relatively rare in many LAC economies. However, since the pandemic, LAC central banks have initiated asset purchase programs to bolster their financial markets.they have not yet faced the necessity or

capacity to implement significant monetary expansion through household accounts. More broadly, a CBDC might radically reshape the monetary policy transmission mechanism in unforeseen ways—perhaps by shifting the demand for base money, along with its evolving response to interest rate fluctuations (Kamin et al., 2024).

3.2. Costs and risk of CBDCs.

In designing a CBDC, central banks need to carefully assess all associated expenses, ensuring that every cost is meticulously examined, potential adverse consequences, and associated risks of its issuance. Yet, these challenges aren't insurmountable; as will be explained later, they can be managed through thoughtful design and careful implementation.

- **Costs of implementing a CBDC**

Issuing a CBDC is expected to entail considerable fixed costs—most notably the development of essential infrastructure, as well as ongoing expenses related to labor, software, cybersecurity, and maintenance. A comprehensive public education Moreover, a dedicated support program will be essential for a successful launch. Meanwhile, private companies are expected to incur expenses—costs such as those related to integrating CBDCs into their payment systems and Fees charged by payment service providers to access the CBDC infrastructure are expected to be lower for the private sector than those imposed by current payment systems.

Latin American and Caribbean (LAC) economies might face slightly higher CBDC-related costs compared to other regions, mainly due to less developed digital infrastructure and a smaller pool of technologically skilled workers. Nevertheless, these costs are unlikely to outweigh the net benefits of CBDCs. In fact, Several LAC economies have rolled out rapid payment systems—consider Brazil's Pix, Mexico's Codi, and Costa Rica's Sinpe—that incur costs largely comparable to those of CBDCs, all while keeping budget impacts minimal.

- **Risk of cyber-attacks and criminal activity**

Being digital currencies, CBDCs are exposed to a range of cyber risks much like other digital payment systems. These risks include cyberattacks, data breaches, money laundering, fraud, and theft. If any of these issues occur, the central bank could be held accountable, potentially damaging its reputation and undermining public trust, which could impede the widespread adoption of the CBDC. To mitigate these vulnerabilities, robust security measures, regulatory oversight, and public confidence in the system's resilience are necessary.

In Latin American and Caribbean (LAC) countries, the threat of cyber risks is particularly concerning due to the growing number of cyberattacks on financial institutions in the region. The Inter-American Development Bank has highlighted that LAC has also become a target for account creation fraud. While cybersecurity protections have improved across the region, many LAC countries are still in the early stages of strengthening their digital infrastructure. This relatively weaker infrastructure, Public worries about digital theft and errors from service providers have intensified a preference for physical cash in certain LAC regions. Consequently, cyber risks remain a formidable barrier to CBDC adoption in these areas.

To address these concerns, the central bank must design CBDCs with resilience and safety in mind, and mandate top-tier security measures from third-party collaborators in CBDC implementation. These measures are within the capacity of LAC jurisdictions, as demonstrated by the successful implementation of security protocols in fast payment systems like Brazil's Pix. Lessons learned from such systems can be applied to CBDC arrangements to enhance their security and public trust.

- **Undesirable implications for financial stability**

Introducing a Central Bank Digital Currency (CBDC) might negatively impact the banking sector. particularly in bank-centric economies like those in the Latin American and Caribbean (LAC)

region. One major risk is that interest-bearing CBDCs might attract depositors away from traditional bank savings accounts, compelling banks to seek alternative funding sources, such as market-based funding or borrowing from central banks. Both of these options would require adequate collateral, and if banks were unable to maintain their deposit base, they might be forced to offer higher interest rates or additional services to retain customers, which could undermine their profitability and their ability to supply credit. This dynamic could also lead banks to assume greater risks to compensate for the lost deposits, weakening their ability to properly assess risk due to the lack of information on depositors.

Furthermore, during periods of financial instability, depositors might opt to move their funds into CBDCs, exacerbating the challenges faced by domestic banks. However, these risks can be managed through thoughtful CBDC design and appropriate regulatory measures. For instance, central banks could mitigate disintermediation by imposing limits on CBDC holdings, and implement structures that would automatically transfer any holdings above the limit into a private "waterfall" bank account, as seen in The Bahamas. Additionally, a tiered payment system could reduce the attractiveness of holding large amounts of CBDC by lowering interest rates or imposing higher service fees once a certain threshold is reached.

To further protect against the possibility of runs on CBDCs, deposit insurance systems for bank deposits should be reinforced, and central banks could place restrictions on how easily commercial banks can convert deposits into CBDCs. While this might provoke early runs from depositors, central banks can mitigate the effects by providing liquidity to commercial banks during periods of strain. Even in the event of a run, it is anticipated that the damage would be less severe than in the current environment, where funds can be easily transferred to other banks or foreign assets. Redirecting CBDC inflows toward commercial banks would allow central banks to control liquidity more effectively and re-establish stability in the financial system.

- **Risk of overlaps between monetary and fiscal policy**

Should CBDC disbursements occur instantly for remote communities or individuals, the previously distinct realms of monetary and fiscal policy may begin to converge. Considering the longstanding issues of budget deficits and fiscal dominance in LAC countries, this risk is notably high. It becomes clear when the central bank functions as an intermediary for fiscal transfers or, in other words, when it effectively distributes "helicopter money." Moreover, future scenarios may demand a closer coordination between monetary and fiscal policies. Therefore, CBDCs must be designed with enough flexibility to adapt to these possibilities (Kamin et al., 2024).

3.3. The impact of CBDCs on financial markets.

- **CBDCs and economic theory**

Integrating cryptocurrencies into the financial system has ignited persistent debates about their function and how they relate to conventional money. Cryptocurrencies, in particular, They are frequently regarded as speculative assets instead By fulfilling money's traditional roles—namely, acting as a medium of exchange, a store of value, or a unit of account—it deviates from the usual categorization that divides money into two types: public money, which is issued by the state and backed by its promise, and private money, created by commercial banks through lending, with sovereign currency as the underlying base.

Cryptocurrencies challenge the traditional understanding of money, especially the Chartalist perspective, which asserts that money's value derives from state issuance. In contrast, cryptocurrencies are not tied to any government authority, this challenges the traditional view of money as solely a state creation. Moreover, the credit theory of money—which defines money as credits or debits and still depends on state-backed currency—struggles to account for the decentralized nature of cryptocurrencies.

Conversely, central bank digital currencies (CBDCs) resonate with the Chartalist perspective—after all, they're issued by central banks and serve as digital, state-backed versions of money. Take the Bank of England, for example: it has indicated that its CBDCs, issued in pound sterling, They are designed to operate alongside traditional cash and bank deposits rather than completely replacing them. Similarly, China's sovereign digital currency is designed to mesh seamlessly with the current financial system, though its precise complementary role remains to be fully defined and will largely hinge on how it is eventually deployed.

The rise of cryptocurrencies has led to an encroachment into the realm of financial resources traditionally controlled by sovereign entities, prompting central banks to consider issuing their own digital currencies. This shift represents an attempt to regain control over the digital money space and could influence the balance between public and private money. CBDCs, by making central bank-issued digital money accessible to individuals and businesses, could significantly alter the financial landscape, potentially reducing reliance on private money and creating new dynamics between government-issued and privately created digital currencies. The full implications of this shift warrant further exploration as CBDCs continue to develop globally.

- **CBDCs and the global monetary system**

The introduction of China's sovereign digital currency (DCEP) is expected to have a significant impact, Considering the scale of China's economy and its broad international development initiatives, this unfolds amid persistent US-China competition and significant liquidity exchanges between the two countries., the adoption of a digital currency by China is likely to strengthen the role of the RMB as a stabilizing force, While also spurring other nations to develop their own digital currencies, this development naturally begs the question: how might these changes impact the long-standing dominance of the US dollar? With the current geopolitical competition between global payment systems like SWIFT and CHIPS, DCEP is poised to be a key element in China's development of its own cross-border payment infrastructure. Will this push the US, and possibly other developed nations, to introduce their own sovereign digital currencies? Such a move seems increasingly likely in the long run.

Central Bank Digital Currencies issued in national currencies are expected to complement, rather than replace, physical cash and bank deposits.This approach might serve to protect national currencies from the escalating competitive pressure of cryptocurrencies, with far-reaching consequences for the global monetary landscape.

- **CBDCs and financial stability**

It has been argued by some that while cryptocurrencies may lead to some investor losses, they do not pose a significant threat to monetary or financial stability. CBDCs, however, are expected to align with and contribute to the core functions of central banks, This amplifies their crucial role in preserving stability. Recent reports from the Bank for International Settlements stress that when a central bank issues a CBDC, it must not jeopardize monetary or financial stability. Yet, significant uncertainties still loom over CBDCs and their potential effects on financial stability. Key unknowns involve the future structure of financial systems and the ways in which CBDCs will be crafted and implemented, and how widely they will be adopted. Although central banks tend to be more stable than commercial banks and might even monopolize deposit-taking via CBDCs, such a shift could prove disruptive—just as sweeping transformations often are.

- **CBDCs, lenders of last resort and unconventional monetary policies**

Historically, central banks have acted as lenders of last resort—a concept famously outlined by Bagehot in 1873. Now, in the era of CBDCs, they are compelled to reconsider how best to carry out this essential function. Remember the global financial crisis of 2008–09? In its wake, central banks turned to unconventional tools such as large-scale asset purchases, quantitative easing, Central

banks have employed forward guidance and even negative interest rates to stabilize economies and keep inflation in check. Still, the question remains: how will these strategies evolve under a CBDC framework?

For example, will CBDCs enable the implementation of a negative interest rate policy more efficiently than current systems? This is a key question, as it directly affects monetary transmission mechanisms. Similarly, how central banks offer forward guidance with a digital currency—both in terms of signalling future policy and managing market expectations—has not been fully explored.

- **CBDCs, price stability and inflation targeting**

Central banks carry the vital duty of maintaining price stability; consequently, institutions like the Bank of England, the US Federal Reserve, and the European Central Bank have embraced a clear policy of inflation targeting.Additionally, these institutions have been granted independence in shaping their monetary policies to enhance effectiveness. However, the introduction of Central Bank Digital Currencies (CBDCs) presents new challenges in this area. One key implication of CBDCs is their reliance on blockchain technology, which could offer a more precise means of monitoring money supply and transactions, thereby impacting how central banks pursue their goal of price stability.

- **CBDCs and green monetary policy**

Central banks have increasingly become advocates for environmental sustainability through green monetary policies, expanding their roles from merely ensuring price and financial stability to promoting environmental stability. In this context, cryptocurrencies raise significant environmental concerns. As of November 2018, Bitcoin's annual electricity consumption was around 45.8 TWh, resulting in approximately 22–22.9 million metric tons of CO2 emissions each year.

Due to the energy-intensive 'proof-of-work' mining process, emissions from cryptocurrencies are expected to rise substantially. For instance, Projections indicate that Bitcoin's yearly energy consumption in China will hit a peak of 296.59 TWh by 2024, leading to around 130.50 million metric tons of CO2 emissions. There are valid worries that cryptocurrencies could hinder countries' efforts to meet their Paris Agreement targets.

Yet, Tom Mutton—the director of the Bank of England’s digital currency unit—argues that Bitcoin isn’t the ultimate standard for technology. In fact, when designed appropriately, CBDCs might offer a more efficient and eco-friendly method of money creation.

- **CBDC infrastructure**

Technological advancements have greatly improved payment systems, with examples like Google Wallet, Apple Pay, Mobile money services like Kenya’s M-Pesa—where the underlying currency remains national—offer a relevant example. Similarly to the Bank of England's platform model, CBDC platforms are designed to enhance existing real-time gross settlement systems, enabling private payment providers to connect and deliver CBDC services directly to customers. China's digital currency, DCEP, integrates smoothly with platforms like WeChat Pay and Alipay.

On the other hand, cryptocurrencies use distributed ledger technology, often prioritizing decentralization and anonymity, which contrasts with the requirements of CBDCs. There is currently no global agreement on the appropriate technology for CBDCs, especially regarding privacy concerns. While blockchain-based CBDCs can increase transaction transparency, they also raise privacy and security issues by maintaining records of all economic transactions that could be accessed by government authorities. This creates an opportunity to combat global financial corruption but also presents challenges to individual privacy. Ideally, CBDC design should minimize invasiveness, but unresolved issues around technology and design remain. Furthermore,

most CBDC projects are taking place in more technologically advanced economies, which may lead to disparities in technological capabilities across countries.

- **CBDCs and ethics, privacy, and laws**

Cryptocurrencies—true to their name—are built to evade state oversight, functioning as decentralized, peer-to-peer networks free from central bank control. In contrast, Central Bank Digital Currencies (CBDCs) are issued, controlled, and maintained by central banks, raising significant privacy concerns, as all transactions involving CBDCs would be recorded and potentially subject to government monitoring without corrective measures. However, Merging CBDCs with existing digital payment platforms and wallets opens up fresh avenues for financial inclusion, especially benefiting those without traditional bank access.

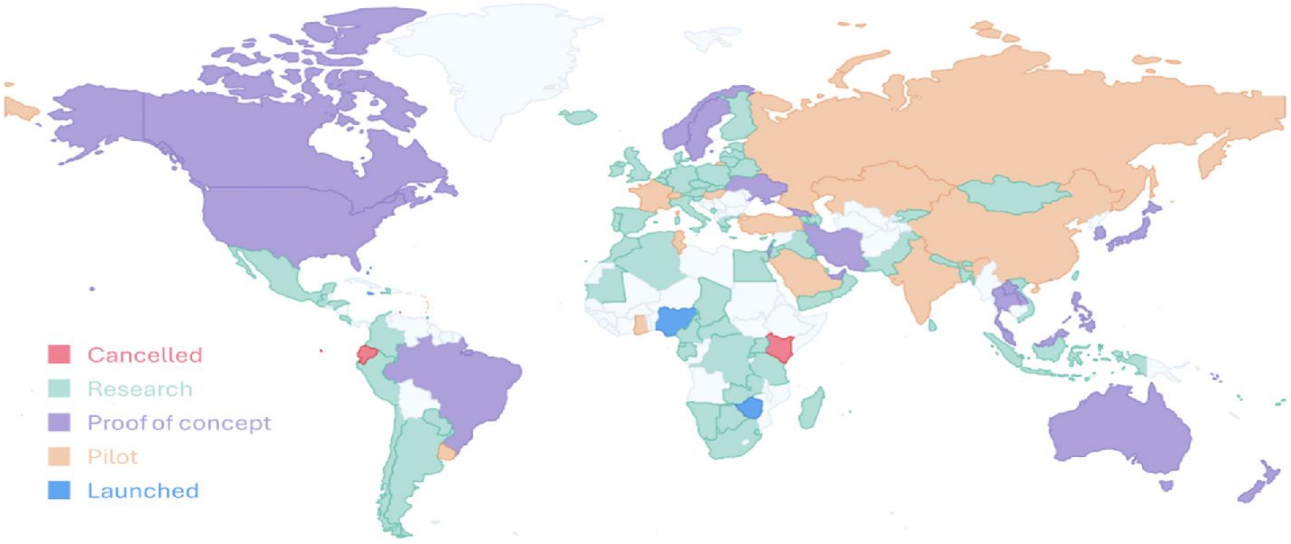
CBDCs are also compatible with smart contracts, positioning them competitively within evolving decentralized finance ecosystems. Nevertheless, ethical and privacy considerations remain important. Additionally, there are unresolved issues regarding regulations, enforcement of contractual obligations, and property rights related to CBDCs that require further clarification. (Elsayed & Nasir, 2022)

3.4. A comparative study of seven economies.

Surveys show that approximately 80% of central banks are exploring CBDC with half actively experimenting and running pilot programs. Specifically, while only 35 countries were considering a CBDC in May 2020, that number has risen to over 114 countries today, representing more than 95% of global GDP. Additionally, 11 of these countries have fully launched their CBDCs. (Bibi, 2023)

Nations such as China and Singapore have eagerly embraced blockchain technology within their monetary and financial frameworks, taking proactive steps—while others, like the US, remain more cautious and skeptical. What drives this hesitation? There are worries that decentralization might disrupt entrenched power structures and give a boost to previously sidelined players. Both cryptocurrencies and CBDCs, intriguingly, could contest the US dollar's status as the global reserve currency. For example, China regards blockchain as a strategic tool that can fortify its financial system and expand its economic influence.

Figure 1. The state of CBDCs in the world (as of April 2024)



Source: (Zhang et al., 2024)

China's development of the e-CNY is aligned with its broader objectives of enhancing technological sovereignty, reducing dependence on the global dollar framework while advancing the renminbi's international role. This initiative is designed to boost efficiency and competitiveness in global finance. Meanwhile, the US is deeply invested in maintaining the stability of its financial system—a bedrock for the global economy. These differing approaches highlight how national priorities vary, especially when it comes to monetary policy and global economic influence. As the issuer of the world's de facto primary reserve currency, the US might experience considerable setbacks if emerging technologies begin to erode the dollar's unmatched dominance. Moreover, the decentralized features of blockchain and the introduction of CBDCs might chip away at the dollar's dominance in global trade and finance. Beyond these geopolitical implications, tokenizing currencies and assets also brings a host of financial advantages.

Tokenization offers several advantages to financial markets. First, it enhances liquidity by enabling the fractionalization of high-value assets, such as real estate or artwork, allowing individuals to own portions of these assets without needing to purchase them outright. This opens up investment opportunities to a broader audience. By tokenizing physical assets, they are transformed into digital tokens that can be traded round the clock on global digital platforms. This expanded accessibility not only simplifies transactions but also significantly boosts the liquidity of assets that were once considered illiquid.

Secondly, tokenization enhances market efficiency. By harnessing blockchain technology, it streamlines processes that typically involve various intermediaries—think brokers, escrow agents, and legal advisors. In many cases, smart contracts automate these roles, slashing costs and accelerating transaction times. Moreover, blockchain’s immutable and transparent record-keeping provides a trustworthy trail of asset ownership and transfers, which in turn curbs fraud and bolsters security.

Thirdly, tokenization supports regulatory compliance and strengthens security. Embedded smart contracts can be tailored to enforce regulations automatically across different jurisdictions—for instance, by controlling who may acquire or transfer tokens and by ensuring proper reporting. The robust encryption and tamper-resistant nature of blockchain further diminish risks of unauthorized access, thus ensuring that the overall integrity of transactions remains intact.

To illuminate today's decentralized technology scene, this section delves into a comparison of tokenization practices applied to both currencies and assets in top developed economies. focusing particularly on their regulatory frameworks. The analysis, guided by the TAM framework, encapsulates regulators’ views on tokenization by evaluating its perceived usefulness, ease of use, and associated risks.

In the United States, Tokenization is primarily used for traditional financial assets rather than fiat money. Even with a recent dip in its share, the US dollar continues to command a dominant role in the global financial and monetary system., it remains the foremost reserve currency. It still plays a pivotal role in international debt, cross-border borrowing, global corporate finance, development funding, and global invoicing.The US has limited motivation to introduce a CBDC that could potentially undermine the dollar's supremacy.

According to reports from the President's Working Group on Financial Markets, stablecoins are complex products that carry significant risks. Consequently, some have proposed that only insured depository institutions be allowed to issue stablecoins convertible into US dollars. In this model, these digital assets would be regulated as insured deposits, with oversight covering both the issuers and their parent companies.

Meanwhile, in the US, the tokenization of conventional assets—ranging from real estate and art to fine wine and other collectibles—is swiftly gaining momentum. Imagine investing in a fraction of a high-value property rather than buying it outright—this is exactly what tokenizing real estate offers

by enabling fractional ownership.There is also increasing interest in tokenized bonds, which offer greater transparency, better accessibility, and lower costs. However, tokenization is still in its early stages, Encountering hurdles like regulatory obstacles, vague legal frameworks, cybersecurity threats, and the ever-present risk of fraud.

The oversight of tokenized assets involves multiple regulatory bodies. For instance, security tokens are managed by the Securities and Exchange Commission (SEC), while other token types fall under the supervision of the Commodity Futures Trading Commission (CFTC) and the Financial Industry Regulatory Authority (FINRA).

EU: Following an extensive two-year review—from October 2021 to October 2023—outlined in the summary report "A Stocktake on the Digital Euro," the European Central Bank (ECB) is gearing up for a potential digital euro. Still, the ECB will only proceed with its launch once the necessary legislation is in place. Across the Euro system, approaches differ: while countries like Malta and Gibraltar have adopted lenient regulations to position themselves as blockchain and crypto hubs, traditional centers such as Germany and France enforce much stricter rules.

Within the wider EU framework, efforts are underway to craft a unified regulatory system for tokenized assets. At the heart of these endeavors is the European Securities and Markets Authority (ESMA), which enforces securities laws while safeguarding fair competition. Meanwhile, MiFID II—short for the Markets in Financial Instruments Directive II—lays out precise rules for investment service providers engaged in trading and advising on securities. Moreover, the EU has released its inaugural final report under the MiCA framework, a significant stride toward establishing a comprehensive regulatory regime for crypto-assets across its member states.

Additionally, the EU is venturing into blockchain technology to tokenize bonds, initiating several projects aimed at establishing standards and regulations for this nascent asset class. A prime example is the European Blockchain Services Infrastructure (EBSI), which is set to develop a blockchain-driven platform that streamlines both the issuance and trading of tokenized bonds, further propelling the region's tokenization initiatives.

UK: In the United Kingdom, tokenized assets fall under the purview of the Financial Conduct Authority (FCA), the nation's foremost financial regulatory body. The FCA has proactively set forth guidance addressing the regulatory nuances of various token types—be they security tokens, utility tokens, or stablecoins. Notably, the authority classifies most tokens as securities, thereby mandating compliance with the legal framework established by the Financial Services and Markets Act 2000 (FSMA). Consequently, companies offering tokenized assets are required to meet an array of obligations, including rigorous disclosure standards, investor protection measures, and anti-money laundering (AML) protocols.

Moreover, the FCA is exploring breakthrough technologies—like blockchain and smart contracts—to refine how tokenized assets are regulated. One notable project is the FCA’s Regulatory Sandbox, a controlled setting where companies can experiment with innovative products, services, and business models. This method not only sparks creativity but also safeguards investor interests.

Overall, the tokenization of assets in the UK is a fast-growing industry supported by a favorable regulatory environment. However, firms must comply with a range of regulations to ensure investor security and maintain market integrity.

Switzerland has long been a trailblazer in the tokenization industry, positioning itself as a vibrant hub for issuing and trading tokenized assets. Its forward-thinking regulatory framework has been instrumental in spurring innovation and attracting investment in the blockchain space. The Swiss Financial Market Supervisory Authority (FINMA) monitors tokenized assets while offering definitive guidance on their regulatory implications—be it for security tokens, utility tokens, or stablecoins. FINMA has made it clear that the majority of these tokens will be regarded as

securities, which in turn requires adherence to Swiss regulations like the Swiss Federal Act on Collective Investment Schemes (CISA) and the Swiss Financial Services Act (FINSA). Consequently, companies involved in tokenized assets must meet rigorous regulatory standards, including disclosure obligations, investor protection measures, and anti-money laundering (AML) protocols.

In addition to these measures, FINMA is exploring the potential of emerging technologies like blockchain and smart contracts to enhance asset regulation. It has also established a dedicated regulatory framework for initial coin offerings (ICOs), offering much-needed clarity for companies raising capital through tokenized assets. These initiatives are thoroughly detailed in FINMA's annual report on digitalization. Ultimately, Switzerland's supportive regulatory environment continues to drive the growth of the tokenization industry, This is exemplified by notable achievements—take, for instance, the Swiss bank Cit´eGestion, which, in 2023, made history as the first bank to tokenize its own shares.

Australia: The asset tokenization arena is witnessing robust growth, with a myriad of companies and organizations employing tokenized assets for diverse goals—be it capital raising, active trading, or exploring innovative investment avenues. In this landscape, the Australian Securities and Investments Commission (ASIC), the nation's chief financial regulator, holds jurisdiction. ASIC has detailed guidance on handling various tokens—whether they are security tokens, utility tokens, or stablecoins—making it clear that most will be treated as securities. Consequently, they fall under the regulatory framework of the Corporations Act 2001, which imposes disclosure requirements, investor safeguards, and anti-money laundering measures.

In addition to enforcing existing regulations, ASIC is actively exploring new technologies like blockchain and smart contracts to regulate tokenized assets more effectively. The commission recently introduced a regulatory sandbox, allowing companies to test out innovative financial products, services, and business models within a controlled environment. Simultaneously, the Australian Securities Exchange (ASX) is embracing blockchain technology and progressing toward tokenizing bonds, with a pilot program already in the works. This initiative aims to streamline the issuance and trading of bonds for both corporations and governments, potentially enhancing market liquidity and boosting transparency.

Japan: The Financial Services Agency (FSA)—the nation's primary regulatory authority—plays a central role in overseeing tokenized assets. Notably, the FSA has taken a proactive stance by issuing detailed guidance on various token types, such as security tokens, utility tokens, and stablecoins. Interestingly, most tokens are classified as financial instruments, meaning they fall under the Financial Instruments and Exchange Act. As a result, companies offering tokenized assets must comply with a range of regulatory obligations, from rigorous disclosure and investor protection requirements to robust anti-money laundering (AML) measures.

To further foster innovation in tokenization, the FSA has launched a regulatory sandbox that enables companies to test new products, services, and business models within a controlled, low-risk environment. This approach not only stimulates the exploration of emerging technologies and novel ideas but also propels the tokenization industry's growth within a supportive regulatory framework.

South Korea: The Financial Services Commission (FSC) is making significant progress in formalizing asset tokenization. It has empowered the Korea Exchange to introduce a marketplace that leverages competitive trading techniques for security tokens. As the country's leading financial regulator, the FSC is proactively rolling out the "Token Security Guideline" to manage the issuance and circulation of tokenized securities—suggesting revisions to existing laws so that these assets are treated as electronic, distributed ledger-based instruments.

Under FSC rules, most tokens are classified as securities and fall under the Capital Markets Act, which enforces disclosure requirements, investor protection measures, and anti-money laundering

protocols. Beyond these rules, the FSC is also exploring how emerging technologies like blockchain and smart contracts might be woven into the regulatory framework for tokenized assets. To foster innovation in a safe setting, a regulatory sandbox has been set up, allowing firms to experiment with new products, services, and business models operating within controlled settings.

Table 2. Compares regulatory bodies, regulations, and attitudes towards tokenization of the major economies reviewed above.

Table 2. Comparison of tokenization environments in major economies.

Economy	Regulatory Bodies	Legislative Framework	Attitude
US	SEC, CFTC, FINRA	The Securities Act	Skeptical
UK	FCA	FSMA, sandbox	Supportive
EU	ESMA	MiFID II, MiCA	Mixed
Switzerland	FINMA	CISA, FINSA	Supportive
Australia	ASIC	The Corporations Act, sandbox	Supportive
Japan	FSA	The Financial Instruments and Exchange Act, sandbox	Supportive
South Korea	FSC	The Capital Markets Act, sandbox	Supportive

Source: (Zhang et al., 2024)

The traditional financial centers, such as the US, Germany, and France, have exhibited a more cautious and skeptical approach towards tokenization, This hesitancy stems from the fact that blockchain technology not only redistributes the roles traditionally held by financial intermediaries, but also disrupts established financial hierarchies—posing a threat to dominant global currencies like the US dollar (USD) and regional benchmarks such as the euro (EUR). As tokenization gains traction, it could significantly undermine these dominant currencies' roles. Despite this, many countries have developed or are developing comprehensive regulations and legislation to safeguard participants and maintain financial system stability. However, the inherent borderless and decentralized nature of blockchain presents a unique challenge, as country-specific regulations may not be fully effective or adaptable. This could pose the greatest obstacle to the widespread development and adoption of asset tokenization. (Zhang et al., 2024)

4. Conclusion.

The present study has investigated the evolving landscape of Central Bank Digital Currencies (CBDCs) as well as asset tokenization, shedding light on their transformative potential and associated challenges. The major findings show that, while CBDCs and tokenized assets have the potential to improve market liquidity, operational efficiency, and financial inclusion, they also cause severe disruptions to established financial institutions and regulatory processes.

Summary of Key Findings

Countries have different motivations for adopting Central Bank Digital Currencies (CBDCs), with some focusing on improving financial efficiency and reducing reliance on the US dollar, while others prioritize maintaining financial stability and regulatory oversight. For example, China’s e-

CNY aligns with its broader strategy to internationalize the renminbi, whereas the US is more hesitant, as it seeks to protect the dominance of the dollar. Tokenization brings notable advantages, such as enhanced liquidity for traditionally illiquid assets and streamlined market operations through blockchain technology. However, it also presents challenges like regulatory discrepancies, as well as risks related to fraud and cybersecurity. Regulatory responses vary, with permissive frameworks in places like Switzerland, and more cautious approaches in the US, highlighting the complexities of integrating these innovations into established financial systems.

Implications

The findings highlight the necessity for a more sophisticated understanding of the way CBDCs and asset tokenization could transform global banking. Policymakers have to establish regulatory frameworks that balance innovation and stability. Financial institutions must react to these shifts by seizing new possibilities while mitigating dangers. Investors and market participants must be aware of the changing regulatory landscape in order to successfully navigate the intricacies of tokenized assets and digital currencies.

Research Limitations

This examination is constrained by the availability and scope of existing data, which may not completely depict the rapid development and intricacies of CBDCs and asset tokenization. Furthermore, the analysis is limited to big economies, which may not capture the experiences and regulatory approaches of smaller or emerging markets. The changing nature of technical breakthroughs and regulatory reactions makes it difficult to provide a complete and up-to-date assessment.

Suggestions for Future Research

Future research is recommended to focus on several key areas:

1. Longitudinal Studies: Investigate the long-term impacts of CBDCs and asset tokenization on global financial stability and market dynamics.

2. Comparative Analysis: Extend the study to include emerging markets and smaller economies to provide a more holistic view of global trends.

3. Regulatory Evolution: Examine how regulatory frameworks are evolving in response to technological advancements and identify best practices for harmonizing global regulations.

4. Technological Integration: Explore the practical challenges and solutions associated with integrating blockchain technology and smart contracts into existing financial infrastructures.

By tackling these issues, future studies might offer more in-depth insights into the ramifications of new technologies, allowing for more educated financial decisions.

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