

The current state and future prospects of CBDCs and tokenization - Case study of china –

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Abstract:

This research study examines the implementation and effects of Central Bank Digital Currencies (CBDCs) and tokenization in modern financial systems. It evaluates the efficiency and challenges associated with these emerging technologies, with a particular focus on case studies from Jamaica and China. By comparing developments such as Jamaica's Jam-Dex incentive programs and China's e-CNY digital currency, the study examines the objectives, advantages, and potential risks of CBDCs and tokenization. Utilizing a literature review, regulatory analysis, and case study approach, the research highlights how CBDCs can enhance monetary connectivity, improve efficiency, and promote financial inclusion. However, issues such as regulatory uncertainty, liquidity constraints, and security vulnerabilities persist. The case studies offer practical insights into implementation strategies and address challenges related to currency and bond tokenization. The findings provide valuable recommendations for policymakers and financial institutions navigating the complexities of integrating digital currencies and seamlessly incorporated tokenized assets into established financial frameworks.

Keywords: Central Bank Digital Currencies, CBDC, Digital Currency, Digital Fiat Currency, Blockchain Technology, Cryptocurrency.



I. Introduction:

Research Background

In recent years, rapid advancements in digital financial technologies have significantly reshaped global monetary systems. The emergence of Central Bank Digital Currencies (CBDCs) and the increasing emphasis on tokenizing financial assets, including currencies and bonds, mark a fundamental shift in how financial transactions are conducted and regulated. As central banks explore the integration of digital currencies into their monetary frameworks and blockchain technology continues to evolve, it is crucial to examine the potential benefits, challenges, and broader implications of these innovations.

Research Problem

Despite the promising progress, the adoption and integration of CBDCs and asset tokenization present considerable challenges. These encompass regulatory ambiguities, liquidity limitations, security vulnerabilities, interoperability hurdles, and technical intricacies. Furthermore, although some nations have made significant advancements, the broader implications of these technologies on financial stability, policy efficiency, and economic inclusion remain largely uncertain. This research addresses the following core question:

"What are the key challenges and opportunities associated with the adoption and integration of Central Bank Digital Currencies (CBDCs) and asset tokenization in modern financial systems?"

Research Importance

This research is crucial as it investigates the evolving landscape of digital finance, providing key insights into the real-world impact of CBDCs and asset tokenization. By analyzing these innovations, the study enhances our understanding of how digital currencies and tokenized assets can either reinforce or disrupt traditional financial systems. It also highlights the importance of robust regulatory frameworks and technological progress in ensuring secure and efficient financial markets.

Aim and Objectives

The primary goal of this research is to examine the current landscape and future potential of CBDCs and asset tokenization, focusing on their implementation, advantages, and challenges. The key objectives are:

1. To evaluate the effectiveness of recent CBDC incentive programs and their influence on financial inclusion and economic efficiency.
2. To investigate the benefits and limitations of CBDCs and tokenized assets, with particular attention to issues of interoperability, security, and regulatory compliance.
3. To analyze case studies from different countries, such as China, to gain insights into the practical applications and challenges posed by digital financial innovations.
4. To suggest strategies for addressing the identified challenges and improving the integration of digital currencies and tokenized assets into established financial systems.

Research Question(s)

1. What are the primary advantages and obstacles related to the adoption of CBDCs and tokenized assets?

2. How do recent incentive programs and technological advancements influence the adoption and effectiveness of CBDCs?
3. What lessons can be learned from international case studies on the integration and impact of digital financial technologies?
4. How can regulatory and technical challenges be addressed to enhance the stability and efficiency of digital financial systems?

Research Hypotheses

This study is guided by the following hypotheses:

- **H1:** The implementation of CBDCs enhances financial inclusion and improves monetary policy efficiency.
- **H2:** Asset tokenization improves transparency and operational efficiency in bond issuance but faces significant regulatory and liquidity challenges.
- **H3:** Countries that adopt a hybrid design for CBDCs experience smoother integration with existing financial systems.

Research Motivation

The desire to comprehend how blockchain technology and digital currencies are revolutionizing the global financial system is what spurred this study. A thorough examination is necessary to inform policy decisions and strategic planning as central banks and financial institutions negotiate the difficulties posed by these advances. This study seeks to offer practical insights that can influence the future evolution of digital finance.

Key Findings

Initial findings suggest that while CBDCs and asset tokenization offer significant potential for improving efficiency and fostering financial inclusion, they also present notable challenges. Major concerns include regulatory uncertainty, security vulnerabilities, and interoperability constraints. Case studies, such as those from China, showcase both successful applications and persistent hurdles, underscoring the need for continuous research and adaptation in this fast-changing domain.

Research Structure

The research is structured as follows:

- I. Introduction
- II. The theoretical framework for the study
- III. The applied framework for the study
- IV. Conclusion and Recommendations
- V. References

II. The theoretical framework of the study.

The emergence of Central Bank Digital Currencies (CBDCs) as a calculated reaction to the shortcomings of conventional banking systems and the changing global financial scene is examined in this section. It looks at how CBDCs might strengthen financial efficiency and monetary sovereignty while addressing urgent issues including the fall in cash use, the speed at which technology is developing, and the expanding power of private payment systems. By synthesizing both theoretical and empirical perspectives, the literature review evaluates the potential benefits and challenges of CBDCs while emphasizing the need for further research to address existing uncertainties and cultivate a more nuanced understanding of their enduring effects on both financial stability and monetary policy:

1. Central Bank Digital Currencies (CBDC).

1.1. Central Bank Digital Currencies (CBDC) Begins its ascent.

Provided that the evaluation of key monetary turning points is sound, current trends indicate that Central Bank Digital Currencies (CBDCs) are on track to become the dominant form of money in the global financial system. This mirrors historical patterns, where existing monetary systems face insurmountable challenges that cannot be resolved within their current frameworks, while viable alternatives begin to take shape. A similar shift occurred in the 18th and 19th centuries, when private banknotes and government-issued paper currency in Europe became ineffective and were eventually replaced by central banks' monopoly on regulated notes. In a comparable manner, today's challenge lies in integrating bank money, emerging digital alternatives, and the financial practices they enable into a new form of sovereign money. This change calls for a restructuring of the interactions between banks, shadow banks, and central banks in addition to substituting digital currency for conventional book money. In the end, digital and sovereign money are probably the way of the future.

In this context, central banks are steadily reclaiming their historic role as the primary stewards of national monetary sovereignty—a role they held until the mid-20th century, before the dominance of the bank money system curbed further progress.. Similar to how the legislative, executive, and judicial departments of government operate, central banks now serve as the monetary authority of a country or set of countries. As the state's central bank, they have transformed from "banks for banks" to serving as the monetary backbone of the financial and real sectors, as well as the public and private spheres. However, they do not act as general financing institutions in the broader sense of fiscal management, credit provision, or capital markets—these aspects will be explored further in the concluding chapter, which discusses the evolving role of central banks and monetary policy.

This brief preview of the central banks' changing role sets the stage for the upcoming monetary shift. At its core, this transformation revolves around the reassertion of a state's monetary sovereignty as a constitutional prerogative, as examined in the chapter on monetary sovereignty and the quasi-state status of private bank money. If the transition fails to strengthen and protect sovereign monetary powers, the concept of monetary policy in its current form could become obsolete. While the notion of a national currency (as a unit of account) remains under the current bank money system, true monetary sovereignty has largely been ceded to the banking sector.

The emergence of private cryptocurrencies has (Crypto currency refers to a virtual currency that is traded peer-to-peer via a blockchain. It is based on the principles of cryptography to validate transactions and issue the currency itself (AMRI, RIAD, & AKHENAK, 2024)), fortunately, raised awareness among central bankers, policymakers,

and the public about the critical importance of monetary sovereignty. However, there remains a failure to fully recognize that national currency sovereignty, without a foundational sovereign money base, is essentially meaningless. This imbalance is evident when, on one hand, Facebook's Libra project—a supranational private stablecoin—was rightly viewed as a threat to monetary sovereignty, yet, on the other hand, the existing realities of conventional bank money are still largely ignored.

To effectively uphold their role as custodians of the currency, central banks must reclaim comprehensive control over monetary systems. This can be achieved through interest rate policies or quantity-based strategies, as long as a sufficiently large amount of central bank money exists in the public domain, beyond the interbank circulation of reserves. However, the precise quantity of central bank money necessary to exert this influence has not been thoroughly examined. Early indications, such as the decline in cash usage, suggest that the required leverage might need to represent approximately half, or possibly more, of the money circulating in the public economy.

As the proportion of central bank-issued secure money grows, the presence of inherently unstable, crisis-prone bank money and third-tier money surrogates linked to bank money declines. This shift enables central bank money to reclaim its role as the primary monetary base, restoring the effectiveness of monetary policy transmission. As a result, central banks gain greater control over money creation and can more effectively regulate the overall money supply.

In 2014, the People's Bank of China pioneered research on digital central bank money by establishing the first dedicated research group. The following year, in 2015, While serving as Vice President at the Federal Reserve Bank of St. Louis, David Andolfatto put forward the innovative idea of a cryptocurrency supported by government backing, which he termed "Fedcoin" or "Fedwire for everyone." By 2016, central banks in Sweden (with the e-Krona) and the United Kingdom had also begun investigating the potential of Central Bank Digital Currencies (CBDCs). In subsequent years, the Bank for International Settlements (BIS) emerged as a leading advocate, actively promoting CBDC development within the global central banking community (Huber, 2023).

1.2. CBDC Definitions.

A digital currency issued by a central bank that represents the issuing authority's liabilities is known as CBDC. It can be viewed by the general public as the digital equivalent of actual currency. Academic definitions, however, offer a more complex viewpoint.

In their 2019 work, Ward and Rochemont describe CBDCs as a unique type of central bank money that is clearly distinct from conventional reserve or settlement accounts. Bitter (2020) describes it as a centrally issued, account-based, digital obligation of the central bank that may bear interest and is accessible to the public. Kumhof and Noone (2018) characterize CBDC as an electronic central bank currency with three key attributes: broader accessibility compared to reserves, greater functionality for retail transactions than cash, and a unique operational structure that enables it to serve a different primary function.

Similarly, Kiff et al. (2020) define CBDC as a digital representation of a sovereign currency issued and backed by a central bank or other monetary authority. Bordo and Levin (2017), along with Engert and Fung (2017), describe it as an electronically stored monetary value representing a central bank liability that can facilitate payments. Ozili (2022) classifies fiat digital currency issued by a central bank as a CBDC, emphasizing its functional equivalence to cash while distinguishing it through its digital nature.

Despite serving the same fundamental purpose as physical cash, these definitions collectively highlight that CBDC remains a direct liability of the issuing central bank, differing from cash primarily in its format and operational structure (Ozili, 2023).

A universally agreed-upon definition of Central Bank Digital Currencies (CBDCs) has yet to be established. However, the International Monetary Fund (IMF) describes CBDCs as "It is a newly created digital currency, issued by the central bank, and designed to function as official legal tender". Unlike traditional forms of electronic central bank money, such as reserves—exchanged through centralized accounts—CBDCs enable decentralized, peer-to-peer transactions, allowing direct exchanges between payers and payees without intermediaries. In recent years, an increasing number of countries have explored the development of CBDCs, though their initiatives remain at varying stages of progress (Alsalmi et al., 2023).

CBDCs can be broadly categorized into two main types: wholesale and retail. Wholesale CBDCs, which may be account-based or token-based, are primarily designed for financial institutions. These systems streamline interbank transfers and securities settlements, while retail CBDCs are designed for public use, providing households and businesses with innovative ways to make payments and store value. However, the introduction of retail CBDCs carries potential risks. Borio et al. (2017) study raised concerns that permitting individuals to shift their funds from commercial banks to risk-free central bank liabilities might inadvertently increase the risk of bank runs. Conversely, wholesale CBDCs, which are restricted to financial institutions, are specifically designed to streamline the settlement of digital tokenized financial assets (Helmi et al., 2023).

1.3. Motives for Introducing Central Bank Digital Currency.

After providing a general characterization of Central Bank Digital Currency (CBDC) and differentiating it from other forms of money, it is essential to consider the rationale behind the introduction of a digital euro. The academic literature and the perspectives of central banks present a variety of motives for this initiative.

1.3.1. Dwindling Usage of Cash.

A commonly cited reason for the introduction of Central Bank Digital Currencies (CBDCs) is the perceived decline in cash usage for payment transactions. At first glance, this rationale seems logical, particularly when considering personal experiences with cash payments. Empirical data confirms this trend. For example, a Bundesbank survey found that cash payments in Germany fell from 74% in 2017 to approximately 60% in 2020, with cashless payments becoming dominant, especially for transactions exceeding EUR 50.

This pattern is also reflected across Europe. Studies by the European Central Bank (ECB) indicate that cash payments accounted for 79% of all transactions in the euro area in 2016, decreasing to 73% by 2019. Sweden, known for its widespread adoption of cashless payments, saw the share of cash transactions in respondents' most recent purchases drop from around 40% in 2010 to just 13% in 2018. Similarly, a study conducted by the Latvian central bank in August 2022 found that cashless payments constituted 71% of transactions, significantly surpassing cash payments at 29%.

Despite this decline, cash remains crucial in many regions, particularly within the euro area, where it is still widely used. In countries like Italy and Spain, more than 80% of all payment transactions are still conducted in cash. Additionally, in Germany, around 70% of respondents across all age groups report no need for alternative digital payment methods. Even in Norway, where cash usage dropped below 5% by autumn 2020, the deputy

governor of the Norwegian central bank stated that there is "at present, there's no compelling reason to proceed with launching a central bank digital currency".

The European Central Bank (ECB) emphasizes the enduring role that cash plays throughout the euro area, though it cautions that a shift in its role may occur, particularly during extraordinary circumstances like the COVID-19 pandemic. However, outside of such extreme situations, the case for introducing a central bank digital currency does not appear compelling in light of the current extent of cash usage.

1.3.2. Technological Change and Innovation.

Another widely cited reason for introducing Central Bank Digital Currencies (CBDCs) is the rapid technological advancement in payment systems. Innovations such as contactless payments, mobile transactions, cryptocurrencies, and stablecoins are reshaping the digital payments landscape, compelling central banks to explore CBDCs as a means to stay ahead of these changes. Fabio Panetta, in his role as Deputy Governor of the Bank of Italy, CBDCs have been portrayed as an inevitable outcome of the financial system's shift to digitalization, while US Federal Reserve Governor Brainard has positioned them as a key element in shaping the future of payments.

Article 127(2), fourth indent, of the Treaty on the Functioning of the European Union (TFEU) serves as the legal foundation for this technological transition. It specifies that one of the primary responsibilities of the European System of Central Banks (ESCB) is to ensure that payment systems operate efficiently. In fulfilling this mandate; the ESCB must also consider the evolving needs of users, as payment systems are fundamental to economic stability. As technological progress shapes new expectations among consumers and businesses, the introduction of CBDCs becomes a viable strategy to address these shifting demands and uphold the ESCB's responsibility to maintain efficient and adaptable payment systems.

In this context, many economic scholars emphasize the digitization of the economy as a key driver for CBDC adoption. Concepts such as "Industry 4.0," the "Smart Economy," and the "Internet of Things" (IoT) frequently appear in discussions on the future of digital finance. CBDCs could enable end-users to conduct transactions using "programmable money" within automated processes. This would allow payment transactions to be executed automatically upon the fulfillment of predefined conditions in a "smart contract." For instance, a payment could be instantly triggered once goods are successfully delivered, streamlining financial transactions in an increasingly interconnected digital economy.

However, the implementation of automated payment processes does not inherently require the existence of a CBDC; rather, the technical design of payment systems—potentially managed by private entities—plays a crucial role. This raises important questions about whether issuing Deploying a CBDC to boost economic growth falls under the responsibilities of the European System of Central Banks (ESCB) or corresponds with the broader strategic aims of the European Union.

Under Article 119(1) of the Treaty on the Functioning of the European Union (TFEU), the task of shaping economic policy is shared between the EU and its Member States. While individual nations concentrate on broad economic strategies—including measures to promote digital transformation—the move towards digitized payment methods also has noteworthy consequences for market competition. This facet may well engage the EU's authority in competition policy as outlined in Article 3(1)(b) of the TFEU.

To ensure that payment processes remain both efficient and secure, the ESCB might take on a supportive role while retaining its autonomous power over any prospective rollout of a

CBDC, as referenced in Article 127(1), second sentence, and (2), fourth indent, of the TFEU. Regardless of these legal considerations, it is essential to recognize that adapting to technological advancements in both payment systems and the broader economy does not necessarily have to be framed as the primary rationale for implementing a CBDC.

1.3.3. Situations of Oligopoly in the Digital Payments Sector.

Closely linked to advancements in payment technology is the need to protect users from oligopolistic practices in the digital payments sector—an argument frequently cited in support of Central Bank Digital Currencies (CBDCs). The digital payments industry is largely dominated by private corporations with significant market power, including Apple Pay, Google Pay, Amazon Pay, WeChat, Alipay in China, and M-Pesa in Africa. This high level of market concentration presents several risks, particularly regarding reduced competition and potential monopolistic control over payment systems.

However, At its core, European economic policy embraces a free-market system where competition flourishes without undue restrictions, a principle laid out in Article 119(1) of the Treaty on the Functioning of the European Union (TFEU). Consequently, the primary role of fostering competitive dynamics through innovation falls to private enterprises. Additionally, existing competition and antitrust laws provide sovereign mechanisms to enhance market competition, meaning that a CBDC may not be a necessary tool to address these concerns.

Nonetheless, oligopolistic structures often introduce the risk of market abuse or arbitrary restrictions on individuals. Private payment providers may blur the boundaries between the core functions of money—such as exchange and payment—and unrelated activities like data collection and social networking. This integration raises privacy concerns, as dominant players with vast user bases could exploit payment data for commercial purposes, such as targeted advertising.

Moreover, in highly concentrated markets, the failure of a key player can have significant implications. This risk is particularly pronounced in emerging payment technologies like cryptocurrencies and stablecoins, where regulatory frameworks remain underdeveloped. In such cases, users may face financial losses without adequate legal protection or compensation mechanisms, further underscoring the importance of regulatory oversight in digital payments. Given these two significant risks, the introduction of a state-issued digital currency could foster greater trust among users within the digital payment landscape and serve as a public complement to private-sector offerings.

1.3.4. Sovereignty.

Another politically driven motivation for introducing Central Bank Digital Currency (CBDC) is the preservation of monetary sovereignty. As digital payment methods proliferate, private entities and foreign states have introduced new forms of digital money, increasing the risk that individuals may substitute their domestic currency with these alternatives—a phenomenon known as "digital dollarization." The widespread adoption of foreign currencies, stablecoins, or other private digital assets could weaken the central bank's influence over the monetary system, particularly by disrupting the monetary policy transmission mechanism.

Beyond policy implementation, central banks rely on transaction data from payment systems to analyze financial flows and monitor the distribution of money. If their own currency is overshadowed by private cryptocurrencies, stablecoins, or foreign central bank digital currencies, this data sovereignty would be compromised, limiting their oversight and control over key financial infrastructure.

Additionally, issuing a CBDC aligns with broader political objectives, particularly in nations seeking to maintain financial and technological independence. A payment ecosystem dominated by private players—combined with the competitive presence of foreign CBDCs—can place technologically lagging states at a disadvantage, making them vulnerable to the financial and geopolitical influence of more advanced economies.

This concern is particularly relevant to the euro area, where non-European payment providers, such as Visa, Mastercard, and American Express, already play a dominant role in cashless transactions. The risks of such reliance became evident during the Russia-Ukraine conflict when financial sanctions led Visa and Mastercard to suspend operations in Russia. Similarly, U.S.-based cryptocurrency platforms restricted access for Iranian and Venezuelan users due to American sanctions. These examples highlight the geopolitical risks of depending on foreign-controlled payment systems and underscore the strategic importance of a sovereign digital currency.

This indirect political influence exerted by private entities contrasts sharply with the direct political implications associated with foreign central bank digital currencies. Several nations have already introduced their own CBDCs, notably the E-CNY from the People's Republic of China and the Sand Dollar from the Bahamas. These countries not only gain a competitive edge in the race for global reserve currency status, but they also have the opportunity to collaborate with politically aligned states. With the backing of substantial state financial power, these nations can potentially dominate cross-border payments, thereby exerting considerable international political influence.

1.3.5. Miscellaneous Motives.

Additional motives for the introduction of Central Bank Digital Currency (CBDC) are often discussed, though their significance varies depending on regional economic and financial conditions.

One widely cited motivation is the promotion of financial inclusion (Households and businesses accessing appropriate financial services and using them effectively, provided responsibly and sustainably in a well-regulated environment (OULAD BRAHIM, 2024)), particularly for underserved populations. CBDCs are envisioned as a means to provide access to digital payment systems for individuals without bank accounts. However, financial exclusion stems from multiple factors, including low income, limited financial literacy, and the absence of commercial incentives for private payment service providers to operate in certain areas. Geographic disparities can further complicate access to financial services, making financial inclusion a relevant but region-specific concern. As a result, while CBDCs may address these challenges in some contexts, they are unlikely to serve as a universal justification for their implementation, particularly in highly industrialized nations with well-developed banking infrastructure.

Another key argument for CBDCs is cost reduction, which primarily involves two aspects. First, CBDCs could lower expenses associated with cash production, transportation, distribution, and disposal. Second, they aim to reduce the costs of cross-border payments, which currently average around 7% of the transaction volume worldwide. However, before cost savings can be realized, there may be significant upfront expenditures related to the technical implementation of CBDCs, including hardware and software development, which could initially impose financial burdens on users and financial institutions.

A less frequently mentioned but nonetheless important consideration is the potential use of CBDCs as a tool for monetary policy. Specifically, CBDCs could introduce a new transmission channel by allowing central banks to directly influence households and

businesses through remuneration mechanisms, such as interest-bearing digital currency. However, the success of this method is predominantly influenced by the unique design and issuance framework of the digital currency—for instance, the way the digital euro is structured plays a critical role (Kriese, 2023).

2. Literature review.

The literature on Central Bank Digital Currencies (CBDCs) has expanded significantly, with both theoretical and empirical studies examining their potential impact, design, and broader macroeconomic consequences. Andolfatto (2021) explores how CBDCs could enhance payment efficiency while also challenging traditional banking models by potentially reducing deposits and lending capacity. Similarly, Fernández-Villaverde et al. (2021) discuss the democratization of central banking through CBDCs, emphasizing their role in promoting financial inclusion while also posing risks to financial stability. Agur et al. (2022) further contribute to the debate by analyzing optimal CBDC design, weighing the trade-offs between privacy, security, and usability, as well as their implications for monetary policy. Meanwhile, Barrdear and Kumhof (2022) critically assess the macroeconomic effects of CBDCs, arguing that their impact on existing monetary frameworks will largely depend on the specifics of their implementation.

Despite these contributions, the literature reveals several contradictions and gaps. For instance, while some studies, such as Wang et al. (2022), highlight the positive impact of CBDC-related news on financial markets, others, like Li et al. (2022), suggest a more nuanced response from the fintech industry. This indicates that market reactions depend on specific CBDC design elements and their perceived effects on traditional financial intermediaries. Additionally, Zhang and Huang (2022) emphasize the importance of blockchain technology in ensuring CBDC security and privacy, yet there remains considerable debate over the extent to which blockchain should be integrated into national CBDC frameworks. Another critical gap pertains to the global implications of CBDCs, particularly regarding the dominance of the US dollar. Kuehnlenz et al. (2023) address this issue, underscoring the need for further research into the geopolitical consequences of widespread CBDC adoption.

Additionally, the literature highlights several limitations in existing research. For example, studies such as those by Nández Alonso et al. (2021) and Cunha et al. (2021) primarily focus on specific countries or regions, which restricts the broader applicability of their findings. Moreover, there is a notable lack of long-term studies examining the sustained impact of CBDCs on financial systems and macroeconomic stability. Ozili (2023) and Bhaskar et al. (2022) suggest that future research should address these gaps by investigating the varied effects of CBDC adoption across different economic contexts and developing more comprehensive models that integrate both technological and economic considerations.

In conclusion, while the expanding body of literature on CBDCs offers valuable insights, significant debates persist regarding optimal CBDC design, its impact on private banks and financial stability, and its long-term macroeconomic implications. Future research should aim to bridge these gaps by adopting a more holistic approach that considers the complex interplay between technology, policy, and economic outcomes.

III. The Applied framework for the study.

This section explores the evolution of Central Bank Digital Currencies (CBDCs) and their possible effects on the efficiency of monetary policy. It also addresses the

complexities associated with asset tokenization, including bonds and currencies. Furthermore, it delves into China's advancements in this field, with a particular focus on the "currency bridge" initiative, which leverages blockchain technology to enhance cross-border transactions (Blockchain refers to a series of blocks in which information of all kinds is stored, blockchain is generally defined as a transparent and secure. Technology for storing and transmitting information that operates without a central control body (AIT MIMOUNE , 2025). It consists of five main pillars: Consensus Algorithms, Smart Contracts, Transactions, Distribute Ledger, P2P Network (Zenagui, Hadjadj, & Chekifi, 2024)). This initiative could play a significant role in bolstering the global presence of China's digital currency in international trade.

1. CBDC System Design Principles.

1.1. Design choices.

Although it is still too early to comprehensively assess central banks' experiences with CBDCs, particularly in Caribbean nations, analyzing their design choices provides valuable insights. When developing a CBDC, central banks must weigh multiple factors that align with their objectives and the specific dynamics of their financial systems. These design decisions often involve intricate trade-offs that may not be immediately evident, making the experiences of early adopters particularly instructive. Table 1 below outlines the key design considerations of central banks in Latin America and the Caribbean (LAC).

A fundamental element in deploying CBDCs is the design of their system architecture, which outlines how claims are structured and responsibilities divided between central banks and private entities in handling transactions. This structure covers essential areas like initiating payments, maintaining records, onboarding processes, KYC procedures, and customer support. Interestingly, nearly every central bank in the region that has launched a CBDC has chosen a hybrid model, as shown in Table 1.

For instance, in The Bahamas, the Sand Dollar is managed through commercial banks and other payment service providers (PSPs) that operate mobile wallets, while the central bank takes charge of the core infrastructure and regulatory oversight. Similarly, the DCash system in the Eastern Caribbean assigns financial institutions the tasks of onboarding users and performing KYC checks. Notably, individuals without traditional bank accounts can set up basic digital wallets using only a national ID and an email address. While this approach simplifies access by easing KYC requirements, it also enforces stricter limits on wallet balances. In contrast, Ecuador's now-defunct CBDC was issued directly by the central bank with the main aim of enhancing financial inclusion.

Another key design decision involves incorporating features that mitigate potential disruptions to bank intermediation—such as the cost, availability, and volatility of funding—while preserving financial stability, particularly by preventing bank runs. To reduce competition with conventional bank deposits, non-interest-bearing CBDCs have been introduced by both The Bahamas and the Eastern Caribbean Central Bank, along with limits on transaction volumes and account balances. In The Bahamas, these restrictions vary based on whether the account is for an individual or a business, as well as on whether the individual holds a bank account. Meanwhile, in the Eastern Caribbean, the limits on transactions and holdings are linked to each user's KYC profile, ensuring compliance with AML and CFT regulations.

A third critical design consideration involves determining how users will access the CBDC. One option is an "account-based" system, which ties ownership of the digital currency to a specific identity scheme. Alternatively, a "token-based" approach allows users to access the CBDC by proving knowledge of an encrypted value. Regardless of the chosen

method, central banks must also address concerns around data privacy and user anonymity. This issue is especially pertinent in the Latin American and Caribbean (LAC) region, where higher informality rates and a greater reliance on cash often prevail compared to other emerging markets. Moreover, a significant number of consumers in this area tend to hesitate more than the global average when it comes to sharing personal data with banks, fintech firms, or even non-financial service providers. Consequently, safeguarding their privacy and preventing any potential misuse necessitates that the CBDC's design includes robust privacy measures.

Tab (1): Features of major CBDC projects in Latin America and the Caribbean.

	Ecuador	Uruguay	The Bahamas	East Caribbean	Jamaica
					
Architecture	Direct ¹	Hybrid	Hybrid ²	Hybrid ³	Hybrid ⁴
Infrastructure	Centralised	Centralised	DLT and Centralised	DLT	Centralised
Cross-border use	National use only	National use only	National use only	Use by residents of monetary union only	National use only
Offline use	Available	Available	Possible ⁵	Possible ⁶	Possible
Users' personal data	Held on the central bank platform	Anonymous but traceable	Can be accessed only by user's wallet provider	Can be accessed only by user's financial institution	Can be accessed only by user's wallet provider
Transaction registry	Held on the central bank platform	Managed by a private company	Central bank keeps the ledger of all individual transactions and holdings	Held on the blockchain	Central bank can access retail ledger but not the user's identity
Current status	Operated between 2014 and 2018	Pilot concluded in April 2018	Live CBDC	DCash concluded in January 2024. DCash 2.0 to be launched	Live CBDC

Source: (C et al., 2024)

Under the regulatory frameworks implemented in The Bahamas, Jamaica, and the Eastern Caribbean, the central bank is charged with monitoring the transaction ledger. However, only the institution responsible for identity verification is granted access to customers' personal data.

A fourth key design consideration is the infrastructure used for the CBDC, particularly whether to adopt a traditional centrally controlled database or utilize distributed ledger technology (DLT). The distributed nature of DLT could improve resilience and offer better interoperability with private sector systems that use similar technologies. However, many DLT solutions face scalability challenges due to the time required for transaction validation, especially in permissionless systems like Bitcoin, which can process only a

limited number of transactions per minute. For this reason, central banks are not considering permissionless DLT for their CBDCs, instead focusing on permissioned DLT, where trusted parties validate transactions. Some central banks, like in The Bahamas, are incorporating a hybrid approach, using DLT for transaction recording while relying on centralized infrastructure for settlement. Other central banks may opt for conventional centralized systems that can provide similar benefits—such as programmability, instant settlement, and resilience—under the supervision of a central authority.

A fifth another factor to consider is whether CBDCs should be available to non-residents, either immediately or down the road. Granting access to non-residents might help streamline international transfers and reduce transaction fees. However, there are potential risks, such as facilitating capital flight, allowing non-residents to hold savings in foreign currencies, and increasing the potential for tax evasion. To address these concerns, central banks may implement user identification processes and impose restrictions on non-resident access. For now, all countries in the region have chosen a more cautious stance, limiting CBDC access to residents only.

1.2. Implementation issues.

Once design decisions are made, central banks face several critical challenges in implementing Central Bank Digital Currencies (CBDCs).

First, central banks must decide whether to rely on external contractors alternatively, one might tap into internal expertise to plan, develop, and supervise CBDC operations. For example, The Bahamas partnered with a lead contractor to supply the technology and support the CBDC's creation, a strategy also adopted by Jamaica. The Eastern Caribbean Central Bank partnered with a firm for the design, testing, and rollout of its CBDC. Regardless of whether the platform's design and construction are outsourced, central banks must ensure they have knowledgeable personnel and allocate budgetary resources to collaborate with contractors for effective implementation and long-term operations.

Second, it's essential for central banks and third-party entities to clearly define their roles and responsibilities. In the hybrid model adopted in LAC, private financial intermediaries handle customer-facing operations, while central banks are responsible for issuing, owning, and overseeing the CBDC platform. Effective communication and collaboration between these entities are crucial to ensure smooth operations.

Third, central banks should prioritize financial education to encourage widespread adoption. The Central Bank of Ecuador discontinued Dinero Electrónico (DE) due to public distrust, with many fearing it could lead to de-dollarization or become a government surveillance tool. Even in more secure settings, public education remains essential. The Central Bank of The Bahamas observed that people required support to transition to digital payments and had notable privacy concerns. The Eastern Caribbean Central Bank had to run a campaign to clarify that DCash was not a cryptocurrency with associated risks. Public education campaigns should also engage commercial banks, highlighting benefits such as reduced cash handling costs and an expanded customer base.

Ultimately, central banks need to foster initiatives that drive CBDC adoption. For example, in 2023, Jamaica's central bank rolled out two programs aimed at promoting Jam-Dex: one offered a 2% cashback on purchases up to 5,000 JMD, and another provided a reward to small businesses that processed five Jam-Dex payments. Moreover, central banks can benefit from tapping into private sector expertise for their market strategies. Additionally, Payment Service Providers (PSPs) involved in the CBDC initiative are expected to have a wide geographical footprint, ensuring that users can easily top up their wallets or convert digital currency into cash.

2. Objectives Pursued and Benefits Expected.

Central banks associate a number of objectives and expectations with the introduction of CBDC. The most important ones are summarised here.

2.1. Monetary Connectivity (Interoperability, Convertibility).

Central banks emphasize that Central Bank Digital Currencies (CBDCs) should complement, rather than replace, existing forms of money. This means that CBDCs, along with their associated digital wallets, transmission channels, and databases, must be technically compatible with current payment systems used for traditional monetary forms. The main focus of interoperability concerns existing central bank real-time gross settlement (RTGS) systems in relation to bank money and e-money based on bank money. While interoperability is not expected to be a major obstacle, it does require additional technical efforts, which come with associated costs.

The need for interoperability among payment systems is primarily driven by the goal of ensuring that various types of money—especially CBDCs—can be exchanged for bank money or cash and vice versa. If CBDCs are not intended to be interchangeable with other forms of money, then interoperability becomes less important.

When it comes to stablecoins and cryptocurrencies, central banks and traditional banks have paid relatively little attention to the issue of interoperability and convertibility. This may be due to the view that private cryptocurrencies are largely considered competitors that authorities are keen to exclude. Crypto platforms, however, are eager to offer conversion services, which would allow them to profit from facilitating exchanges—profits that central banks and traditional banks could potentially miss out on if they do not engage in these services.

2.2. Efficiency Increase, Cost Reduction.

Central Bank Digital Currencies (CBDCs) are expected to offer significant benefits in terms of efficiency, particularly in managing money and payments. One of the primary advantages is the convenience of digital wallet handling, which surpasses traditional methods involving cash and bank money. The ability to use CBDCs offline, in addition to online further enhances their usability. A central feature of this increased efficiency is the goal of faster payment execution, with the aim of real-time finalization, even when transactions cross different currency zones. Ensuring the security of digital wallets and safeguarding money transfers is crucial to maintaining trust and stability.

The enhanced efficiency is also anticipated to lower costs, primarily by streamlining the interbank payment system and reducing the need for multiple intermediary steps currently involved in traditional accounts. While this idea seems promising, the requirements for interoperability and convertibility could introduce additional costs. As a result, it is still uncertain how much of the expected cost reduction will be realized in practice.

2.3. Increased Utility.

In addition to the anticipated efficiency gains and cost reductions, Central Bank Digital Currencies (CBDCs) are expected to enhance their practical use, particularly through the programmability of digital tokens and the potential for financial innovations tied to smart contracts and the Internet of Things.

One example of this potential is automated interim credit. This allows individuals to lend excess funds to others as a micro-credit line within a self-defined framework, or access such services themselves. It's important to note that CBDCs, like cash, represent a positive

monetary balance and cannot be overdrawn like a traditional bank account. However, individuals may still establish a credit line based on their existing funds or current financial situation.

Those participating in automated credit arrangements should be aware that these transactions involve investment, which carries interest and associated risks. Unlike traditional bank deposits, which may be partially government-guaranteed, the claims and liabilities related to these automated lending arrangements do not necessarily have the same level of state protection.

2.4. Social Inclusion.

The goal of promoting social inclusion is also associated with anticipated cost savings. In this instance, this entails providing the previously unbanked with access to basic financial services and payment transactions using CBDC. This still affects a large number of individuals in recently industrialized nations, and the majority in many emerging nations. Digital wallets accessible through smartphone apps can aid with catch-up development in this way.

2.5. Safeguarding Financial Privacy, Verifiability and Legality.

Central Bank Digital Currencies (CBDCs) must comply with several legal requirements, which can be challenging due to conflicting objectives and the need to balance various legally protected interests. The introduction of CBDCs adds further complexity to this legal landscape.

One essential requirement is that CBDCs must safeguard financial privacy and data protection, especially regarding the confidentiality of funds and payments. Anonymity should be preserved as much as possible within legal and practical limits. However, it is equally important that payment transactions remain traceable and verifiable when necessary, particularly for regulatory authorities or in response to official requests. Financial institutions, including banks and payment service providers (PSPs), must meet their know-your-customer (KYC) obligations and assist in detecting money laundering, tax evasion, and other illicit activities. While these obligations are established, their enforcement can sometimes be inconsistent.

A notable benefit of CBDCs is their potential to reduce the risk of banknote counterfeiting, an issue that has already decreased with the rise of cashless payments. Experts generally agree that counterfeiting digital tokens should be virtually impossible due to their cryptographic features and the unique identities that can be instantly verified. However, token theft, particularly on cryptocurrency exchange platforms, remains a concern. Addressing this challenge may conflict with the need to protect user identities, creating a complex issue for regulators and policymakers.

2.6. Improved Effectiveness of Monetary Policy, Increased Financial Stability.

Most central banks expect that Central Bank Digital Currencies (CBDCs) will enhance the effectiveness of monetary policy, contributing to greater stability and resilience within the monetary and financial systems. This is anticipated to foster stronger public confidence in both the monetary system and the central banks.

With the widespread adoption of CBDCs, it is expected that monetary policy will become more effective through a stronger quantity lever, allowing policy signals to be transmitted more effectively. The reasoning is clear: an increase in CBDC circulation could amplify the effects of monetary policy, while a decrease could diminish those effects. This raises

concerns about the limitations of current monetary policy and suggests that the existing bank money regime may be inherently unstable and less resilient during crises.

Although central banks officially justify the introduction of CBDCs by emphasizing their role in providing central-bank money (legal tender), particularly as cash usage declines, they often avoid addressing the systemic issues associated with the decreasing role of cash. Recently, however, European Central Bank President Christine Lagarde and Executive Board member Fabio Panetta have acknowledged that without a digital currency, central banks could face marginalization. They stress that the digital payments landscape should not be left entirely to private instruments and advocate for the need for a strong monetary anchor, in the form of a CBDC, to ensure monetary stability (Huber, 2023).

3. Perceived risks.

Drawing from insights provided by both our comparative and case studies, we outline the key challenges encountered in the tokenization of currencies, bonds, and various other financial instruments.

3.1. Regulation uncertainties.

Bond tokenization currently exists in a regulatory void, with authorities offering only minimal direction on its categorization and oversight. In major economies such as the US and the EU, regulatory frameworks remain underdeveloped, as noted in the EU's report, "*A Stocktake on the Digital Euro*." This regulatory uncertainty can create skepticism among market participants, potentially slowing the adoption and expansion of tokenization in financial markets.

3.2. Liquidity challenges.

Liquidity poses a significant challenge in asset tokenization, primarily due to the difficulty in accurately determining the value of tokens. This uncertainty can result in diminished demand and low trading volumes, creating challenges for investors looking to sell their bond tokens. Additionally, it complicates the capital-raising efforts for issuers. These challenges create a trust gap that slows the broader acceptance and growth of tokenized currencies and assets.

3.3. Security concerns.

Digital tokens are maintained and exchanged electronically, which makes them prone to cyberattacks and hacking attempts. In 2021, nearly \$10 billion was lost due to various scams and breaches, leading to substantial asset losses and diminishing trust in the technology. This decline in confidence may significantly slow down the adoption and broader use of digital assets. Moreover, addressing digital or cybercrime presents both technical and legal challenges, as perpetrators often operate from different countries, complicating enforcement and accountability efforts.

3.4. Interoperability difficulties.

Tokens are restricted to trade exclusively on approved platforms, a limitation that can impede their utility and deter new entrants into the market. This constraint might lead to a fragmented ecosystem marked by a lack of trust and a drop in the overall effectiveness of the tokenization process. For projects such as the currency bridge, it is vital that countries work together to merge diverse monetary systems into one blockchain, a task that calls for shared leadership and reciprocal trust. The Bank for International Settlements (BIS) has outlined three models to enable cross-border CBDC interoperability: the Helvetia Phase II project, SWIFT CBDC experiments, and Project Dunbar. Although achieving technical

interoperability is within reach, considerable efforts remain necessary to develop standards, create interfaces, and tackle legal and governance challenges.

3.5. Capability limits.

Tokenization involves a multifaceted procedure that demands significant technical skills and specialized knowledge to both implement and maintain effectively. Furthermore, the sponsors behind these tokens often do not have the necessary expertise to manage asset acquisitions and oversee assets after fundraising, which can slow adoption and make it challenging for both issuers and investors to fully harness the technology. (Zhang et al., 2024)

4. A Case study of China.

China is at the forefront of digital innovation in finance, which is worth an in-depth inspection. In this section, we conduct a case study of China's tokenization in three contexts: (i) currency tokenization (CBDC), (ii) bond tokenization, and (iii) "Currency Bridge".

4.1. Currency tokenization.

The evolution of the digital RMB, commonly known as e-CNY, began in 2014 when the People's Bank of China (PBoC) initiated a research project aimed at exploring both the advantages and challenges of blockchain-based digital currencies. The objective was to create a digital counterpart to China's national currency, the CNY. In 2019, the PBoC launched a pilot project in cities such as Shenzhen and Chengdu to evaluate the system's technical performance and overall viability. This pilot proved successful, demonstrating not only robust technical capabilities—such as stability, scalability, and practical functionality—but also high user satisfaction and ease of use. Building on these promising results, the digital yuan was officially introduced in 2020 as a key step towards modernizing China's financial infrastructure and boosting financial inclusion. (Refer to Fig. 1 for a detailed timeline of e-CNY's development.)

In everyday use, the digital yuan serves as a digital version of the physical currency, enabling consumers to carry out routine transactions like purchasing goods, paying for services, or settling bills. Its rapid adoption has seen millions of Chinese citizens engage with the currency for various financial activities. Additionally, the PBoC has continually refined the digital yuan by incorporating features such as QR code payments and offline transaction capabilities.

The launch of e-CNY marks a significant milestone in China's push towards digital transformation, reinforcing its position as a global innovator in the realm of digital currencies. Its success has attracted international attention, with other countries now examining the potential benefits and hurdles associated with digital currency implementation.

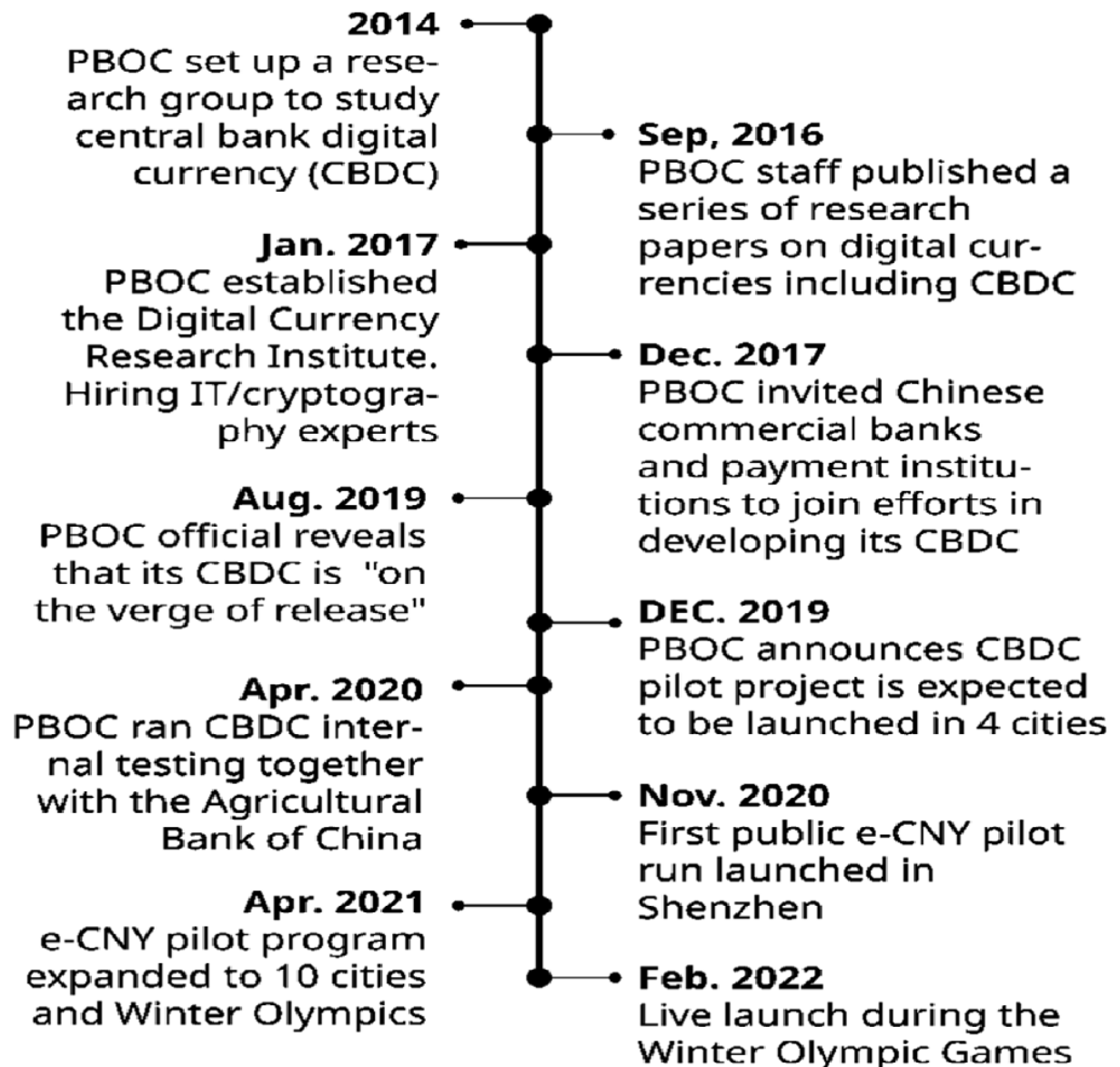
A major benefit of the digital yuan lies in its ability to simplify cross-border trade and investment for Chinese businesses. By utilizing a digital currency, companies can reduce the costs and complexities inherent in traditional currency exchanges, thereby increasing the efficiency and transparency of international transactions. Moreover, e-CNY may help promote the global use of the CNY by offering a fresh, innovative channel for international investors to access Chinese debt markets. Through the issuance of tokenized bonds denominated in digital yuan, both the Chinese government and its corporations could tap

into a broader pool of investors, including those who typically face barriers to participating in conventional bond markets.

4.2. Bond tokenization.

Bond tokenization refers to the process of converting a conventional bond into a digital token, thereby enabling its exchange on blockchain platforms.

Fig (1): The development of e-CNY.



Source: (Zhang et al., 2024)

Bond tokenization is the process of creating digital representations of traditional bonds on a distributed ledger, leveraging blockchain technology and smart contracts. Blockchain serves as the core infrastructure for bond tokenization, providing a secure, transparent, and decentralized ledger for transactions. Thanks to its decentralized design, tokenized bonds can be transferred directly between parties without relying on traditional intermediaries like banks or other financial institutions. This approach not only cuts down on fees, but it also boosts efficiency and speeds up the transaction process. Additionally,

smart contracts function as self-enforcing agreements, with the conditions between buyers and sellers being directly embedded within the contract itself. These smart contracts automate the entire bond tokenization process, ensuring the secure, transparent, and efficient creation, management, and transfer of tokenized bonds.

Here are several compelling cases that demonstrate the real-world implementation of bond tokenization:

- ZhongAn, known as China's first fully online insurance company, has been exploring blockchain's potential in this area. In 2019, the firm conducted a successful trial on a blockchain-based platform for issuing bonds, showcasing how the technology can boost both efficiency and security in bond issuance and trading.
- In a similar approach, the Bank of China (BoC) has been proactive in applying blockchain to bond tokenization. In the same year, BoC issued bonds worth \$2.8 billion using its own blockchain system. This system seamlessly integrates various functions such as bond creation, bookkeeping, underwriting, network management, purchasing, order summarization, pricing, and placement.
- The China Central Depository & Clearing (CCDC) has also made strides by developing a blockchain-based platform for digital bond issuance. Selected for a national blockchain innovation pilot program in early 2022 and supported by both regulators and the market, this platform became fully operational later that year.
- Additionally, the Shanghai Stock Exchange has been investigating how to incorporate blockchain technology for bond tokenization in recent years. In 2023, the Securities and Futures Commission of Hong Kong (SFC) issued two key circulars concerning the tokenization of SFC-approved investment products and clarifying the role of intermediaries in tokenized securities.

Collectively, these examples underscore the growing momentum behind bond tokenization in China. By capitalizing on the inherent advantages of blockchain technology, these initiatives are set to transform the traditional bond market, paving the way for fresh investment opportunities and enhanced capital formation. A distinctive aspect of these developments is the use of consortium blockchains, which are managed by a group of organizations rather than by a single entity (as seen in private blockchains) or an extensive open network (like public blockchains).

Take R3 as an illustration—a consortium that brings together more than 200 entities from banks, financial institutions, and tech companies, all working to propel the evolution of blockchain technology in the financial services arena. Similarly, Hyperledger, an open-source blockchain initiative hosted by the Linux Foundation, involves several leading players in finance, banking, IoT, supply chain, manufacturing, and technology. Additionally, the Marco Polo Network, which is focused on trade and working capital finance, aims to streamline and automate trade transactions through blockchain technology.

Consortium blockchains bring several benefits for bond tokenization, making them an appealing option for institutions aiming to digitize bonds:

1. **Enhanced Security:** Compared to public blockchains, consortium blockchains offer a safer environment. This is because the member organizations can implement more rigorous security measures and exercise tighter control over the network—an essential factor when dealing with sensitive financial assets like bonds.

2. **Better Scalability:** Consortium blockchains allow the governing entities to control the number of nodes and select an appropriate consensus mechanism, ensuring efficient network management and optimization.
3. **Enhanced Privacy:** Members on these blockchain networks can control who accesses the system and what data is shared—a vital safeguard for sensitive financial information, such as the specifics of bond issuances.
4. **Improved Interoperability:** Consortium blockchains are engineered to mesh effortlessly with other blockchain networks, enabling the smooth transfer and exchange of tokenized bonds across a variety of platforms while enhancing the overall interoperability of the bond tokenization process.

To develop a secure, scalable, private, and interoperable bond tokenization framework, establishing a collaborative consortium blockchain network is crucial. Based on the reviewed cases, several key challenges emerge:

- **Complex Governance Structure:** Consortium blockchains involve multiple entities with diverse objectives. Designing a governance framework that ensures fair participation while balancing these interests can be difficult. Leading financial institutions often take charge, potentially introducing some level of centralization.
- **Interoperability Challenges:** Ensuring seamless integration with other blockchain networks (e.g., e-CNY) requires significant technical effort. Compatibility issues may arise, emphasizing the importance of strong leadership and investment in interoperability solutions.
- **Regulatory Compliance:** Adhering to jurisdiction-specific regulations is essential, particularly in highly regulated sectors like bond issuance. Navigating these complexities demands ongoing collaboration with policymakers.
- **Security Risks:** While consortium blockchains enhance security compared to public networks, they still face risks such as data breaches and cyber threats. Implementing rigorous security protocols and continuous monitoring is critical.
- **Technical Barriers:** Developing a consortium blockchain requires expertise in blockchain architecture, cryptography, and distributed systems. Addressing scalability and performance concerns necessitates significant resources and innovation.
- **Adoption Resistance:** Some organizations may hesitate to embrace consortium blockchains due to skepticism or reluctance to alter established financial processes. Overcoming this resistance requires education, outreach, and clear demonstrations of benefits.

Even with these hurdles, consortium blockchains bring notable benefits—improved security, scalability, and privacy—that make them highly appealing to banks and bond issuers. To promote wider adoption, we suggest a gradual strategy: start by tokenizing existing bonds within a solid regulatory framework, and then, once the market is sufficiently mature, move on to issuing new tokenized bonds.

4.3. Currency bridge.

Tokenization's evolution has been closely interwoven with the process of elevating the Chinese Yuan (CNY) onto the global stage, especially with the launch of the m-CBDC-Bridge project in 2022 by China's five largest commercial banks. This project aims to facilitate cross-border transactions between trading partners in various currencies, promoting trade and investment by offering a more convenient, efficient, and cost-effective

means of currency exchange, including the conversion of e-CNY with currencies like USD, EUR, and JPY. Leveraging blockchain technology, the m-CBDC-Bridge reduces transaction costs and boosts efficiency by minimizing reliance on intermediaries, enabling faster and more reliable transactions. Moreover, the secure and transparent nature of blockchain builds trust by preventing fraud and financial crimes while providing a clear transaction history. This technology also expands access to financial services, particularly in developing countries where such services are often limited.

Promoting the use of e-CNY within this currency bridge could support its adoption in international trade, potentially increasing its global demand and advancing its internationalization. Overall, a blockchain-enabled currency bridge like the m-CBDC-Bridge offers significant advantages for both international and regional trade, driving economic growth and development by encouraging more open and inclusive trade practices.

The first step in the internationalization of the Chinese Yuan (CNY) is establishing it as the anchor currency for regional trade, particularly through the Regional Comprehensive Economic Partnership (RCEP). This pivotal trade accord unites ten ASEAN nations together with China, Japan, South Korea, Australia, and New Zealand. Its primary goal is to boost trade and investment by easing tariffs and other non-tariff barriers, thereby fostering a more integrated economic landscape. By incorporating e-CNY into a consortium blockchain within the RCEP framework, trade and investment in the Asia-Pacific region could be greatly enhanced. Employing the e-CNY for international transactions enables Chinese companies to substantially reduce the expenses and complications commonly tied to traditional currency exchanges, thereby enhancing both operational efficiency and transaction clarity. Moreover, the RCEP is poised to cultivate a more accessible and inclusive trade and investment climate, which could further spur the wider adoption of the e-CNY.

However, Similar to launching a consortium blockchain for bond tokenization, building a currency bridge demands decisive leadership. In this regard, China should play a proactive role, leveraging its position as the first country to develop a CBDC like e-CNY, alongside its early advancements in bond tokenization. With greater influence in this area comes an equally significant responsibility. (Zhang et al., 2024)

IV. Conclusion

This comprehensive review highlights the transformative impact of CBDCs and asset tokenization on the financial sector.

Summary of Key Findings

The key findings indicate that CBDCs aim to improve monetary efficiency, enhance financial inclusion, and strengthen monetary policy, while tokenization enhances transparency, security, and operational efficiency in financial transactions, particularly in bond issuance. China's advancements with the digital yuan (e-CNY) and its pioneering efforts in bond tokenization demonstrate both the potential benefits and the challenges of incorporating these technologies into the financial system.

Implications

The adoption of CBDCs and tokenization has the potential to transform financial systems by increasing transaction efficiency, reducing costs, and expanding financial inclusion. For central banks and financial institutions, these innovations offer new ways to streamline operations and enhance accessibility. Meanwhile, for investors and market

participants, tokenization provides greater transparency and broader market access. However, the integration of these technologies also introduces challenges, including regulatory ambiguities, liquidity constraints, and cybersecurity risks, which must be effectively managed to maximize their advantages.

Research Limitations

This review is constrained by its emphasis on specific case studies and the fast-paced nature of technological advancements, which may affect the applicability of its findings to broader contexts. The analysis is largely centered on developments in China, potentially limiting its representation of the global landscape of CBDCs and tokenization. Additionally, the review does not extensively explore the long-term economic and social effects of these technologies, leaving certain aspects of their broader impact unaddressed.

Suggestions for Future Research

Future research should expand its focus to include a broader range of international experiences with CBDCs and tokenization, providing a more comprehensive perspective on global developments. Investigating the long-term economic effects and societal implications of these technologies will be crucial for understanding their broader impact. Furthermore, exploring the dynamic relationship between regulatory frameworks and technological advancements will be essential in addressing the challenges highlighted in this review. Comparative analyses of different regional approaches to CBDCs and tokenization could offer valuable insights into best practices and effective strategies for successful implementation.

Bibliography

- Agur, I., Ari, A., & Dell’Ariccia, G. (2022). *Designing central bank digital currencies*. *Journal of Monetary Economics*, 125, 62–79. <https://doi.org/10.1016/j.jmoneco.2021.05.002>
- AIT MIMOUNE , K. (2025, 01 20). Blockchain: cryptocurrencies projection in the banking and financial sector during the period (2009-2023). *Journal of Contemporary Business and Economic Studies*, 08(01), pp. 193-204. <https://asjp.cerist.dz/en/article/262701>
- AMRI, R., RIAD, M., & AKHENAK, A. (2024, 01 15). Crypto Currencies and Islamic Finance: The case of start-up Stellar. *Journal of Contemporary Business and Economic Studies*, 07(01), pp. 68-80. <https://asjp.cerist.dz/en/article/238438>
- Andolfatto, D. (2021). *Assessing the Impact of Central Bank Digital Currency on Private Banks*. *The Economic Journal*, 131(634), 525–540. <https://doi.org/10.1093/ej/ueaa073>
- Barrdear, J., & Kumhof, M. (2022). *The macroeconomics of central bank digital currencies*. *Journal of Economic Dynamics and Control*, 142, 104148. <https://doi.org/10.1016/j.jedc.2021.104148>
- Bhaskar, R., Hunjra, A. I., Bansal, S., & Pandey, D. K. (2022). *Central Bank Digital Currencies: Agendas for future research*. *Research in International Business and Finance*, 62, 101737. <https://doi.org/10.1016/j.ribaf.2022.101737>
- Cunha, P. R., Melo, P., & Sebastião, H. (2021). *From Bitcoin to Central Bank Digital Currencies: Making Sense of the Digital Money Revolution*. *Future Internet*, 13(7), 165. <https://doi.org/10.3390/fi13070165>

- Fernández-Villaverde, J., Sanches, D., Schilling, L., & Uhlig, H. (2021). *Central bank digital currency: Central banking for all?* Review of Economic Dynamics, 41, 225–242. <https://doi.org/10.1016/j.red.2020.12.004>
- Kuehnlenz, S., Orsi, B., & Kaltenbrunner, A. (2023). *Central bank digital currencies and the international payment system: The demise of the US dollar?* Research in International Business and Finance, 64, 101834. <https://doi.org/10.1016/j.ribaf.2022.101834>
- Li, Z., Yang, C., & Huang, Z. (2022). *How does the fintech sector react to signals from central bank digital currencies?* Finance Research Letters, 50, 103308. <https://doi.org/10.1016/j.frl.2022.103308>
- Náñez Alonso, S. L., Jorge-Vazquez, J., & Reier Forradellas, R. F. (2021). *Central Banks Digital Currency: Detection of Optimal Countries for the Implementation of a CBDC and the Implication for Payment Industry Open Innovation.* Journal of Open Innovation: Technology, Market, and Complexity, 7(1), 72. <https://doi.org/10.3390/joitmc7010072>
- Ozili, P. K. (2023). *Central bank digital currency research around the world: a review of literature.* Journal of Money Laundering Control, 26(2), 215–226. <https://doi.org/10.1108/JMLC-11-2021-0126>
- Wang, Y., Lucey, B. M., Vigne, S. A., & Yarovaya, L. (2022). *The Effects of Central Bank Digital Currencies News on Financial Markets.* Technological Forecasting and Social Change, 180, 121715. <https://doi.org/10.1016/j.techfore.2022.121715>
- Zhang, T., & Huang, Z. (2022). *Blockchain and central bank digital currency.* ICT Express, 8(2), 264–270. <https://doi.org/10.1016/j.icte.2021.09.014>
- Alsalmi, N., Ullah, S., & Rafique, M. (2023). *Accounting for digital currencies.* Research in International Business and Finance, 64. <https://doi.org/10.1016/j.ribaf.2023.101897>
- Bitter, L. (2020). *Standard-Nutzungsbedingungen: Banking Crises under a Central Bank Digital Currency (CBDC).* <https://hdl.handle.net/10419/224600>
- Bordo, M. D., & Levin, A. T. (2017). *NBER WORKING PAPER SERIES CENTRAL BANK DIGITAL CURRENCY AND THE FUTURE OF MONETARY POLICY.* <http://www.nber.org/papers/w23711>
- Borio, C., Claessens, S., Cohen, B., Domanski, D., Halaburda, H., Hughes, K., Schanz, J., Song, H., Bech, M., & Garratt, R. (2017). *Central bank cryptocurrencies 1.* In BIS Quarterly Review. www.blockchain.info
- C, V. A., Kamin, S., & Zampolli, F. (2024). *Central bank digital currencies (CBDCs) in Latin America and the Caribbean.* Latin American Journal of Central Banking. <https://doi.org/10.1016/j.latcb.2024.100140>
- Engert, W., & Fung, B. S. C. (2017). *Central Bank Digital Currency: Motivations and Implications.* www.bank-banque-canada.ca
- Helmi, M. H., Çatık, A. N., & Akdeniz, C. (2023). *The impact of central bank digital currency news on the stock and cryptocurrency markets: Evidence from the TVP-VAR model.* Research in International Business and Finance, 65. <https://doi.org/10.1016/j.ribaf.2023.101968>
- Huber, J. (2023). *HuberThe Monetary Turning PointFrom Bank Money to Central Bank Digital Currency (CBDC).* Switzerland: Springer Nature

- Kiff, J., Alwazir, J., Davidovic, S., Farias, A., Khan, A., Khiaonarong, T., Malaika, M., Monroe, H., Sugimoto, N., Tourpe, H., Zhou, P. (2020). *A Survey of Research on Retail Central Bank Digital Currency*, WP/20/104, June 2020
- Kriese, L. (2023). *Central Bank Digital Currency: A Technical, Legal and Economic Analysis*. Springer International Publishing. <https://doi.org/10.1007/978-3-031-44738-9>
- Kumhof, M., & Noone, C. (2018). *Staff Working Paper No. 725 Central bank digital currencies-design principles and balance sheet implications*. www.bankofengland.co.uk/working-paper/Working-papers
- OULAD BRAHIM, L. (2024). The Role of the Central Bank in Supporting Comprehensive Financial Systems in the Region of the Middle East: Case Study of the Central Bank of Iraq. *Journal of Contemporary Business and Economic Studies*, 07(01), pp. 209-228. <https://asjp.cerist.dz/en/article/238447>
- Ozili, P. K. (2022). *Central bank digital currency in Nigeria: opportunities and risks*. <https://ssrn.com/abstract=3917936>
- Ozili, P. K. (2023). *Central bank digital currency research around the world: a review of literature*. In *Journal of Money Laundering Control* (Vol. 26, Issue 2, pp. 215–226). Emerald Publishing. <https://doi.org/10.1108/JMLC-11-2021-0126>
- Ward, O., & Rochemont, S. (2019). *Understanding Central Bank Digital Currencies (CBDC)*. The Institute and Faculty of Actuaries (IFoA), An addendum to “A Cashless Society- Benefits, Risks and Issues (Interim paper)”
- Zhang, Y., Gong, B., & Zhou, P. (2024). *Centralized use of decentralized technology: Tokenization of currencies and assets*. *Structural Change and Economic Dynamics*, 71, 15–25. <https://doi.org/10.1016/j.strueco.2024.06.006>
- Zenagui, B., Hadjadj, C., & Chekifi, M. (2024). Blockchain technology in the field of banana global supply chains. *Journal of Contemporary Business and Economic Studies*, 07(01), pp. 52-67. <https://asjp.cerist.dz/en/article/238437>