

Development and Practice of Digital Currency, Challenges and Opportunities: The Case of Digital RMB

Yan Yu^{1,a,*}

¹*School of Economics and Management, Beijing University of Posts and Telecommunications, 10 Xitucheng Road, Beitaipingzhuang, Haidian District, Beijing, China.*

a. yu.yan@bupt.edu.cn

**corresponding author*

Abstract: Amid the vigorous development of the digital economy, the digital RMB is gradually becoming a key issue in the field of financial technology. The digital transformation of the RMB provides the financial industry with a strategic opportunity to shift from informatization to digital operations, aiming to enhance the efficiency of the financial system in serving the real economy, expand financial inclusion, and lay the foundation for the internationalization of the digital RMB. As the influence of the digital RMB continues to expand, the challenges encountered in its development, such as market adaptability, technical challenges, mechanism constraints, and the complex international environment, have become increasingly prominent. Therefore, in advancing the digital RMB, it is essential to continuously improve the monetary and financial legal system and regulatory framework, and to emphasize the importance of strengthening the construction of an international cooperation system, in order to promote the healthy development of the digital RMB and address the challenges of globalization.

Keywords: Digital Currency, Digital RMB, Development Opportunities, Financial Innovation, Regulatory Policy

1. Introduction

1.1. Concept and Characteristics of Digital Currency

Digital currency is currency based on digital technology rather than physical form, utilizing encryption technology to ensure transaction security and anonymity, enabling efficient and low-cost international payments. Its characteristics of digitization, decentralization, and security stand out in the financial sector, reducing costs and time. Mainstream digital currencies like Bitcoin have attracted global attention and regulation, and their development prospects will be influenced by policies and regulations.

1.2. Development History of Digital Currency

With the rapid development of Internet technology, people's demand for convenience in life has risen again, and paper money gradually could not meet people's transaction needs, leading to the emergence of electronic money. In 1952, the Franklin National Bank of California issued the first bank credit

card, followed by the Bank of America, which began issuing the "BankAmericard" in 1958. In 1974, Roland Moreno developed the IC card as a storage medium for electronic money. By 1982, electronic money transmission systems were established in the United States, Germany, and the United Kingdom, making credit cards mainstream. Nowadays, electronic forms of money like Alipay and WeChat Pay have become the primary means of daily transactions.

In 2008, Satoshi Nakamoto first proposed the concept of Bitcoin, marking the birth of digital currency. Subsequently, many countries began to research legal digital currencies. In 2014, the People's Bank of China established a research team, and in 2016, it announced the issuance of legal digital currency and explored its relationship with blockchain technology. By 2020, major countries such as China, the United States, the United Kingdom, and Japan were conducting pilot programs for legal digital currencies. The security and application potential of digital currency are being widely studied, indicating its important position in future finance.

1.3. Significance and Research Questions

The importance of digital currency research lies in promoting financial innovation, technological development, enhancing the inclusiveness of financial services, preventing risks, and stabilizing finance. The research needs to cover the operation of digital currency, market conditions, applications and business models, risk and regulatory challenges, as well as technological advancements and development prospects, to support its sustainable development.

2. Literature Review

Research on central bank digital currencies (CBDCs) is gaining increasing attention in academia, with the digital RMB being a focal point in this field. Current studies on the digital RMB mainly focus on two aspects: first, exploring the purposes or motivations for its issuance; second, examining its design schemes and implementation paths. In-depth research on these two aspects can enhance the understanding of the characteristics and advantages of the digital RMB, providing scientific basis for future policy making. Regarding the first aspect, the research shows the following viewpoints: The development of the digital RMB is driven by various factors, including both demand and supply elements, as well as considerations of financial regulation and the need to counteract the disorderly development of private currencies [1]. The primary purpose of issuing the digital RMB is to improve the convenience of daily payments for Chinese residents and to reduce the management costs of the central bank [2]. The system of legal digital currency impacts the overall economic operation and plays a crucial role in enhancing the internationalization of the RMB [3]. The main aim of issuing the digital RMB is to strengthen the central bank's regulation and control over the currency. Additionally, this measure highlights the practical needs of combating money laundering and terrorist financing activities, as well as reducing international trade costs. However, the most critical goal is to promote the internationalization of the RMB by using digital currency to compete with international currencies like the US dollar and the euro [4]. In the short term, China's promotion of the digital RMB is to respond to the competition from private digital currencies and to safeguard national monetary sovereignty. In the long term, it is to better adapt to the development trend of the digital economy, thereby enhancing the overall development level of China's digital finance [5]. The development of the digital RMB presents opportunities and advantages such as economic transformation, digital economy development, financial technology advancement, and competitive fault tolerance. Seizing these opportunities to promote the internationalization of the RMB and ensuring that the digital RMB is technically seamless are important means to advance the internationalization of the RMB [6].

Regarding the design schemes and implementation paths of the digital RMB: By deeply analyzing the entire process of the digital RMB from theoretical proposition to model construction and pilot

operation, it is found that the digital RMB is a key technological means to promote the internationalization of the RMB [7]. China has a technological lead and comparative advantage in the field of digital RMB research and development. To ensure its smooth implementation, necessary adjustments to relevant laws and regulations should be made based on actual circumstances, clarifying the legal status of the central bank digital currency as RMB. Through legislation, its regulatory scope should be defined, and technological means should be used to set a reasonable regulatory range, balancing risk prevention, financial innovation, and rights protection [8]. To ensure the rapid rollout of the digital RMB and maintain financial stability, the central bank should intensify pilot tests from a technical perspective, establish a communication dialogue mechanism between the central bank, commercial banks, and the industry based on the principle of coordination, and regulate the behavior of commercial banks through financial technology regulatory innovation [9].

3. Theoretical Foundations of Digital Currency

3.1. Blockchain Technology and Its Principles

Blockchain technology, originating from Bitcoin, is used to maintain a decentralized database. It stores data across multiple nodes through a distributed network, enhancing fault tolerance and scalability while reducing the risk of failure. Blockchain employs cryptographic technology to secure data, ensuring that information is tamper-proof, making it suitable for high-security scenarios. The consensus mechanism maintains data consistency and supports smart contracts, providing a technological foundation for the digital economy.

3.2. Classification of Digital Currency

The birth of Bitcoin brought widespread attention to decentralized digital cryptocurrencies, leading to the development of various types and forms of digital currencies. Digital currencies can be categorized into two types: legal and non-legal. Legal digital currencies are developed by central banks, while non-legal digital currencies include network-native cryptocurrencies and stablecoins pegged to legal tender.

3.3. Economic Principles of Digital Currency

From a supply perspective, the issuance of digital currency is determined by algorithms rather than by central banks, making them resistant to inflation and scarce, similar to gold. On the demand side, digital currency serves as a store of value, a medium of exchange, and a settlement tool. Its decentralization reduces transaction costs, increases speed, enhances anonymity, and facilitates global peer-to-peer transactions.

4. Evolution of Digital RMB Theory

4.1. Development History of Digital RMB

4.1.1. Initial Stage (2014-2015)

Since 2014, the People's Bank of China (PBOC) has been developing digital currency. A specialized team was formed to comprehensively research various aspects such as issuance, operation, technology, and legal issues. Additionally, an in-depth analysis was conducted on the economic impacts of legal digital currency, its relationship with private digital currencies, and international practices, yielding significant results.

4.1.2. Project Launch Stage (2016-2017)

After two years of research, the PBOC's digital currency project entered the implementation phase. In 2016, the PBOC held a seminar to clarify issuance goals and established a research institute to develop a prototype system. By the end of 2017, with approval from the State Council, the PBOC collaborated with commercial banks, telecommunications, and internet companies to develop and promote the digital RMB.

4.1.3. Research and Testing Stage (2018-2019)

In 2018, the digital RMB entered the testing phase, with the development and trial operation of functional modules. Fintech companies were established to manage the infrastructure and maintenance. In 2019, the PBOC announced the progress of the digital RMB development, adopting a two-tier operating system and beginning closed-loop testing.

4.1.4. Pilot Stage (2020 to Present)

Since 2020, the digital RMB has launched pilot programs and testing in locations such as Shenzhen, Suzhou, Xiong'an, Chengdu, and venues for the Winter Olympics, forming a "4+1" pilot framework.

In August 2020, the Ministry of Commerce issued the "Notice on the Overall Plan for Comprehensively Deepening Service Trade Innovation Development Pilot," outlining plans for pilot testing the digital RMB in multiple regions. By early 2021, the pilot programs expanded to 28 provinces and cities nationwide. With key development milestones achieved, the current focus is on steadily expanding the pilot programs, exploring new models, and deepening the pilot efforts.

5. Practical Applications of Digital RMB

5.1. Application of Digital RMB in the Real Economy

The application domains of the digital RMB can be divided into several aspects, including retail payments, enterprise-level payments, cross-border payments, and smart contracts. Currently, the general public primarily participates in the retail payment sector, which focuses on small-value, high-frequency transactions. The enterprise-level payment applications of the digital RMB are continuously expanding to cover various corporate scenarios.

5.2. Application of Digital RMB in Public Services

The application of the digital RMB in the public service sector is gradually expanding, encompassing public payments, government subsidy distribution, and combating illegal activities. In terms of public payments, for example, the Dalian Municipal Taxation Bureau has implemented the digital RMB for social security payments, covering 4 million citizens and providing equal quality services. Additionally, the controllable anonymity of the digital RMB aids in monitoring and combating crimes such as money laundering, tax evasion, and terrorist financing, thereby maintaining social order and stability.

6. Risks and Challenges of Digital RMB

China has made an early start in the planning and research of digital currency, with rapid progress in experiments, testing, and pilot programs aimed at benefiting the public and enhancing the inclusiveness of financial services. While the digital RMB improves monetary accessibility, it also faces new challenges that need to be addressed.

6.1. Technical Security Risks

The digital RMB adopts a dynamic competitive evolution mechanism, continuously incorporating the latest technological advancements. However, this approach also increases the complexity of the system. Currently, China's digital currency is still in the pilot stage, and both theoretical research and practical applications need to be further strengthened.

6.2. Challenges of International Monetary Competition

With the emergence of central bank digital currencies (CBDCs), the fragmentation of the global monetary and financial system is likely to intensify. We must carefully consider this development trend and take appropriate measures to address potential challenges. To address this issue, international financial organizations such as the International Monetary Fund (IMF) and the Bank for International Settlements (BIS) are actively seeking to establish unified standards to mitigate this trend. Consequently, governments and central banks worldwide need to strengthen cooperation to jointly develop interoperability standards for legal currencies in terms of technology and circulation.

Research by [10] and others indicates that the currency swap mechanism reveals a lack of cooperation between China and the US in monetary sovereignty, reflecting their competition in the international monetary system and the challenges to RMB internationalization. The advent of CBDCs has raised concerns about global financial stability, prompting international financial organizations to seek the establishment of unified standards.

7. Advantages and Opportunities of Digital RMB

Amid the urgent need for economic restructuring and digital development in China, the introduction of the digital RMB has become an irreversible trend. According to the "Outline of the Fourteenth Five-Year Plan for National Economic and Social Development and the Long-Range Objectives Through the Year 2035" of the People's Republic of China, the country has decided to adopt a prudent strategy to promote the development of the digital RMB. Although the digital RMB is currently in the testing and pilot stages, its advantages and opportunities in financial inclusion and the richness of application scenarios are already evident, promising to inject new vitality into the long-term development of China's economy and society.

7.1. Promoting Financial Innovation and Development

The introduction of the digital RMB promotes financial innovation and development, particularly in the area of inclusive finance. It overcomes geographical limitations through internet and mobile technology, expands the coverage of financial services, and enhances efficiency and security. Technologies such as smart contracts improve the automation and accuracy of transaction processing.

7.2. Broad Application Scenarios

The digital RMB has been piloted nationwide, with major commercial banks launching digital wallet services and third-party payment platforms incorporating its applications, driving the popularization of mobile payments. The People's Bank of China is also promoting its international payment business, leveraging the advantages of domestic digital platforms to accelerate the digital transformation of the financial industry and the broader economy.

8. Conclusion

The digital RMB promotes the digital transformation and improvement of China's financial infrastructure, enhancing the effectiveness and flexibility of monetary policy execution. This, in turn, strengthens the ability of financial services to support the real economy and expands financial inclusion. However, it also poses challenges and impacts the stability of the existing economic, financial, and monetary systems. Therefore, it is crucial to maximize benefits while mitigating risks and responding appropriately. To address the development of the digital economy and the global competition among central bank digital currencies (CBDCs), China needs to intensify the technological research and innovation of the digital RMB, ensure information security, anticipate the impacts on the financial order, monitor financial risks, and enhance public awareness of security. The legal and compliance framework should be improved to establish the legal status of the digital RMB, build a robust regulatory system, and innovate in anti-money laundering technologies. Furthermore, international cooperation and exchange should be strengthened to share experiences and standards with developed countries, establish collaborative regulatory mechanisms, jointly combat cross-border illegal activities, and promote the stable and prosperous development of the digital RMB and the global digital economy.

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