

*Original Research Article*

# Challenges and Opportunities in the Application of China's Central Bank Digital Currency to the Payment and Settle Account System

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**Abstract:** With the advancement of the Internet and big data technology, currency has gradually developed in the direction of virtualization and digitization. The governments and central banks of various countries have gradually begun to pay attention to the role of digital currencies, and central bank digital currencies have emerged as the times require. As one of the first countries to study digital currency, China will devote itself to applying central bank digital currency to actual transactions in the future.

This article focuses on how China's CBDC is used in the transaction settlement system. The opportunity is that the central bank's digital currency technology improves the security, flexible operation and diversified application scenarios of the overall transaction settlement system, and further safeguards China's national financial sovereignty. The challenge is that the current technology is still uncertain and different from the traditional RMB. In the future, China's CBDC will also compete fiercely with other sovereign currencies. It is recommended to strengthen technological innovation, improve the relevant systems and regulations of the central bank's digital currency operation, and make relevant policies to prevent the United States from imposing political and economic sanctions on China. This article will provide suggestions on the challenges that the People's Bank of China may face in the future application of digital currency to the transaction settlement system.

**Keywords:** Central Bank Digital Currency; Technology; Market Circulation; Opportunities; Challenges

## 1. Introduction

Digital currency is currently one of the largest gathering points in the financial industry. With the advancement of digitalization and technology in the whole industry, the rapid development of the digital economy has made the birth of digital currency an irreversible trend. Although in the early years Bitcoin, Libra and other digital currencies characterized by "decentralization" have been produced based on blockchain technology, on the one hand, because of the lack of supervision system and framework, there is no entity to endorse, on the other hand, such as Bitcoin Such private digital currencies use PoW mechanism, which makes it difficult to popularize and their security is also threatened. Various countries began to focus on the research of digital currency, CBDC (Central bank digital currencies, central bank digital currency is the electronic form of central bank currency, households and businesses can use it to make payments and store value.) came into being. The Chinese version of digital currency is also called DC\EP (Digital Currency/Electronic Payment, electronic payment based on digital currency). Yi Gang, the current governor of the People's Bank of China, once stated that China has begun to study digital currency in 2014 and is one of the first countries in the world to explore digital currency; in 2019, the English version of China Daily publicly announced that China's CBDC is about to

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emerge. According to Xinhua News Agency, in the future Winter Olympics, China will usher in a wider range of closed tests, and large-scale cross-border transactions can conduct further risk tests. Since the COVID-19 pandemic in 2020, online has become a major trend. How does the central bank's digital currency apply to life to realize contactless transactions, and how does it apply to the payment and settlement system to play its important role? It is an important direction of research.

China's central bank digital currency has the functions of centralization, high efficiency, and traceability. It is a digital legal currency that is based on blockchain technology and endorsed by national credit. China's central bank digital currency has both opportunities and challenges in its development: Based on the perspective of technological progress, existing studies have shown that such progress products of e-commerce and the Internet can not only bridge the digital divide, benefit the people's livelihood, but also promote local economic development and narrowing the gap between rich and poor. However, technological uncertainty has brought risks and instability to the country's financial industry. From the perspective of market circulation, China's central bank digital currency greatly enhances the internationalization status of the renminbi, but it also makes the financial system more complicated and the international situation more severe. China should take into account the establishment of relevant systems at home and abroad, and devote itself to the development of related technologies, combined with 5G, to improve the international status of China's CBDC.

This article focuses on the actual application of the central bank's digital currency in the settlement and payment system, extending from the characteristics of the central bank's digital currency to the opportunities and challenges encountered in the application process, further summarizing and supplementing the existing research, and giving answers to challenges. Relevant countermeasures provide suggestions for the future development of the central bank's digital currency. The thesis will start from the perspective of technology and market circulation, on the one hand, it will analyze in detail the advantages brought by the combination of technological advancement and the financial industry, and provide corresponding countermeasures for the uncertain risks that follow; on the other hand, from the domestic From the perspective of foreign market circulation, it analyzes the positive impact of the central bank's digital currency on the international status of the renminbi, and provides institutional suggestions for possible international challenges.

## 2. Literature review

Some scholars start from the motivation of digital currency issuance, analyze from the interest rate policy and the needs of payment security. Matheus R. Grasselli (2018) and others found in their research that the central bank digital currency is conducive to more flexible application of interest rate policies. The central bank can adjust the interest rate of the digital currency to a negative value when needed. In the future, CBDC can replace cash as a mechanism to solve the problem of residents withdrawing cash to deal with the restriction of interest rate policy, providing the government with fiscal policy to stimulate consumption and stimulate economic growth<sup>[1]</sup>. The idea. Gross, Jonas (2020) and others concluded that its main motivations are higher financial stability, higher security and efficiency of the payment system, and a higher degree of business process automation<sup>[5]</sup>.

Another scholar was the first to conduct research on private digital currencies. Woo (2014) believes that the price of Bitcoin is unstable. When there is more speculation in the market, the price of Bitcoin will fluctuate greatly. In addition, without national credit endorsement, it is difficult to be widely accepted by the society, so there is no currency. All functions<sup>[2]</sup>. Nabilou & Hossein (2020) believes that Bitcoin, cryptocurrency, base currency, and central bank currency have significant similarities. It may monopolize the central bank's issuance of base currency, stabilize prices, smooth operation of the payment system, conduct monetary policy, credit institutions, and finance. The stability of the system poses risks.

Central bank digital currency is widely considered to affect the operation of the macro economy. Brearley, Beth (2017) believes in research that the central bank can apply interest-paying digital currency to monetary policy, which can reduce excessive fiscal policy intervention, and reduce the implementation of quantitative easing monetary policy, so that the macro level. The regulation is more effective, direct, and diversified. Bindseil, Ulrich (2019) reviewed the

advantages associated with CBDC and reviewed the relevant background from the history of central bank currency issuance in different forms. And study CBDC from the perspective of risk, especially the risk of CBDC promoting bank systemic run under crisis conditions. Hanl, Andreas (2019) and others focused on the digital currency issued by the central bank. Discussed the concept, design, implementation of the central bank's digital currency in the monetary policy framework and its impact on the macro economy<sup>[2]</sup>. Cassoni and Ramada (2013) mentioned in their research that digital currency is based on blockchain technology, which is more conducive to the flow of assets between regions, thereby injecting impetus into regional economic development.

In addition, some scholars have explored digital currencies from the perspective of the central bank and the government's financial supervision and commercial banks. Tsindeliani, Imeda (2019) took Russia as an example to analyze the legal nature of cryptocurrencies as objects of financial supervision and legal supervision. The connotation of cryptocurrency is analyzed from the aspects of currency, electronic currency, foreign currency, other property, and the possibility of transferring crypto loans into creditor's rights. In the end, it is concluded that cryptocurrencies and national currencies may be equivalent in the future Paulson, Erin (2019) found that the launch of fiat digital currencies will trigger competition among commercial banks to provide the best cryptocurrency services, which will further lead Chinese regulators to conduct more supervision of the country's currency flows and protect China Capital boundaries to prevent illegal cash flow.

Regarding how digital currency is used in payment and settlement, existing literature focuses on the motivation of digital currency issuance (Gross, Jonas, 2020; Matheus R. Grasselli, 2018), private digital currency (Wood, 2014; Nabilou & Hossein, 2020), commercial banks (Paulson, Erin, 2019), monetary policy (Brearley, Beth, 2017; Hanl, Andreas, 2019; Bindseil, Ulrich, 2019; Hanl, Andreas, 2019; Cassoni and Ramada, 2013), financial regulation (Tsindeliani, Imeda, 2019) ), however, there is a lack of research on the application of central bank digital currency to the payment and settlement system. This article builds an analysis framework for digital currency payment and settlement, including opportunities and challenges, as well as relevant countermeasures and suggestions, and will further supplement and explain the levels that are not covered by the existing literature.

### **3. Characteristics of central bank digital currency**

#### **3.1 Centralization**

Centralization is the biggest feature that distinguishes central bank digital currency from private digital currency. As for the emergence of earlier years, private digital currencies such as Bitcoin basically adopted a decentralized and distributed accounting model. From the perspective of the settlement and payment system, decentralization is to abandon the settlement and transaction system as a centralized platform system<sup>[3]</sup>. All transaction parties adopt point-to-point transactions. Although this reduces the risk of network security to a certain extent, If a central node is attacked, the collapse of the entire settlement and transaction system will not occur. But at the same time, it also makes a lot of deficiencies in private digital currency supervision<sup>[4]</sup>. As a sovereign digital currency, the central bank's digital currency, on the one hand, its value is endorsed by the country's credit, and is naturally subject to the supervision of national regulatory agencies and the protection of relevant laws and regulations. On the other hand, the central bank's digital currency is an important means of macro-control, and its circulation and control need to be controlled by the state, so its center must be the central bank of a country.

#### **3.2 High efficiency**

From the perspective of people's lives, the central bank's digital currency, as a sovereign currency, has ther bridged the digital divide and truly realized the electronicization of "cash transactions". "Dual offline payment" also makes the daily transaction settlement of the people more efficient. For regions with underdeveloped infrastructure, the existence of central bank digital currencies can even further narrow the gap between rich and poor, allowing technology to accelerate financial inclusion. From a national perspective, the original paper currency manufacturing cost was too high. For paper banknotes, its complete life cycle has gone through design, plate making, production, sorting,

destruction, storage, custody, and escort, which will cause huge costs. The issuance of central bank digital currency undoubtedly simplifies the process and greatly reduces the cost of currency printing, making currency issuance more efficient.

### **3.3 Traceability**

The real-name system is also one of the characteristics of the central bank's digital currency. China's central bank digital currency adopts a hierarchical settlement transaction system. Each CBDC stores the holder's information. Small transactions can be "controllable and anonymous", and large transactions require identity verification<sup>[5]</sup>. This enables the government to accurately track the flow of every sum of money, and to a certain extent prevents the rampant criminal activities such as "money laundering" and "corruption". On the other hand, the accuracy and convenience of data tracking make it easier for the government to grasp the true flow of currency and make timely adjustments, which also makes macroeconomic policies more effective.

## **4. Opportunities and challenges for the central bank's digital currency to be used in the payment and settlement system**

### **4.1 Technical opportunities and challenges**

The central bank's digital currency adopts blockchain technology as its foundation, and builds up modules such as big data and the Internet to improve the security, flexible operation and diversification of its overall system. The specific framework includes a digital currency issuance library, a digital currency bank library, a trusted service management module, a certification center, a big data analysis center, and a registration center, and a set of technical systems used to accurately calculate the flow of digital currency and register holder information. Users can use digital currency clients and security chips to realize digital currency transactions and settlements through mobile terminals. While filling the "digital gap", it also promotes economic exchanges between regions and improves the security and convenience of transaction settlement. This is undoubtedly a manifestation of the benefits of science and technology to the people's livelihood.

However, the current technology is still uncertain. On the one hand, as a centralized central bank digital currency, once the central bank headquarters system is technically invaded, it may cause all CBDCs to be tampered with, and network security companies and national central bank systems will be greatly threatened and challenged. On the other hand, when the user uses the electronic wallet specially designed for the digital currency of the central bank, the user needs to enter the set digital password. Once the digital password is leaked, others will most likely control the user's digital assets. Therefore, the technology of network security system in related aspects needs to be further strengthened.

### **4.2 Opportunities and challenges in market circulation**

#### **4.2.1 Domestic opportunities and challenges**

Based on China's domestic currency circulation perspective, compared with traditional paper renminbi, CBDC's features such as high efficiency, traceability, and convenience have greatly improved the efficiency of transactions. Compared with the cumbersome manufacturing and custody process of the traditional RMB, the central bank digital currency undoubtedly saves a lot of manpower and material resources for the country and the government, and its traceability also makes the macroeconomic policy control more precise and effective. The liquidity faced by traditional banknotes Risks, credit risks, and operational risks can all be greatly reduced for digital currencies. However, the traditional paper renminbi and central bank digital currencies must be differentiated in their control systems due to the differences in their communication media. As far as the current situation is concerned, the business environment facing the central bank's digital currency is temporarily immature, and various technologies lack security. With the change and expansion of its application scenarios, it will also have a large impact on the traditional banking industry. How to coordinate the traditional currency system and the digital currency system to achieve equilibrium in all parts of the market will become the core issue faced by the institution-making agencies.

### 4.2.2 International opportunities and challenges

Based on the perspective of international currency circulation, the launch of China's central bank digital currency has a great effect on safeguarding China's national financial sovereignty. As far as the current RMB is concerned, its internationalization is still highly dependent on the existing international payment and settlement system. However, the emergence of the central bank's digital currency has made the RMB less dependent on the international transaction settlement system, and because of its tokenized payment characteristics, it does not need to be certified and supported by local financial third-party institutions in cross-border transactions, as long as both parties to the transaction Acknowledge and complete the payment<sup>[6]</sup>. This not only makes cross-border transactions more convenient, but also greatly reduces costs, greatly promotes the internationalization of the RMB, and strengthens the country's financial sovereignty.

However, currency itself, as a carrier of international economic competition, has a certain degree of independence and is repellent to other currencies. The issuance of the digital currency of the People's Bank of China will inevitably lead to fierce competition between China's CBDC and other sovereign currencies, which also increases the instability of China's international trade and foreign economy. On the other hand, the launch of China's central bank digital currency has shaken the stability of the US dollar system to a certain extent. In the context of the Sino-US trade war, this will inevitably make the situation more serious. The United States may impose further sanctions on China and hinder China's international trade development.

## 5. Countermeasures against challenges

### 5.1 Technical level

Strengthen technological innovation, make full use of network security system, all levels of linkage, division of labor and control. The realization of digital currency transactions and settlements in cyberspace must rely on the security of digital wallets. The central bank's digital currency adopts the "dual offline payment" transaction settlement model. Two devices only need to "touch" to complete the payment<sup>[7]</sup>. The guarantee of its transaction speed must be guaranteed by powerful technology. In the context of the rapid development of 5G, the R&D department of science and technology should combine the high compatibility and transmission speed of 5G to increase the issuance and transaction speed of digital currency, reduce costs, and shorten the value exchange procedures. In terms of macroeconomic adjustment, 5G can also be combined with big data technology to more accurately record the flow of CBDC and improve the stability and reliability of data.

The technical departments of the central bank should carry out division of labor and cooperation to effectively prevent and control risks: APP maintenance, digital currency risk control and data monitoring, digital currency popularization and other activities that rely on technological means should be completed in stages to achieve the popularization of digital currency. At the same time, related issues should be resolved quickly to control the systemic risks that technical issues bring to the financial system.

### 5.2 Market circulation level

#### 5.2.1 Domestic recommendations

In the domestic transaction settlement system, the relevant systems and regulations of the central bank's digital currency operation should be improved, and legal provisions that are different from the traditional currency and currency system should be formulated. As a new category of currency, it must undergo multi-level experiments and summaries to ensure the realization of its normative value. At present, my country's central bank digital currency is still in the pilot stage. When formulating relevant laws and regulations, it is necessary to have customer perception and fairness. The emergence of central bank digital currency will inevitably have a great impact on the traditional renminbi. If the central bank pays interest on it in the future, commercial banks will inevitably be affected. The digital currency system needs to take into account the equilibrium role of various sectors in the market to prevent the occurrence of "black swan" and "black rhino" events in the financial industry.

## 5.2.2 International recommendations

In the international transaction settlement system, China should make relevant policies to prevent the United States from imposing political and economic sanctions on China. China's central bank digital currency will inevitably have a crowding-out effect on the US dollar, further weakening the political hegemony of the US dollar as the system. At the same time, China should strengthen cooperation with other international currency and finance, cultivate global partners, expand the functions of legal digital RMB currency pricing and reserve currency, and improve the internationalization of the RMB and its status in the world. Establish a digital RMB offshore market system, improve the return mechanism of offshore RMB, attract more international investors, and promote the further development of China's financial market<sup>[8]</sup>.

## 6. Conclusion

In the context of the rapid development of Internet technology, the central bank's digital currency, characterized by centralization, efficiency, and traceability, will be widely used in domestic and foreign transaction settlements in the future, and will play an important role. As a new thing, China's central bank digital currency will inevitably bring certain opportunities and challenges.

In terms of technology, the central bank's digital currency, as a product of financial innovation, has injected new vitality into the traditional financial industry. Compared with traditional transaction settlement, central bank digital currency greatly improves the efficiency of value exchange. At the same time, technological uncertainty also brings risks to the financial industry, making the traditional financial system challenged. my country's technical departments need to strengthen technological innovation and hierarchical control to avoid systemic risks caused by technical defects.

In terms of market circulation, the central bank's digital currency has improved China's financial sovereignty, greatly improving the international status of the renminbi, and also filled the "digital gap" in domestic transaction settlement, and further narrowed the domestic gap between rich and poor. However, the central bank's digital renminbi will inevitably threaten the political hegemony of the US dollar system, and will also change the international transaction settlement system. China needs to improve relevant systems and policies to maintain the stable development of its own economy and international trade.

## References

1. Grasselli MR, Lipton A. On the normality of negative interest rates. *Review of Keynesian Economics* 2019; 7(2): .201–219.
2. Woo D. Bitcoin: A first assessment. *Cause and Effect* 2013; 1–14.
3. Cassoni A, Ramada C. Digital money and its impact on local economic variables: the case of uruguay. *Document de Investigation* 2013; (92): 1–37.
4. Nabilou H. Testing the waters of the Rubicon: the European Central Bank and central bank digital currencies. *Journal of Banking Regulation* 2020; 21(4): 299–314
5. Sandner PG, Schulden P, Grale L, *et al.* The digital programmable Euro, Libra and CBDC: Implications for European Banks. *SSRN Electronic Journal* 2020.
6. Tsindeliani I. Financial regulation & digital money: How russia dips its toes into the waters of cryptocurrency. *Global Jurist* 2019; 19(2).
7. Bindseil U. Central bank digital currency: Financial system implications and control. *International Journal of Political Economy* 2019; 48(4): 303–335.
8. Hanl A, Michaelis J. Digitales Zentralbankgeld als neues instrument der geldpolitik. *MAGKS Papers on Economics* 2019.