Research on Digital Currency and Financial Technology Innovation of the People's Bank of China

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Abstract. Digital currencies are becoming increasingly important to governments and financial institutions around the world as advanced technology develops. The central bank of China has led research on digital currency around the world since China has one of the largest electronic payment markets. With this digital currency, the People's Bank of China is promoting inclusive financial growth, enhancing monetary policy transmission, and improving payment efficiency. As well as its impact on international monetary systems, financial security, privacy protection, and financial security protection will also be profoundly affected. In this paper, the focus will be on the Chinese central bank's digital currency development, technical foundation, and application status. As well as analyzing its impact on future innovations in financial technology, opportunities and challenges will also be discussed. By developing a digital currency, China has expressed its interest in the future of the modern financial system in a positive way with forward-looking and responsive layouts. DCEP, as a new payment tool, aims to replace some cash and improve the speed and security of fund circulation. Compared with traditional electronic payment methods, CBDC is expected to bring breakthroughs in user privacy protection, reduced transaction costs, and improved cross-border payment convenience.

1 Introduction

In the past decade, the rapid development of financial technology (FinTech) has completely changed the traditional model of financial services, driving profound changes in the global financial industry. Central Bank Digital Currency (CBDC) is considered an important innovation that can enhance the efficiency and security of payment systems. In 2014, the People's Bank of China began in-depth research on legal digital currency, aiming to keep financial stability and prevent and control payment risks while securing the leadership of financial technology development. Developing and piloting China's central bank digital currency (DCEP) demonstrates China's financial technology innovation foresight.

The article examines DCEP's potential impact on financial technology by examining the research, development, and challenges faced by China's central bank's digital currency, as well as financial technology innovation's history. As a result of analyzing these discussions, decision-makers in the financial services industry and academic researchers in finance can obtain new perspectives on research that can help them to advance their academic careers.

2 Overview of China's Central Bank Digital Currency (CBDC)

2.1 Definition and Characteristics

Payments made with digital currency are processed by the People's Bank of China using two types of digital currencies. DCEP and DCEPP are digital currency electronic payments. Both cases use legal tender. It is different from ordinary electronic currency, DCEP aims to replace M0 (cash in circulation) and has the same legal status as traditional paper currency and coins, regarded as a digital extension of currency issuance. Compared with existing digital payment tools, CBDC has multiple unique features and advantages.

Statutory nature: As an electronic form of legal tender, CBDC must be distinguished from other electronic funds since it has an unquestionable legal status, ensuring its acceptance by the public as a tool for exchange, a measure of value, and a storage medium.

Security and controllability: It is CBDC's objective to enhance the security of financial transactions and fund flows through the implementation of various encryption technologies and blockchain principles. The unified issuers and managers of fiat money by the central bank has increased the controllability of currency circulation to a large extent [1].

Double tier operation system: The People's Bank of China intends to operate its digital currency in a double-tier system. People's Bank of China exchanges currency with commercial banks or other operating institutions before issuing it to the public. It is possible to achieve

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efficient circulation of money by utilizing existing financial resources and networks.

Privacy Protection: CBDC provides "controllable anonymity", which allows regulatory agencies to track transactions to prevent money laundering and terrorist financing while protecting user privacy [2].

Efficient cross-border payments: The development of CBDC provides new possibilities for simplifying cross-border payments, reducing intermediary links, lowering transaction costs, and accelerating fund settlement speed.

2.2 Development History

Chinese central bank started studying digital currency in 2014 as part of its economic development program. Early research focused on the technical framework, operating mechanism and legal status of digital currency. In the early stages of research, CBDC has laid a solid foundation for the future development of this drug.

Digital Currency Research Institute was established earlier this year by People's Bank of China with the purpose of improving the operating mechanism of the digital currency technology platform. As part of the pilot project discussion of digital currency, the China Banking Association orchestrated a series of meetings with a series of commercial banks under the guidance of the People's Bank of China in order to conduct a pilot project discussion.

People's Bank of China has made significant progress in digital currency research. From 2017 to 2018, it was reported that the development of basic functions of digital currency had been completed and entered the testing stage [3]. The central bank gradually establishes an issuance and operation system in line with China's national requirements.

In the second half of 2019, the People's Bank of China announced to accelerate the research and development of CBDC, and began to carry out small-scale pilot tests in Shenzhen, Suzhou and other places in 2020. These pilot tests not only cover consumer payments, but also include multiple application scenarios such as wage payments and public transportation, making the concept of CBDC increasingly recognized by the public [4].

By 2021 and 2022, the People's Bank of China will further expand the pilot scope of DCEP, covering more regions and scenarios, as well as a broader user group. During the Beijing Winter Olympics, DCEP achieved international media and athlete application testing, marking another step forward in its international promotion.

2.3 Difference from Cryptocurrency

Although there are similarities in certain technical characteristics between China's central bank digital currency (CBDC) and cryptocurrency, they have significant differences in essence. These differences are mainly reflected in aspects such as currency attributes, issuing institutions, regulatory frameworks, security, and privacy protection.

Monetary attribute: CBDC is an electronic form of legal tender with unlimited legal power, endorsed by the state, and supported by legal status and sovereign credit. Bitcoin is a privately issued digital asset that is not legal tender [5].

Issuing institution: CBDC is directly or indirectly issued and managed by the People's Bank of China and other central banks, with the characteristics of centralization; Cryptocurrencies are mostly generated and issued by non-central bank entities or decentralized network nodes through algorithms, and belong to decentralized assets.

Regulatory framework: CBDC belongs to the scope of central bank supervision and is subject to the current financial regulatory policies and laws and regulations of the country. Its issuance and circulation are also under supervision. Cryptocurrencies have largely departed from the traditional financial regulatory system, resulting in significant legal and regulatory uncertainties.

Transaction security: The underlying platform of CBDC usually has high-intensity protection measures, and due to its legal tender nature, the risk is relatively low. Cryptocurrencies have extremely high market volatility and potential security risks (such as losing private keys, exchanges being hacked, etc.), and investors face significant capital loss risks.

3 Application scenarios and effectiveness of China's central bank digital currency

3.1 Application Scenarios

In order to better integrate China's central bank's digital currency into the daily lives and economic activities of the public, various application scenarios were considered. Here are some main application scenarios:

Retail payment: CBDC can be used for daily shopping and consumption, such as supermarket shopping, catering consumption, etc. The public can easily achieve face-to-face instant payment through electronic devices such as mobile phones.

Public services: In terms of payment for public utilities such as water, electricity, gas, and transportation, CBDC can provide convenient payment solutions.

Cross border payments: CBDC can be applied to cross-border trade and personal remittances, reducing the cost and time of cross-border transactions and improving the efficiency of cross-border capital flows [6].

Government payments: Government transfer payments, such as social welfare and subsidy payments, can improve the timeliness and accuracy of fund distribution through CBDC.

Enterprise applications: large scale transactions between enterprises, salary payments, supply chain finance, etc. can also achieve efficiency improvements and optimize financial processes through CBDC.

Cracking down on illegal activities: In areas such as anti-money laundering and counter-terrorism financing, the traceability of CBDCs enables governments to better

regulate and prevent illegal financial activities. As shown in Figure 1:

Fig. 1. Application scenarios of China's central bank digital currency

3.2 Pilot achievements

Since 2020, China has carried out pilot projects for CBDC in multiple cities, achieving significant progress and positive feedback. The pilot mainly focuses on the retail payment field and gradually expands to other fields such as wage payment and government services. According to official reports, as of a certain point in time, the pilot areas have achieved millions of transactions covering various industries such as catering, transportation, shopping, services, etc., proving the usability and convenience of CBDC in real environments [7].

In the pilot, feedback from users and merchants was generally positive. Users experience the convenient payment experience brought by CBDC, while merchants obtain a more efficient settlement process and reduced operating costs through the application of CBDC. In addition, the pilot also verified the system stability, security, and beneficial supplement to the current financial ecosystem of CBDC.

3.3 Effects on the Real Economy

In the course of implementing and promoting CBDC, it has become increasingly evident that CBDC has a tangible effect on the real economy, which has been emphasized more and more. As a result of CBDC, payment systems have been significantly improved, capital flows have been optimized, and transaction costs have been reduced, thereby enhancing the economic participation of small businesses and everyday consumers. Secondly, the promotion of CBDC has also contributed to the improvement of financial inclusion, especially in remote areas, with more people being able to access convenient financial services as a result of CBDC promotion [8].

Apart from their responsibilities under financial regulation, CBDC assists the country in regulating capital flows, preventing and controlling financial risks, and maintaining the stability of financial markets in terms of monitoring capital flows and financial regulation. Also, CBDC has been supporting the development of innovative payment methods, as well as providing practical application scenarios for high-tech applications such as big data analysis and smart contracts developed for upcoming payment methods.

Furthermore, CBDC may also generate some new challenges, including issues of adaptability within the current financial system as well as potential effects on traditional banking practices. In light of these potential adverse effects, it is important to formulate policies and measures to promote a healthy and balanced growth of the real economy in harmony with CBDC's development when promoting the development of the CBDC [9].

4 The role of financial technology innovation in promoting China's central bank's digital currency

4.1 Definition and Scope of Financial Technology

4.1.1 Digital payment

Digital payment financial technology (FinTech) refers to innovative activities that use new technologies to create and provide financial services. Digital payment, as an important branch of financial technology, focuses on using electronic means to process payment processes. It has changed traditional cash and check payment methods, providing more efficient, secure, and convenient payment solutions [10].

Digital payment includes but is not limited to online payment platforms, mobile payment applications, digital wallets, contact and contactless payment technologies, etc. These methods enable consumers to complete payment and fund transfer without physical media through the Internet, mobile network and computing technology, which greatly meets the demand of modern society for real-time and flexible payment. Financial technologies such as big data, cloud computing, and encryption technology have fueled the rapid development of digital payments.

With the popularity of smart phones and the Internet, digital payment has become one of the fastest growing fields in global financial services. It not only serves

individual consumers, but also plays an increasingly important role in inter enterprise transactions, government services and international remittances.

4.1.2 Blockchain Finance

Blockchain finance refers to the use of blockchain technology to provide new mechanisms, processes, and solutions in financial services and related businesses. This technology has been developed in order to establish a decentralized distributed ledger using the concept of a distributed ledger. As a result of the blockchain technology, which enables the connection of continuously recorded data blocks with the use of cryptography, it is possible to conduct the transmission of assets in a secure, transparent and tamper-proof manner, without the need for a central trust authority on a large scale.

Currently, blockchain finance has a wide range of applications that can be applied to a wide range of scenarios and markets, including cryptocurrencies, smart contracts, supply chain financing, asset securitization, identity authentication, clearing and settlement, and a variety of other scenarios [11]. Typically, such applications introduce blockchain technology as a way to provide a more efficient, cost-effective, and secure way to conduct transactions. This will enable transaction records to be made more transparent, but it will also ensure that participant privacy is protected at the same time.

Blockchain technology has been applied to the financial sector in an effort to establish a new infrastructure for financial transactions, thereby providing a solution to issues of trust, efficiency, and security associated with traditional financial transactions by implementing a new kind of infrastructure. While the world of blockchain finance does continue to face challenges in terms of laws and regulations, the maturity of the technology, and the acceptance of the market, blockchain technology also continues to emerge as a powerful contributor to the future of the financial industry, disrupting our established paradigms and upending our conventional wisdom.

4.2 Application of Financial Technology in CBDC

4.2.1 Improve payment efficiency

As a result of distributed ledger technology (DLT), which is based on blockchain technology and operates in a decentralized environment, CBDCs can carry out instant payments through the Fintech industry. By doing so, we are able to decrease the time it takes for funds to clear and increase the efficiency of the payment process. Providing real-time clearing and settlement facilitates the flow of funds between corporations and individuals, which has a positive impact on corporate money flows and personal consumption because of the flexibility it provides.

Using mobile payment platforms, consumers can now conduct transactions using their smartphones from anywhere at any time. Clearly, this approach is more convenient and accessible than traditional methods of banking and payment, as well as offering greater access and simplicity. Using mobile payment applications in conjunction with CBDC further simplifies the payment process, eliminating the need for small transactions to be processed in cash or to be processed by POS machines in a timely manner.

Smart contracts, for example, can be used to automate the receipt and payment processes by executing preset conditions in various processing cycles. The automated payment mechanisms minimize manual intervention, reduce the possibility of error, and improve the efficiency and accuracy of transactions.

4.2.2 Ensure transaction security

In order to protect the security of transaction data and prevent any leakage or tampering of information, CBDC uses advanced encryption technology in financial technology. A secure execution of digital currency transactions is a critical requirement in an environment where everyone has access to the Internet.

When it comes to identity authentication and authorization management, it has been shown that financial technologies, such as secondary authentication and biometric recognition, can enhance user authentication. This effectively prevents unauthorized access and potential financial fraud by ensuring only authorized users can conduct transactions [12].

We can quickly identify abnormal trading behaviors with the use of financial technology monitoring tools such as antifraud systems and real-time monitoring. Detecting and suppressing illegal activities, such as money laundering and terrorist funding, is crucial to preventing and prosecuting them. Figure 1 shows the following data:

Table 1. Application of Financial Technology in CBDC (Central Bank Digital Currency)

Guarantee Measures	Technology/Tools	Application Description
Data Encryption	Advanced Encryption Technology	Widely used in CBDC to protect transaction data security and prevent information leakage or tampering. Encryption protection is a key prerequisite for the secure execution of digital currency transactions.
Identity Authentication and Authorization Management	Secondary Authentication, Biometric Identification	Utilizing financial technology to enhance user authentication, ensuring that only authorized users can execute transactions, effectively preventing unauthorized access and financial fraud.

Monitoring and Prevention	Anti fraud system and real-time monitoring	Financial technology monitoring tools can quickly detect abnormal trading behavior, provide data support for regulatory agencies, and strengthen prevention and crackdown on illegal activities such as money laundering and terrorist financing.

In general, it is important not to underestimate the importance of financial technology in ensuring the security of CBDC transactions. In order to enhance the security capabilities of the digital currency system, it has integrated multiple high-end technologies that have been integrated into one strong security defense line. The establishment of a sound and healthy CBDC and its long-term development are crucial to the continued success of the organization.

4.3 The Collaborative Development of Financial Technology and CBDC

4.3.1 Building an open digital RMB ecosystem

The partnership between fintech companies and China's central bank electronic currency (CBDC) has created a free and open ecosystem for digital RMBs. This ecosystem is centered around the central bank's digital currency, continuously absorbing financial technology innovation while establishing a wide range of multi-level application scenarios, forming an interconnected digital payment environment.

The application and promotion of financial technology, such as mobile payments, cloud computing, big data analysis, etc., provide strong technical support for digital RMB. Traditional financial institutions such as fintech companies and banks can access the central bank's digital currency platform through APIs and other means, allowing various innovative financial services and products to be developed and provided on this platform, forming a unified standard and compatibility, enabling the circulation and use of digital RMB in a wider range of fields. As shown in Figure 2:

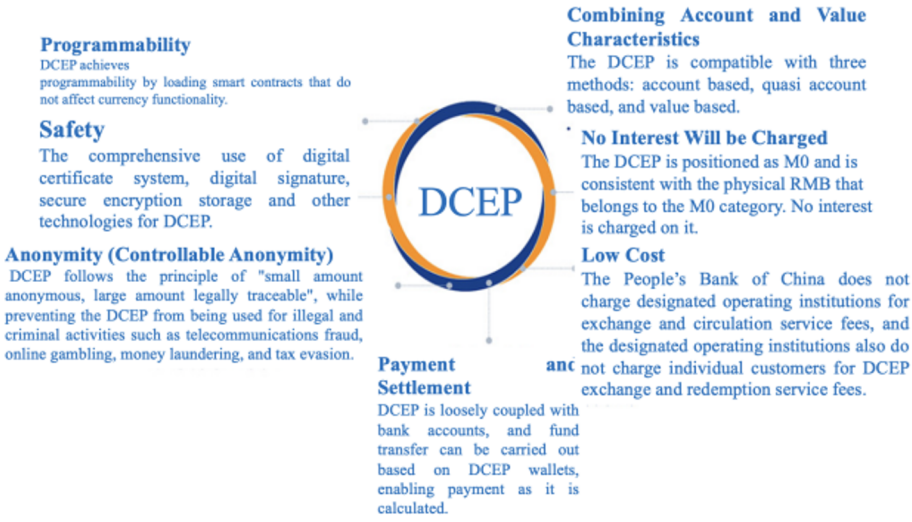

Fig. 2. Ecological Structure of DCEP

The construction of this open ecosystem not only facilitates the daily economic activities of consumers and enterprises, but also provides a convenient technical path for regulation, improving the effectiveness and efficiency of regulation. The financial system can be monitored through financial technology to ensure safety and stability.

4.3.2 Promote overall innovation in the financial system

Promote the overall innovation of the financial system, the coordinated development of financial technology and CBDC, and continuously push the entire financial system towards a more innovative and efficient direction. With the gradual popularization of digital currencies, traditional financial service models and products are also undergoing innovation and transformation, and financial institutions are beginning to pay more attention to customer experience, personalized services, and risk management.

During this process, financial technology began to play a more important role in risk assessment, asset management, loan services, and other areas. By utilizing machine learning, data mining and other technologies, the design and service of financial products are more precise, meeting the personalized needs of different customers and improving the efficiency of resource allocation.

Financial technology and CBDC have a mutually reinforcing and common development relationship. With financial technology, CBDC is promoted through a wide range of technical means and application scenarios. Financial services have been stimulated and enhanced by comprehensive digitization and intelligence.

5 Conclusion

As the digital economy and financial technology advance rapidly, China's central bank digital currency (CBDC) enters the market. In an effort to remain on top, the People's Bank of China has introduced a new form of currency as part of its electronic payment system for digital currencies. It is through CBDC that China has been able to expand the application scope of financial technology, combining traditional currency with modern digital technology in a bid to establish a more efficient, safe, and convenient payment system that will promote economic growth that is sustainable and healthy.

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