The Development and Implementation of the Digital CNY

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Abstract. With the growing development of digital economic and network industry, digital RMB will become an important element of digital finance in China's digital economy. This paper analyses the design features, research and development motivation and other principles of digital RMB over the years, compiles the development process and operation mechanism, and discusses the future tendency of digital RMB to give some development suggestions. Firstly, the digital RMB needs to speed up the legislative process to avoid the frequent occurrence of crimes. Secondly, as a member of the leading development team, digital RMB can be considered to be promoted to the international market to facilitate cross-border transactions and international communications. Finally, the digital RMB is currently being piloted in a single scene and needs to be transformed into a wholesale digital currency in order to be more likely to avoid international risks and participate in international competition.

Keywords: Digital Economy; Digital RMB; Digital Finance.

1. Introduction

With the rapid development of the global economy, the demand for digital currencies is increasing every day. Many countries and areas are also trying to develop their own digital currencies. As early as the 20th century, the idea of digital currency has appeared, and in 2008, with Satoshi Nakamoto's elaboration of the electronic cash system supported by blockchain technology, the digital currency is gradually known by the public [1]. The use of digital currency is an important basis for the development of the digital economy, which can effectively improve the efficiency of the development of the digital economy and reduce its development costs [1]. Create a new type of RMB in digital form to meet the public's cash needs in the context of the digital economy is the goal of research and development on digital RMB, which is equivalent to the basic RMB, and can be used to pay and store commodities, and as a substitute for the basic currency to provide convenience to the people. China started CBDC-related research in 2014, and the People's Bank of China formally established the Digital Currency Research Institute in 2016, and the legal tender digital currency project was launched in 2017.DC/EP is a digitized form of currency with functions and attributes similar to banknotes, and belongs to the digital financial infrastructure (including the digitization of the CNY), of which payment products are called the digital Chinese Yuan (e-CNY) [2]. So far in 2019, pilot tests and experiments of application scenarios have been launched nationwide, and the practice of digital RMB has been further accelerated, while rapid progress has been made in various areas such as retails, wholesales and cross-border payments [3]. More than 1.32 million digital RMB pilot scenarios covering topics like life payments, catering services, transportation and travel, shopping and consumption, and government services will be available by 2021. 3.51 million Public wallets and more than 20.87 million personal wallets have been created altogether, with a cumulative number of transactions of more than 70.75 million and an amount of about 34.5 billion Yuan [4, 5]. The central bank's issuance rate is also progressing, expanding from retail business to wholesale business, then to Currency Bridge. Undoubtedly, legal tender digital currency has become a hot issue in academic research, and digital RMB has an indispensable role in the advancement of China's financial as well as real economy, meanwhile, digital RMB will face various challenges in the process of development.

This paper will take an overview perspective to objectively describe the original purpose of the digital RMB, the progress of research and development, the design concept and the operation mechanism to analysis the significance of the digital RMB for future financial and economic growth in China. The purpose of the digital RMB is explained in the second section of the paper, the initial

development status and the process and value of the digital RMB so far will be explained. The next part will discuss the design concept and workings of RMB, and in the fourth part, the trend of future use of digital RMB will be considered. The final section concludes with some recommendations for the development of the digital RMB.

2. Development and Practice of Digital RMB

2.1. The original intent and progress of the digital CNY

The central bank launched its digital currency programme in 2014 and established a special research group for the purpose of issuing legal tender digital currency. Digital RMB is a legal currency in digital form issued by the People's Bank of China (PBoC), with the participation of designated operating institutions, supporting the loose-coupling function of bank accounts, equivalent to the physical RMB, and intended to be complementary to the paper version of the PBoC [6], In order to meet the public's demand for cash in the context of the digital economy, a new type of RMB in digital form is being created. At the same time, it supports the development of China's digital economy, enhances the level of inclusive financial development, and improves the operational efficiency of the currency and payment system. The original aim of the development of the digital RMB was firstly to expand the form of cash provided by the central bank to the public.

With the development of digital technology and electronic payments, the use of cash in retail payments is decreasing, and the central bank can unify people's monetary unit of account through the development of digital RMB. It also facilitates access to basic financial services for a small number of members of the public who do not have bank accounts. Short-term residents can also use digital RMB to meet their daily needs without opening an account, while the payment-as-settlement feature can also greatly improve the capital turnover rate [4]. Secondly, digital RMB supports fairness, efficiency and security in the retail payment field Digital RMB will become another payment tool after WeChat and Alipay. Distinguished from the previous two electronic payments, the highest level of security is available with digital RMB, which is also supported for offline transactions and is the nation's official form of payment. It can also be anonymized to protect the privacy of individuals. In addition, the digital RMB responds to the international community's initiative to promote the internationalization of the RMB, achieve cross-border use and facilitate issues such as transfer exchange rates [4].

2.2. Present state of development

In 2017, the Central Bank's Digital Currency Institute was established. As a basis for advancing the digital currency program. And based on the criteria of asset size and market share, technical development force, etc. As participating R&D institutions, large commercial banks, telecommunications companies, and internet businesses were chosen. At the end of 2019, the PBoC initially began to carry out digital RMB trials in Shenzhen, Suzhou, Xiongan, Chengdu, and 2022 Beijing Winter Olympics scenarios As of June 2021, the digital RMB trials had exceeded 1.32 million, Covering areas such as daily bill payment, catering, transport and shopping. Over 70 million transactions totaling 34.5 billion dollars have been made in total. The Beijing 2022 Winter Olympics and Paralympics also brought different degrees of convenience to people outside and inside the country. In the Beijing Winter Olympics Organizing Committee campus, applications such as autonomous vehicles, self-service vending devices, and autonomous supermarkets were deployed on a test basis, and wearable technology, including payment fingertips, cash logos, and payment-compatible Winter Olympics apparel, were introduced. Most trial users think that using digital RMB will increase payment efficiency and lower costs of living and is already no different from third-party payments. Not only that, but several places have also already begun to try to use digital RMB to pay wages on behalf of their employees. As of March 2022, 64 personnel in Xiangcheng, Suzhou received talent subsidies totally 235,000 RMB through digital RMB. It's not just Suzhou. More and more places are trying to pay salaries in digital RMB. People say it's convenient to withdraw digital RMB

to their bank cards without fees after receiving their salaries, and as usual, each transaction can be completed within seconds.

3. What's digital RMB?

3.1. The design of digital CNY

The digital RMB aims to provide the people with a secure and inclusive payment tool with convenience and privacy, so the digital RMB has three design principles: adherence to legal compliance, convenience, and openness and inclusiveness. In order for the digital RMB to complement or even be more advantageous than the paper version of the RMB, the design of the digital RMB is also endowed with the following characteristics [4]. The first is that digital RMB is appropriate with account-based, quasi-account-based, value-based, etc., both in terms of value and account features, adopting variable denomination design and realizing value transfer in the form of crypto-coin cords, which has the same qualities as the base currency. Second, zero interest. Digital RMB is primarily found in the cash category of payment certificates, has no interest associated with it, and will coexist with physical RMB for a very long time. The digital RMB has a lower cost, and in common with the physical RMB, banks will not charge merchants for the exchange and circulation of the digital RMB, and similarly, there shall be no exchange and circulation fees for the digital RMB between merchants and individual users. A cash-based payment tool that can more quickly increase the efficiency and effectiveness of retail payment and lower the cost of retailing goods for the entire society is made up of universal digital RMB and certain operators' electronic account funds [7].

Also, digital RMB accounts are freely coupled and digital RMB payments are settled. Users can choose to keep their digital RMB wallet tied to their bank account, or use only a digital RMB wallet, detached from their bank account, while omitting the transfer of claims from intermediaries, allowing transactions to be completed directly between the trader and the consumer. Digital RMB also offers anonymity and privacy. The public can remain anonymous for small transactions. In addition, it provides the public with enough privacy while preventing the use of the digital RMB for gambling, fraud, and other crimes. "Anonymity for small amounts and traceability for large amounts" is the guiding principle of digital RMB, which can be aware of the need to protect security and personal data, and takes into full consideration of a certain line of demarcation according to the current e-payment system as well as the efficiency of business processing, and at the same time meets the need for small-amount unidentified transactions [6]. Digital RMB will comprehensively apply digital certificates, digital signatures and secure encrypted storage and other technologies to prevent the emergence of counterfeiting of digital RMB or transactions, and realize the characteristics of non-repeatable spending, non-illegal copying and counterfeiting, non-tampering of transactions and resistance to deniability, etc. It has initially built a multi-level security protection system to guarantee the security of digital RMB in its entire life cycle and control the risk, so as to allow digital RMB to run for as long as possible. The digital RMB can be customized [7]. By adding smart contracts that don't affect the currency function, digital RMB can become programmable. This enables digital RMB to execute automatic payment transactions in accordance with the terms and guidelines set forth by the parties to the transaction, with the goal of ensuring security and compliance. This not only makes the transaction more convenient but also makes the business innovative.

3.2. Operation of the Digital CNY

The digital RMB mainly utilizes a two-tier operation model. The PBoC is responsible for the agreed development and issuance of digital RMB, while commercial banks with certain conditions are selected as the medium of exchange for digital RMB. The central bank (Subsystem A) issues a certain amount of digital currency to these commercial banks (Subsystem B), while users withdraw and exchange it on demand through the commercial banks. This covers two layers of the operating system. The first tier of digital RMB flow occurs between the central bank and commercial banks, maintaining the total amount of currency issued. The second layer is between the commercial banks

and the social users, where the currency of individuals or businesses will be deposited in the commercial banks. The third level is between individuals and businesses, that is, transactions between the public, where the digital RMB flows between currency wallets [3].

In addition, the digital RMB operating system includes four mechanisms: issuance, repatriation, transfer and settlement. The first one is the issuance mechanism, i.e. commercial banks need to apply to the central bank for approval of the digital RMB. The commercial banks apply to the central bank, the central bank implements unified supervision and approval of this type of application, and the deposit reserve of the commercial banks will be deducted by the accounting system department [3]. The digital RMB repatriation mechanism means that the central bank receives the digital RMB deposited by the commercial banks, the central bank will deposit this amount and carry out a series of storage or cancellation operations, after the application for digital RMB deposit is submitted by the commercial banks, the subsequent approval order is completed by the central bank, and a portion of the cancellation process will be carried out, the accounting system department initiates the deposit reserve increase command and deducts the same amount of the reserve ratio. And then informs the commercial bank that the repatriation is complete. Secondly, there is the digital RMB transfer mechanism, which refers to the transfer of digital RMB from one commercial bank A to another commercial bank B. After the transfer request is made by bank A, the subsequent nullification plan will be completed by the central bank, and the generation of RMB legal tender coins required by commercial bank B will be based on the amount of money to be transferred, and if there is still any remaining balance of such coins after they are nullified, the remainder will be realized by the central bank, and the RMB legal tender coins will be sent to commercial banks A and B respectively [3]. The final type is the digital RMB payment mechanism, the user's digital RMB transfer is mainly achieved through the digital RMB wallet, and the central bank data center will keep the transaction records from the data nodes. If both the receiver and payer are offline, the transaction process is recorded by the e-wallet to continue to complete the transaction at another period [3].

4. Tendency of development

First of all, digital RMB helps improve the domestic retail payment system. As a legal reserve, digital RMB has the ability to influence and promote economic development to a degree with its high efficiency and security of capital flow. The payment-as-settlement and loosely-coupled account characteristics of digital RMB can slow down the clearing time and risk of user funds and accelerate the turnover efficiency of retail goods. However, it is obvious that, as far as commercial banks are concerned, the development of digital RMB will further weaken the role of bank card payment medium. Digital RMB focuses more on the supplement of flowing cash, which can be detached from banks and accounts. Traditional POS card payments and bundled bank card payments are based on bank accounts, and digital RMB has a relatively low threshold, so the role of bank cards will be further weakened [8]. Digital RMB will also bring new opportunities. Digital RMB helps overcome the mobile compensation market's monopoly. In the past few years, Internet behemoths have dominated mobile payment entrances via its flow, but these entrances have market segmentation and payment barriers with each other because of competition, while digital RMB, as a legal tender, can overcome this technical flaw and business obstacle, eliminate the platform and data monopolies, and establish a new simplified and universal monetary system [8]. China needs to accelerate the legislative process for digital RMB. The current legal definition of digital RMB is not clear, and many people take advantage of this loophole to use digital RMB to launder money for crimes [5, 9]. Data from the China Payment Clearing Association shows that from 2008 to 2018, the number of third-party payment transactions in China increased 11 times, and the total amount of transactions was raised from RMB 663 trillion to RMB 3,768.7 trillion. In the whole year of 2020, the People's Bank of China issued a total of 68 fines to a number of third-party payment platforms, of which the highest amount of one-time penalties amounted to RMB 116 million RMB, which set a new historical record for penalties imposed by the central bank [10]. On the other hand, digital RMB will improve the cross-

border payment system, which will in turn drive the internationalization of RMB [8]. As of 2021, our central bank has already conducted multilateral digital currency bridge projects with the Hong Kong Monetary Authority, the central bank of Singapore, and the central bank of Thailand [5]. Digital currencies can change the complex mechanism of cross-border payments currently distributed around the world and cleared in branches in various time zones, realizing all-day cross-border payment services globally and greatly enhancing the convenience of cross-border payment and settlement [8]. This will also accelerate the process of RMB internationalization and greatly broaden the development space of RMB internationalization.

5. Conclusions

There is no doubt that the way of payment in our daily life has changed dramatically with the development of digital CNY. By exploring the characteristics of digital CNY, its mechanism, philosophy and other basic principles, this paper finds that digital RMB has a positive impact on our life. Digital RMB enhances the stability and security of our transaction and payment. Because it has the same value as physical currency, it is located in the M0 category. Unlike privately issued currencies such as Bitcoin, the digital RMB is guaranteed by the state credit, which makes it very stable. Furthermore, the digital RMB enhances the convenience and efficiency of payment for transactions. General electronic payment refers to the lack of trust between the two parties, the establishment of intermediate transitional account, and then through the third-party custody to achieve the completion of the transaction, while the digital RMB through the encrypted string of the form of transfer, removing the interference of the third-party intermediary, is the real payment is the settlement, to enhance the efficiency of at the same time reduces the risk. Digital RMB can also enhance the universality and people's nature of financial services. Digital RMB is a non-profit tool that enables the public who do not have bank accounts to enjoy basic financial services through digital RMB wallets, so that people at the bottom of the social ladder can also obtain the same services, effectively improving the caliber and effectiveness of fundamental financial services, and even better realizing cross-border payments. Although the R&D and practice of digital RMB has a better impact and trend for domestic and international development, there are also areas that need to be continuously followed up. China needs to accelerate the legislation on digital RMB. Because the legal definition of the digital RMB is unclear, there are many people who take advantage of this opportunity to commit crimes, and the digital RMB is in great need of systematic regulations to prevent crimes from occurring. China's digital RMB is at the forefront of research and development, and with the trend of the digital economy, this paper believes that digital payments and transactions will inevitably become mainstream in the future. With this opportunity, it is timely to promote digital RMB globally and prioritize the initiative in the currency market. Moreover, the current trial of digital RMB is only located in the retail field of micro-payment, the scene is relatively very single, the accumulation of experience in digital RMB research and development is insufficient, the expansion of the scene is also very thin, the next step needs to be transformed into a batch of digital currency, in order to be more likely to participate in the future of the international monetary competition.

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