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Analysis of Research Status of Digital RMB Based on Block Chain Technology

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Abstract: In 2014, the people's Bank of China set up a digital RMB research group. After six years of research and experiment, it finally ushered in the test stage of closed pilot project, which is expected to be popularized in the near future. Digital RMB is a legal digital currency developed by the people's Bank of China. As a new legal currency, it is expected to compete with Libra. by its advantages of low cost and high efficiency This paper summarizes the current research on digital RMB, discusses the background, characteristics, positioning and relationship with commercial banks based on block chain technology, analyzes the current application of big data and artificial intelligence from the level of digital finance, and puts forward relevant policies for reference to provide new ideas for the development of digital currency.

Keywords: Digital RMB; Commercial Bank; Artificial Intelligence; Blockchain Technology

1 Background to the distribution of dimension

In 2008, the outbreak of the financial crisis, the original monetary system has been unprecedented impact, the establishment of World War II based on credit currency system has been questioned.' Because of the government overpayment of money, people no longer believe in the government. During 2009, the decentralized digital currency Libra based on block chain technology was born. With its anonymity, decentralization and encryption, it quickly occupied the capital market, breaking the situation that only the central bank could issue money. Subsequently, based on blockchain technology and decentralization of the idea of Wright coin, Ethernet coin has also been born. With the development of digital currency, a large number of digital currencies will enter the domestic market, impact on the original monetary system of our country, and reduce the purchasing power and credibility of our credit currency. In order to deal with the influence of digital virtual currency on our original monetary and financial system, China set up a digital RMB research group in 2014 to counter the virtual digital currency in international circulation. In 2016, the people's Bank of China launched a discussion on digital currency, defined China's strategic goal of issuing legal digital currency, defined the overall framework of legal digital currency, and proposed the early introduction of digital RMB. On August 14,2020, the Ministry of Commerce issued the General Program for Comprehensively Deepening the Pilot Project for Innovation and Development of Trade in Services, which proposes to carry out digital RMB pilot projects in Beijing Tianjin, Yangtze River Delta, Hong Kong-Macau Greater Bay Area and the central and western regions with corresponding pilot conditions [12].

2. Overview and characteristics of digital RMB

2.1 What is a digital currency

The legal digital RMB is issued through the national legal tender issuing institution, which has the ability of national credit endorsement and unlimited legal compensation. Different from other commercial virtual digital currencies: from the attribute point of view, Bitcoin and other commercial virtual currencies do not have national credit support[1], its speculative nature is strong, not affected by regulatory and technical problems of relevant departments, so prices tend to fluctuate sharply, which will greatly interfere with the country's financial markets. In terms of currency circulation, the central bank is the only institution that can issue money, and the digital RMB is issued by the central bank on the basis of national credit. In essence, digital RMB is a virtual digital currency issued by block chain technology and centralization, which is a "digital form of RMB", while virtual currency such as Bitcoin is issued based on the idea of decentralization[2].

2.2 Block chain technology

When it comes to digital money, we have to talk about block chain technology. Although digital RMB is not based on block chain, digital RMB retains the characteristics of anonymity, security and non-forgery of encrypted currency through specific issue management mode and related technical principles, on the basis of centralized management requirements. Blockchain is essentially a digital system, which consists of a series of technologies, including cryptography, distributed accounting books, point-to-point transmission, consensus mechanism and other application modes. Each person's digital information is equivalent to a "block" stored on a public database, and countless "blocks" are connected to form a "chain". This is the principle of blockchain. As economic transactions are transmitted to all servers or Internet nodes in the network, the business process becomes a P2P network, composed of transaction requests sent from either party to the computer [3]. Through distributed time service, blockchain technology realizeed independent management operation, and formed decentralization. While decentralized digital currencies such as Bitcoin can be untampered, left traces throughout, and can track the entire process of the money "from birth to death", the digital renminbi retains the centralization of traditional legal coins and integrates the excellent characteristics of decentralized digital currencies, which are highly secure and can store user data at information points around the world. Hackers who want to steal or tamper with data must break through all points in the chain where they want to change information [7], which is almost impossible. Because blockchain technology is open, No one needs access control to enter freely, greatly enhancing the utilization of data. Blockchain is technology, digital currency is a specific application, the digital RMB based on blockchain technology will still face unknown risks, that is, users freely enter the block chain and anonymous risks, the correct view of this new legal currency needs to start from both positive and negative aspects in order to better prevent or resolve risks[4].

2.3 Digital RMB is currently the M0 location [8]

Digital RMB is mainly located M0 (cash in circulation), because digital RMB can be exchanged with cash quota without interest, but also based on 1:1(digital RMB: reserve). Its connotation is that legal cash changes from physical form to digital form. Digital RMB only assumes the four functions of currency, namely value scale, circulation means, value storage and payment mean, and does not have administrative functions.M0 digitization is the inevitable trend of the rapid development of modern science and technology. With the development of modern electronic payment [5], Alipay is a typical account tight coupling mode based on the deposit currency of commercial banks. As part of electronic payment. Alipay has developed the habit of using electronic payment, but Alipay does not have independent clearing function and the ability to generate money out of thin air. Each transaction is bound by a bank card and completed by a commercial bank under the supervision of the central bank. Its payment process is shown in figure 1:

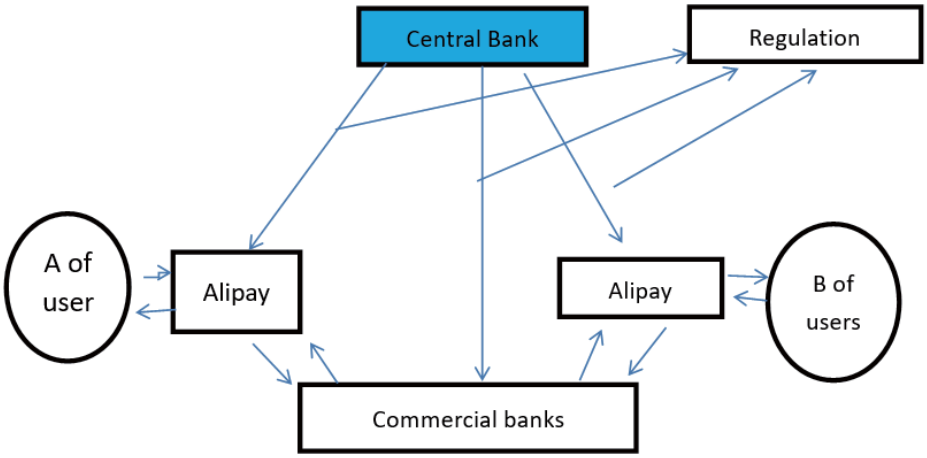


Figure 1. Alipay as an example of the mobile payment process.

The form of electronic payment limits the users stealth right and anonymous payment right, while the digital RMB based on block chain technology and centralization idea is supplemented by the existing electronic payment. The emergence of new legal currency will not change the original mobile payment mode, but also enable commercial banks to reduce the cost of cash management, storage, transportation and other illegal and criminal acts such as money laundering. As a new legal tender to replace cash, the digital RMB must adhere to the idea of centralized management by the central bank[15], and the data of users shall not be disclosed to third parties without permission except as the central bank knows. This is based on the M0 management model and the central bank's function as an issuing bank. The central bank's centralized management has the following aspects:

First, it can maintain the status of legal tender and the right to issue money, resist the erosion of foreign virtual currency and prevent the weakening of the right to issue money. As the ultimate debtor, the central bank issues digital RMB with national credit.

Second, it can realize payment as settlement, greatly improveing the efficiency of capital turnover between merchants and financial institutions. For small and medium-sized enterprises, it helps them solve the problem of liquidity, which is conducive to the circulation of money and the efficiency of monetary policy implementation. At the same time, it can break market segmentation and protect the rights and interests of financial consumers.

Third, the digital renminbi adopts a controllable anonymity mechanism. The central bank holds transaction information and can see all transaction data and capital flows, which are the most true and effective. It can effectively maintain financial stability and prevent money laundering, terrorist financing and tax evasion. Besides, the M0 digital RMB must be issued by commercial banks, using the dual model of central bank-commercial bank, central bank must be the only supplier of digital RMB, commercial bank is the supplement of the central bank. As the issuer of digital RMB, putting in, circulating and withdrawing digital currency is not easy to cause "financial disintermediation", but also has a small impact on the existing financial system and the operation of the real economy. However, the central bank should keep the original principle of cash distribution and prevent the risk of overpayment or run to some extent.

3. Relationship between Digital RMB and Commercial Banks

3.1 Promoting the transformation of commercial banks into service banks

Digital RMB is a new type of currency put in by commercial banks, which brings new challenges and opportunities to commercial banks. In the traditional management mode of commercial banks, the management of paper money cash is very complicated and the management cost is high, including cash transportation and storage, cash extraction, entry and registration, etc. In the case of cash count, banknote true and false inspection, broken banknote recovery and

so on, it needs many people and many jobs, which wastes a lot of human and financial resources. The digital RMB has the same infinite compensation characteristics as paper money, but it is more secure and quick, which can play a strong substitution role in the future. With the issuance and promotion of digital RMB, the original cash business will be replaced by digital network, the business related to paper money cash will be gradually reduced, and the related operating expenses will be reduced. Can greatly promote the transformation of commercial banks. The competitiveness of commercial bank network in the future may be reflected in the supply capacity of customer personalized service and financial service scheme. In addition, with the withdrawal of ATM machines and cash counters and other related supporting facilities, commercial bank outlets will increase, operational efficiency will continue to improve, operating costs will continue to decline [5].

3.2 Enhanced status of commercial banks

The issuance and operation of the digital renminbi is based on the "double-tier operation" model of the central bank-commercial banks, which can increase the status of commercial banks. Under this model, the exchange of digital renminbi and reserves between the central bank and commercial banks constitutes the first layer, and the exchange of digital renminbi with cash or deposits by commercial banks and the public constitutes the second layer, as shown in figure 2:

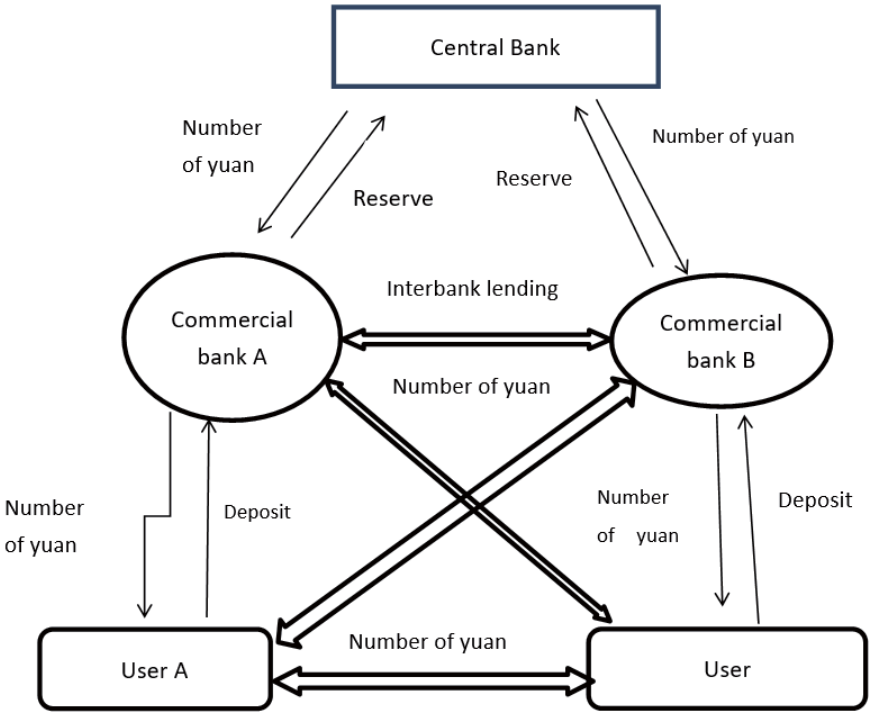
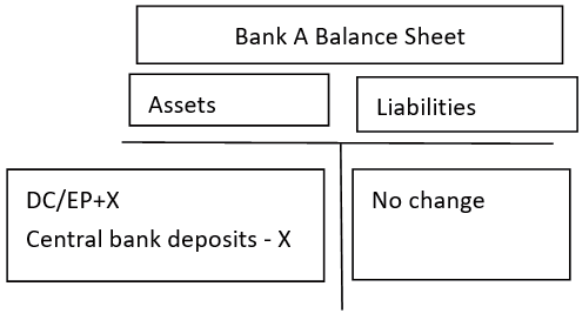


Figure 2. Central Bank-Commercial Bank Double-tier Model.

The development and support of the central bank needs a lot of capital, manpower and material resources. Through the system of double-level operation, commercial banks are also involved, the enthusiasm of commercial banks is mobilized, and the resources of commercial banks are fully utilized [6]. At this time, the risk of capital will be dispersed to all nodes, avoiding the centralized risk of unified operation by the central bank, and the public will strengthen the status of commercial banks by improving the credit of commercial banks from the heart, thus strengthening the status of commercial banks, Even in the future can absorb more central banking business.

3.3 Reduced the ability of commercial banks to create credit money

Zou Chuanwei's [2] balance sheet and DC/EP balance sheet analysis of third party payment after "disconnection", the deposit (withdrawal) of digital currency is reflected in the mutual transformation between user's deposit in commercial bank and digital currency, and the increase or decrease of user's deposit in commercial bank will result in the corresponding increase or decrease of commercial bank's legal deposit reserve in central bank. Assuming that bank A applies to the central bank for X yuan digital RMB, the central bank will deduct X yuan and spend X yuan in bank A's excess deposit reserve DC/EP, At this time, the central bank's balance sheet has not changed, Statement of liabilities DC/EP+X, Bank A deposits- X; Bank A's balance sheet DC/EP+X, deposits in the central bank decreased X, the balance sheet did not change. Its assets and liabilities are shown in figures 3 and 4:



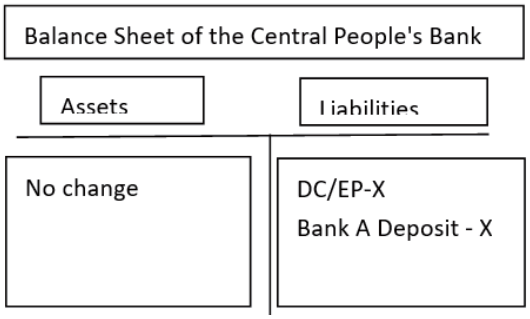


Figure 3. Bank A balance sheet figure 4. Central Bank balance sheet.

The analysis of figure 3, figure 4, shows that when Bank A puts all the X DC/EP into the market, the final consequences of the user A using cash or deposits to withdraw the DC/EP, in commercial banks will lead to a reduction in the excess reserves of the central bank. According to the formula:

$$c = \frac{\Delta C}{\Delta D}$$

$$K = \frac{1}{R_d + T \times R_t + c + e}$$

The c is the cash leakage rate, the ΔC is the cash leakage amount, the ΔD is the increase of the demand deposit, the R_d is the current legal reserve ratio, the T is the ratio of the time deposit to the current deposit, the R_t is the legal reserve ratio of the time deposit, the excess reserve ratio K the coefficient of creation of the deposit currency

As the central bank's excess reserves fall, they directly affect the ability of commercial banks to create credit money. Tang Kui's study found that when the basic currency before and after the issue remains unchanged, because the convenient ability of digital RMB to pay is much greater than cash, and its function is to digitize cash, the balance of digital wallets will increase, as shown by the user's exchange of deposits from commercial banks into the balance of digital wallets, which are directly equivalent to the currency in circulation in the market. Once the currency in the market increases, the cash leakage rate c increase, as a result, the coefficient of deposit currency creation will be reduced, which is not conducive to commercial banks to play a credit currency creation role.

Within Keynes's money demand function, money, as an unprofitable asset, holds no return, and Friedman's money demand function expands the M0 to M2, when it is profitable. Digital RMB is currently located in M0, but with the development of digital technology, new financial derivatives based on digital RMB will be produced, and commercial bank capital transactions will become richer.

3.4 The structure of the debt side of commercial banks is at risk

Because of the issuance of digital currency, some users are not excluded from converting their original demand deposits into digital renminbi in digital wallets. The demand deposits that should have been absorbed by commercial banks will fall, and the balance sheet will shrink. The stability of its development will be limited. If some commercial

banks choose to increase the interest rate of demand deposits to absorb social funds, then the debt end of commercial banks will increase the cost, and the structure of the debt end will be at risk. In daily life, the people's demand deposits are mainly to pay, not as investment funds. Once the digital currency began to be fully implemented, commercial banks in order to ensure profitability, will increase the cost rate of interest payment, from the original stability to risk preference, the pursuit of high-risk, high-yield assets, and ultimately increase the risk risks of the entire banking industry [9]. After the issuance of digital RMB, the influence on commercial banks has advantages and disadvantages, which improves the status of commercial banks and brings new risks. Because of the equal exchange mechanism, the risk of customers holding money is much lower than that of paper money cash. It greatly improves the convenience of depositors. If the public chooses to convert a large number of bank deposits into digital renminbi, such as wars, bank trust crises, and so on, in the process, bank balance sheets are severely shrunk, and bank deposits are largely off-balance-sheet [10]. As a result, the banking crisis and even the entire social credit contraction. To this, commercial banks must make relevant plans in advance, get a good solution [11].

4. Application in the earth of digital finance

4.1 Big Data and Artificial Intelligence

In recent years, ICBC has explored the related application scenarios of artificial intelligence technology in financial services, relying on machine learning and computer vision to improve automatic detection and recognition in the operation department of flow-oriented operations. For example, banks use computer handwritten to identify, replace manual input information, use computer vision technology in financial reimbursement system, and realize automatic identification of invoice number and code. Secondly, ICBC internal system data takes up a lot of resources and services to process. Based on natural language processing and computer vision technology, banks realizes intelligent processing of all processes in the system. Finally, the intelligent vault is the financial digital innovation point of ICBC. ICBC uses the Internet of things, artificial intelligence, big data and other innovative technologies to build an unattended fully automated vault. It is the first commercial bank in China to explore big data and artificial intelligence. It provides reporting experience for digital RMB on big data and artificial intelligence. As the popularity of digital RMB, the advantages of big data and artificial intelligence will gradually be reflected in the future. The specific scenario may be that the bank's related personnel will become robots, or mobile ATM machines. Each ATM is connected to the cloud through the Internet of things.

5. Relevant policy recommendations and summaries

Digital RMB based on blockchain technology is a new mixture of traditional legal currency and decentralized digital currency. It still has the basic functions of value scale, circulation means, payment means and value storage of traditional paper money. Different from other digital currencies [13], the DC/EP retained centralization features greatly improve transaction efficiency and can be quickly applied to daily transactions. Taking the people's Bank of China as the control point, the digital RMB, in addition to each node of the traditional encrypted currency, confirms the redundant steps of each transaction [14], and greatly improves the transaction efficiency. And for the development of digital RMB, put forward the relevant suggestions [15]:

(1) Long-term adherence to the M0 positioning of the digital renminbi

Nowadays, the digital RMB must adhere to the position of M0 for a long time, and do not pay attention to the replacement of M1 and M2 in the short term. At present, the position of digital RMB is M0, supplement to electronic payment.

(2) Adhere to the double-tier operation system and control the circulation of digital RMB

To adhere to the double-level operation system of the central bank-commercial banks, to adhere to the idea of centralized management, the central bank gives appropriate incentive policies to obtain the support of commercial

banks, at the same time enriching the digital RMB exchange channels, and appropriately controls the circulation of digital RMB According to formula M=Y+P-V (M: monetary growth rate, Y： economic growth rate, P： price increase rate, V： currency circulation rate), if the Y,P remains unchanged, because the digital RMB has the characteristics of rapid circulation in the market, once issued too many digital RMB, Then the growth rate of money will decrease.

(3) Improving or rebuilding the debt-end structure of commercial banks

According to the above analysis, whether the user deposits or takes money, it will lead to the stability of the debt side of commercial banks, and the management requirements of commercial banks on the assets and liabilities side will become larger and even face restructuring.

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