Analysis on the Problems of Legal Digital Currency Based on Blockchain and Information Technology

Xianke Li(✉)

Guangzhou College of Applied Science and Technology, Zhucun Street, Guangzhou, China
lixianke1987@163.com

Abstract. In recent years, crypto assets such as bitcoin and global stability currency have tried to play the role of money, and a new round of game between private currency, foreign currency and legal tender has begun. Central banks of various countries accelerated the research on the pilot of legal digital currency based on blockchain and information technology. The introduction of legal digital currency is conducive to the central bank controlling the currency issuance right, improving the convenience of cross-border clearing, expanding the international impact of local currency, and providing a universal basic currency for the development of digital economy in the era of big data. Taking the digital RMB as an example, this paper analyzes the issuance of legal digital currency in China. Starting from smart finance, this paper focuses on the problems of information technology, legal standard circulation environment and macro policy in the issuance of legal digital currency, and puts forward some solutions.

Keywords: Legal digital currency · information technology · blockchain technology · smart finance

1 Introduction

With the increasing maturity of blockchain technology, virtual currency based on node network and digital encryption algorithm represented by bitcoin is becoming more and more prosperous, and a round of hype is set off all over the world. Digital currency is a currency whose issuer is private or national, based on blockchain technology, digital information as a way of existence, cryptography and finance as the theoretical basis, and attached to the Internet as the place of its transaction and circulation [2]. The legal digital currency studied in this paper is a country's financial credit and a digital signal. It is a controllable and anonymous payment instrument issued by the central bank and designated operating institutions to participate in the operation and exchange to the public. Based on the generalized account system, it supports the loose coupling function of bank accounts, is equivalent to banknotes and coins, and has value characteristics and legal compensation. Legal digital currency, while maintaining the monopoly and independence of the currency issued by the central bank, can implement any traditional effect of traditional currency.

Z. Zeng et al. (Eds.): ECIT 2022, AHE 11, pp. 559–567, 2023.
https://doi.org/10.2991/978-94-6463-005-3_56

2 Issuing Cases of Legal Tender

2.1 Characteristics of Digital RMB

First, the digital RMB is a stable currency. Compared with the digital stable currency issued by enterprises such as usdt TEDA currency, digital RMB, which has national credit endorsement, is obviously more reliable. Digital RMB has two key points: legal tender in digital form, with legal compensation (rejection of illegal); It is mainly positioned at M0, that is, cash used for circulation.

Secondly, digital RMB adopts a two-tier operation system. That is, the people's Bank of China does not directly issue and exchange the central bank's digital currency to the public, but first exchanges the digital RMB to the designated operating institutions, such as commercial banks or other commercial institutions, and then these institutions exchange it to the public. This which is basically the same as that of banknote issuance, enables the digital money delivery system to ensure that DC/EP is not over issued. When the money generation request meets the verification rules, the corresponding quota voucher will be sent.

2.2 Transaction Process of Digital RMB

At present, digital RMB adopts a centralized management mode and does not need to use blockchain technology more suitable for decentralized management [4]. Because its main function is circulation, the use frequency is very high frequency. The digital

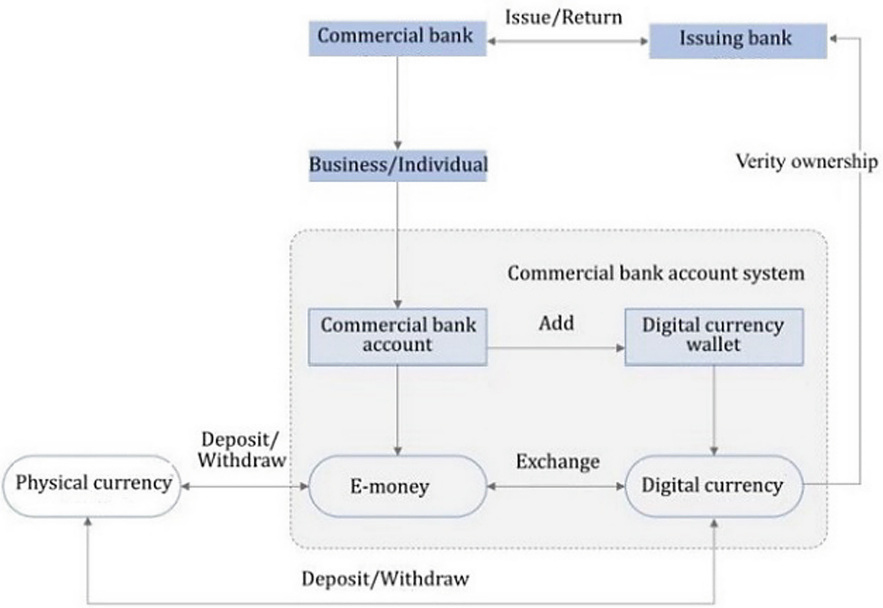

Fig. 1. Payment process of digital currency.

currency based on blockchain technology has the delay of data confirmation. Once the digital RMB is applied, the number of transactions per second is unbearable for the current blockchain technical performance. For example, in 2020, tmall double 11 transactions exceeded 100000 transactions per second. The transaction process is shown in Fig. 1.

2.3 Pilot of Digital RMB

In 2014, the Central Bank of China set up a special research team to conduct in-depth research on the framework of digital currency issuance and business operation, key technologies of digital currency, issuance and circulation environment, legal issues faced, etc. In 2020, the people's Bank of China began to promote the pilot work of digital RMB issuance. As of June 30, 2021, the number of digital RMB pilot scenarios has exceeded 1.32 million, covering living payment, catering services, transportation, shopping consumption, government services and other fields. More than 20.87 million personal wallets and 3.51 million corporate wallets were opened, with a total of more than 70.75 million transactions and an amount of about 34.5 billion yuan.

3 Information Technology of Legal Digital Currency

The information technology requirements of digital currency are very high, and the process must be rigorous. This is because the implementation of the issuance, circulation and return of digital currency need to be carried out on the Internet. Any loopholes and deficiencies in any link will lead to the failure of the digital currency system and cause immeasurable losses.

3.1 Technical Realization Risk

Distributed ledger technology, also known as blockchain technology, is intended to be applied to the legal digital currency prototype system to realize some functions, but this technology is still in the initial research and development stage, and a unified technical standard has not yet been formed. Professional technicians are still working intensively on the research and development of relevant technical schemes [5]. Distributed Ledger has the characteristics of tamper proof, high transparency and decentralization, which can greatly reduce the cost of financial system compared with traditional technology. At the same time, it can also realize real-time clearing without time and space constraints, which greatly improves the financial efficiency, so as to break the current global financial pattern.

At this stage, blockchain technology has made breakthroughs in system resource consumption and data processing capacity, but it also faces the problem of poor technical scalability, which needs to be tested by large-scale practice. To ensure the stability of digital currency trading system, we must have strong concurrent processing ability in the face of large-scale transactions.

3.2 Information Security Risk

The reason why higher requirements are put forward for information technology is that the central bank digital currency, as the legal national currency, needs to have the characteristics of safe storage, safe transaction and safe circulation.

The irreversibility of the blockbook technology is that there is no protection of personal information in the blockchain. Blockchain relies on traditional encryption mechanism and does not have a native encryption mechanism. In order to avoid the deliberate attack of hackers and face the risk of property loss, the public with digital currency needs to keep their private key. It is understood that hackers can control and attack the blockchain system as long as they find the codebook and decode the code. Therefore, strengthening the security of information technology is an important part that the central bank must consider when choosing the underlying technology.

On the other hand, through the core cloud server, the central bank can provide digital currency services to the public. In highly interconnected systems, there is no available high-level encryption algorithm online. At this time, once there is a vulnerability in the cloud server, it may become the object of attack. If hackers attack cloud servers and steal funds, once a breach occurs, it will have an immeasurable impact on the whole system.

3.3 System Construction Risk

Expandable, highly flexible and complete system architecture, which is more conducive to the circulation of legal digital currency.

First, the scalability of the system architecture is that digital money will circulate between traditional banks and society. Of course, it will also circulate among financial institutions and social organizations such as exchanges, credit intermediaries, and even cross-border.

Secondly, there is a lack of data and cases about digital currency in the world. Digital currency requires to build a set of financial architecture and underlying operating system that is different from the past and needs a lot of actual data support. At this stage, more than trillions of financial infrastructure have been invested, but no one knows the amount of investment in new systems. Data storage is an important part of blockchain technology, and the requirements are quite high. At ordinary times, when the transaction volume is small, data storage and hardware equipment can be affordable, but once the transaction volume increases, this will be a challenge.

In addition, in the blockchain industry, there is a lack of all-round talents who understand both blockchain expertise and financial markets. The central bank needs to invest more energy in system construction and overall planning.

4 Legal Norms of Digital Currency

The current legal digital currency is in the research stage, and the existing legal system is still unable to make requirements for the issuance, transaction, circulation and supervision of legal digital currency. Therefore, it is necessary to understand the risks that will exist and use this as a reference to formulate a special and targeted digital currency legal system, which includes the following points:

4.1 The Legal System of Legal Digital Currency is Not Perfect

First, we should solve the problem that legal digital currency does not belong to legal currency. To establish the status of legal tender, statutory digital money needs to be clearly defined by the relevant organs of the state through legislation, simultaneous interpreting its legal status with traditional money. According to the current law, RMB is uniformly printed and issued by the people's Bank of China according to law. Its definition only includes paper money and coins, and does not include digital currency into the category of legal tender.

The second is the legal compensation of legal digital currency. According to the regulations on the administration of RMB and the relevant provisions of the law of the people's Bank of China, no unit or individual may reject all public and private debts paid in RMB within the territory of the people's Republic of China. As a new type of currency, in the early stage of the promotion of legal digital currency, people will doubt whether it can be equivalent to the utility of traditional currency, so they will reject legal digital currency. In addition, in real life, the lack of equipment or lack of operational skills will hinder its circulation in daily life, which will have an impact on the legal authority of digital currency.

The third is the transfer of ownership of legal digital currency. In essence, digital currency can be understood as an encrypted string with value characteristics. Compared with the traditional currency, its form is digital, so it is difficult to distinguish the transfer of ownership, which needs to be clarified by legislation. Therefore, the central bank needs to revise relevant laws to meet the development process of the currency issuance system.

4.2 Unclear Supervision

First, the issue of counterfeiting legal digital currency. According to the current legal norms, counterfeit money refers to "forged and altered RMB". It is stipulated that the deposit and withdrawal institutions shall immediately collect the counterfeit money and stamp it for registration. Because legal digital currency is different from traditional currency, its forgery will also be different from traditional currency. Counterfeiters can crack digital currency by means of low-cost swap and proxy investment, or by means of Internet technology. Once the holder of digital currency does not have the ability to identify the forged digital currency, the assets are easy to suffer losses.

Second, the problem of digital money laundering. China's anti-money laundering institutions can control money laundering by means of monitoring large suspicious transactions and customer identification. Digital currency has the characteristics of high anonymity, cross-border circulation and portability. This not only facilitates money laundering, but also challenges the existing regulatory system. The central bank needs to issue new anti-money laundering rules specifically for legal digital currency and clarify the tripartite rights and responsibilities of anti-money laundering monitoring center, financial institutions and non-financial institutions.

Third, the information of digital currency holders has been stolen. The ownership of digital currency is determined by private key and personal identity information code. The transfer of ownership is completed through electronic information transmission. Once the information is leaked due to some illegal acts, it will bring huge losses to the

holder. Therefore, it is necessary to introduce corresponding legal systems to deal with this phenomenon in order to protect the legitimate rights and interests of holders.

5 Circulation Environment of Digital Money

In recent years, China has been promoting digital money terminal equipment and cultivating public use habits, but it has encountered many difficulties.

5.1 The Promotion Cost is Bound to Increase

On the one hand, the cost of hardware configuration and software upgrade of financial institutions and telecom operators has increased. For the financial system, it has always been the traditional dual system model of "central bank commercial bank". For the promotion of legal digital currency, commercial banks need to configure relevant service terminals, make rational use of, integrate and optimize new and old systems, and regularly maintain and upgrade software. Therefore, the operating costs of relevant institutions will increase. The legal digital currency system is based on power stability and Internet stability. In areas with weak telecommunications infrastructure coverage, it is possible to suffer power damage, interruption of Internet connection or other force majeure factors, resulting in service failure. Therefore, with the implementation of the legal digital currency system, telecommunications needs to upgrade equipment and strengthen the maintenance of facilities.

On the other hand, in order to equip professionals to serve the public, the cost of training professionals will increase. Although electronic information operation has been gradually popularized, some businesses involving counter personnel that have not been migrated still need to consume a lot of labor costs. After the launch of the digital currency system, it is not difficult to predict that major commercial banks will invest more human and material resources to promote digital currency. By promoting the popularity of digital currency, we can reduce counter labor costs and maximize benefits.

5.2 Need a Large Number of Circulation Carriers

Mobile terminal equipment provides a carrier for the circulation of legal digital currency among the public. According to reports, the number of people with mobile phones in China has reached 650 million, that is to say, nearly 50% of the public do not have mobile phones and will not surf the Internet. Moreover, among the public with mobile phones, 30% of the users are middle-aged and elderly people, who are less capable of acquiring new knowledge than young and middle-aged people. In addition to the age distribution will lead to differences in the popularity of digital currency, the regional distribution will also affect the popularity. There are great differences in development between regions in China, and the acceptance of people in remote areas for the use of intelligent mobile terminals is also low. Therefore, we will also encounter varying degrees of difficulties in promoting digital currency. When dealing with the receipt and payment of large amount digital currency or cross-border business, enterprises and businesses also need to be equipped with corresponding and qualified hardware equipment to receive terminal information. Therefore, the construction of mobile terminal market is an important part that the central bank must consider when promoting digital currency.

5.3 Long Acceptance Time

Because digital currency is a relatively new concept for people, people need to take time to accept a new concept of currency. Therefore, the central bank needs to support the construction of digital currency application scenarios, and give the people a long time to adapt, so as to make certain infrastructure construction for the people to quickly accept digital currency. Because digital currency is a string character without physical form and virtual existence, it is difficult to subvert the existing concept of the people and let the people quickly accept it. In the early stage of digital currency issuance, people must learn new technologies and system operation. If the early promotion of digital currency cannot be carried out effectively, the public has no expectations for digital currency. This will make the public more inclined to traditional RMB assets, and the social phenomenon of running on digital currency will appear. As a result, the promotion of digital currency is blocked, which is contrary to the original intention of the central bank to issue digital currency. In addition, people also need to learn how to properly keep digital currency, prevent key loss and reduce the risk of property loss caused by key theft.

6 Macro Policy Regulation

The issuance and circulation of legal digital currency will bring many impacts to the existing financial system and bring new challenges to macroeconomic regulation and policy-making.

6.1 Impact on the Current Financial System

At present, the central bank mainly assumes the role of "Bank of the bank", is responsible for formulating monetary policy and supervising commercial banks, and is not responsible for specific financial business [1]. The issuance of legal digital currency may lead to the transfer of social deposits from major commercial banks to the central bank. When the economy fluctuates sharply and interest rates fall, the public converts commercial bank deposits into digital currency to avoid risks and reduce losses. This behavior of the public has led to the loss of money creation ability of major commercial banks, and the sharp contraction of liquidity, which has greatly affected the productivity of the financial system.

In addition, the existing financial management system will also be impacted. For example, in the deposit insurance system, when the financial crisis occurs, the public may convert their financial assets into digital assets of the central bank, so as to transfer the risk of the financial crisis to the central bank.

6.2 Formulation of Macroeconomic Policies

It has brought new challenges to the formulation of macroeconomic policies. After the promotion of legal digital currency by the central bank, legal digital currency will replace some traditional currencies. Based on this money supply structure, money circulation speed, money multiplier and money creation mechanism will also be changed.

CCTV must re-examine the transmission mechanism and tools of monetary policy [3]. Strengthen the research and development of building theoretical models and speed up the research and development process, so as to predict the effectiveness of policies, determine the intensity of regulation and control, and prevent the occurrence of systemic financial risks. In the context of global economic integration, the circulation of legal digital currency implemented by the central bank will also have an impact on the spillover effect of monetary policy and change its current situation. The financial systems of other countries will also be affected by the impact of block transactions, capital flows and other means. In this regard, the central bank needs to improve the existing foreign exchange management system to meet all the unknown challenges.

7 Conclusions

Under the background of the continuous improvement of informatization and science and technology, the application scenario of legal digital currency will continue to innovate. This paper holds that because digital currency faces three problems: information technology, legal standard circulation environment and macro policy, it will take time for the full promotion of legal digital currency. Central banks need to further improve technology, continue to strengthen information technology research and development, promote the construction of legal digital currency financial system, promote the construction of legal digital currency circulation environment, strengthen the cooperation between commercial banks and other financial institutions, and give full play to the scale advantages of Internet finance, so as to effectively promote the global popularization of legal digital currency.

Acknowledgements. 2021 Youth Innovative Talents Project of Guangdong Provincial Department of Education "Industrial Internet, Enterprise Innovation Network and Regional Industry Collaborative Innovation Research" (2021WQNCX106); Scientific research planning project "Research on artificial intelligence integrating enterprise technological innovation network to promote industrial collaborative innovation" (gzyykjxy202103).

References

1. Li B (2018) Research consensus and Prospect on legal digital currency. Financial Theory Pract (12):103–108
2. Qiao H, Xie S (2017) The latest development of blockchain financial theory research. Financial Theory Pract (03):75–79
3. Yao Q (2019) Economic effect analysis of legal digital currency: theory and demonstration. Int Financial Res (01):16–27
4. Zhuang L, Zhao C (2017) Research on the evolution of digital currency under blockchain technological innovation: theory framework. Economist (05):76–83
5. Zhou C, Cao J (2017) The historical logic of digital currency and the control of national currency issuance right – from the perspective of the central bank's currency issuance function. Comparison Econ Soc Syst (01):104–110