

The Construction of digital RMB guarantee rule system realized by smart contract

Yulin Zheng^{1,a,*}, Jianxin Hu^{2,b}, Zhu Ying^{1,c}, Tao Wang^{2,d}

¹College of Mechanical and Electrical Engineering, Huali College, Guangzhou, China

²College of Economics and Trade, Huali College, Guangzhou, China

^a120206367@qq.com, ^b15683524@qq.com, ^c33735398@qq.com, ^d343339789@qq.com

*Corresponding author

Keywords: Digital RMB, Guarantee Rule System, Smart Contract

Abstract: The guarantee rule system of digital RMB is a system that needs to be continuously improved. Its core is to establish the legal status and guarantee rules of digital RMB. Based on the research of the existing guarantee rule system, on the basis of drawing lessons from the existing blockchain technology and intelligent contract technology, this paper puts forward the idea of using intelligent contract to assist in the construction of digital RMB guarantee rule system. By embedding smart contracts in the whole process of digital RMB issuance, circulation and destruction, we can provide more enforceable guarantees for digital RMB, and gradually establish a digital RMB guarantee rule system that is compatible with China's current legal system and meets the needs of China's financial innovation.

1. Introduction

In recent years, major changes have taken place in the world's monetary and financial fields. The emergence of digital currency dominated by digital RMB (RMB) marks a great change in our cognition and treatment of currency. In this context, it is urgent to build a perfect guarantee rule system to ensure the stability, security and standardization of digital RMB. This paper aims to discuss how to use smart contract to build a practical guide to such a system. Through the discussion of the required practical steps, it is expected to inspire the key links in the construction of a robust digital government guarantee rule system.

The construction of the guarantee rule system of the digital RMB is a complex systematic project. The traditional guarantee rules are mainly based on the law, and there are defects such as incomplete rule coverage, imperfect rule design, and lack of hierarchy in the rule system.^[1] Intelligent contract technology can effectively solve the above problems and provide a new idea for the construction of digital RMB guarantee rule system. The basic framework of the digital RMB guarantee rule system can be designed by using smart contracts, including guarantee, mortgage, pledge and offset. Among them, the guarantee can clarify the specific way of digital RMB guarantee, the mortgage can realize the registration and publicity of property rights through the intelligent contract, and the pledge can automatically realize the registration and publicity through the intelligent contract. In addition, the use of smart contracts can also make the design of

the digital RMB guarantee rule system more flexible and convenient, which can provide guarantee for further promoting the internationalization of digital RMB.

2. The Existing Guarantee Rule System

As mentioned above, the current legal system has provided a certain basis for the construction of the digital RMB guarantee rule system. However, the digital RMB has not yet established its legal status, which makes it impossible to apply the existing guarantee rule system in specific practice. The author believes that the digital RMB should be positioned as a new movable property or rights pledge, rather than accounts receivable pledge (or bill pledge).

The traditional movable property guarantee system has significant transaction attributes and publicity requirements. Its basic content is to fix the information such as the possession, use, income and disposal of movable property or rights through registration, and to make the counterparty of the transaction aware of the change of property rights through publicity.^[2] Under the chattel security system, whether it is a security interest such as mortgage, pledge or lien, it needs to be registered by a third party. In the digital RMB, because it does not have transaction attributes and publicity requirements, it can not be registered. However, the guarantee rule system of digital RMB should be a complete system, rather than only two links of registration and delivery. Although the digital RMB can be used as the pledge object of accounts receivable, its essence is still RMB cash (paper currency), so it cannot produce the same effect of real right change as paper currency. In the whole process of issuance, circulation and destruction of digital RMB, digital RMB can be pledged as accounts receivable (or bill pledge).

Secondly, the digital RMB cannot be used as the pledge target of accounts receivable in practice. Although China's law allows the transfer of accounts receivable to be included in the legal framework, due to the lack of specific provisions and operating rules, the relevant departments do not support the digital RMB as the pledge of accounts receivable in practice.^[3] In reality, only a few banks accept the digital RMB as the pledge of accounts receivable. At present, there is no requirement for the publicity of movable property and right pledge under the legal system of our country. Therefore, it is impossible to publicize and register digital RMB under the existing legal framework. Therefore, digital RMB should be given publicity effect rather than only transferability.

Finally, under the existing legal system, only the 'Property Law' stipulates the chattel mortgage system, the 'Guarantee Law' stipulates the right pledge system, and the 'Maritime Law' stipulates the right pledge system under the maritime law. There are no provisions on digital RMB guarantee rules under the above three legal systems.^[4] Therefore, under China's current legal system, we can learn from foreign laws to construct a digital RMB guarantee rule system. In the relevant legislation outside the region, it is a common practice to include movable property and right pledge into the category of movable property guarantee. For example, the United States' Unified Commercial Code, the French 'Civil Code' and the German 'Civil Code' have relevant provisions. However, China's current legislation does not have provisions on movable property guarantees. China's current legislation also does not make provision for chattel mortgage. However, there are some special cases in practice: one is that there are gaps or imperfections in the chattel mortgage registration system; the second is to set up a specific right pledge or lien on some special movable property; the third is the need for guarantees in special transactions such as financial leasing and factoring.

Although the above legislative attempts have certain rationality and feasibility, they cannot fundamentally solve the problem of imperfect digital RMB guarantee rule system.

3. The Guaranteeability of Digital RMB

The digital RMB has the attributes of currency and illegality, which can be legally defined as

special virtual property, that is, legal currency in electronic form. The digital RMB has the use characteristics of ' payment is settlement ' and ' cash in circulation '. It is essentially a currency, with legal compensation and substitutability. ^[5] The legal status of digital RMB as virtual property should be clarified.

The analysis of the guaranteeability of the digital RMB should be based on its special legal status. From the perspective of attributes, digital RMB, as a special type of virtual property, can be used as collateral for creditor's rights. Digital RMB has the following particularities: First, it belongs to the legal currency with cash, which is legal and replaceable; second, it has the function of value storage and payment, and can become ' class currency ' ; third, it has strong substitutability with cash. In law, China's law does not give digital RMB ownership or other property rights. ^[6] At the same time, there are also acts of fraud using digital RMB in practice. But from the functional point of view, the digital RMB can be used as a collateral or a payment tool. On the one hand, digital RMB has a payment function and can provide support for capital transactions ; on the other hand, digital RMB can be used as collateral for creditor 's rights or as a payment tool to meet the needs of financial institutions to carry out business innovation.

From the perspective of legal status, China has not yet incorporated the digital RMB into the legal currency category stipulated in the "People's Bank of China Law" (hereinafter referred to as the "People's Bank of China Law "). However, under the existing legal framework, digital RMB can still be guaranteed in other ways.

4. The Construction of Digital RMB Smart Contract

Digital RMB smart contracts can be designed into two categories: one is a smart contract based on a specific amount of digital RMB, such as programmable commercial papers and debt certificates based on digital RMB; the other type is smart contracts that target specific goods or services, such as programmable goods and services agreements.

In the circulation of digital RMB issuance, the use of smart contracts can achieve the following functions:

First, the use of smart contracts can improve the efficiency of digital RMB issuance and circulation. The digital RMB smart contract is a specific guarantee rule formulated and implemented by the digital RMB issuer under the premise of complying with the legal currency issuance rules, according to the legal currency issuance rules. Through smart contracts, digital and electronic guarantees can be realized, the essence of which is to convert fiat money into specific goods or services. ^[7]According to the legal currency issuance rules and smart contracts, the digital RMB can achieve efficient, safe and low-cost circulation.

Second, the use of smart contracts can reduce transaction costs. After embedding smart contracts in the process of digital RMB circulation and destruction, transaction costs can be reduced due to the use of technologies such as encryption technology and distributed ledger technology based on blockchain technology and digital currency technology. First of all, in the traditional transaction scenario, the transaction process is cumbersome due to the need for real-name authentication, password operation, signature verification and other operations. The programmability is realized through smart contracts, which can realize operations such as no real-name authentication, no password operation, and no signature verification. Secondly, the introduction of smart contract technology in the digital currency trading scenario can also reduce the information asymmetry in the transaction. By converting fiat money into specific goods or services and then issuing and circulating, it can effectively eliminate the risk of information asymmetry in the transaction process. Finally, after the introduction of smart contracts in the digital RMB destruction link, it can also reduce the credit risk caused by the destruction of legal tenders.

In the traditional system of guarantee rules, due to the opacity of guarantee rules and the lack of standardization of guarantee rules, market participants cannot accurately grasp the content and standards of guarantee rules. Smart contract technology can regulate the behavior of market participants by setting relevant provisions, so that they can more accurately grasp the content and standards of guarantee rules.

5. The Innovative Significance of Digital RMB Guarantee Rules

The guarantee rule system of digital RMB is an important rule in the whole process of digital RMB issuance, circulation and destruction, which is of great significance to the whole digital RMB guarantee system.

First of all, the design of digital RMB guarantee rules is conducive to the safety and convenience of financial transactions. Because the nature of digital RMB is legal currency, its guarantee rules should also be legal and enforceable. Based on the requirements of current laws and regulations on the security of financial transactions, the use of smart contracts to construct guarantee rules can avoid transaction risks caused by the lack of guarantee rules.

Secondly, the design of digital RMB guarantee rules is conducive to preventing possible risks in the process of digital RMB issuance and circulation. Because digital RMB has controllable anonymity, smart contracts can be used to verify the identity information, transaction content and amount of both parties, and to a certain extent, to audit user identity and transaction content.^[8] In this way, the authenticity of user identity and transaction content can be ensured, and the forgery of transactions can be prevented. In addition, smart contracts can also be used to control every link of the issuance and circulation of digital RMB, so as to avoid illegal copying and repeated use of digital RMB, so as to effectively prevent financial risks.

Finally, the use of smart contracts to construct guarantee rules can achieve a good connection with the existing legal system. Because the uses of smart contracts to construct guarantee rules is not a negation of the existing legal system, but an innovation within the framework of the existing legal system. Therefore, it can avoid the problems that the digital RMB cannot be effectively guaranteed or cannot be implemented due to the imperfect provisions of the legal system on the digital RMB guarantee rules. By embedding smart contracts in the existing legal system, it can effectively link up with the existing legal system and ensure that the digital RMB guarantee rule system conforms to the current legal provisions.

5.1. Help to Ensure the Safety and Convenience of Financial Transactions.

In the traditional system of guarantee rules, the guarantee rules are generally determined by the agreement between the relevant subjects, but because the digital RMB is a legal currency, its guarantee rules should also be legal. In the existing legal system, although there are provisions on the guarantee rules, due to the lack of mandatory provisions, the guarantee rules cannot be enforced. In judicial practice, the court generally can only determine the scope of liability of the guarantor based on the agreement between the parties, and cannot enforce the guarantor. In the current situation of imperfect legal system, it is easy to lead to financial transaction security and convenience is difficult to guarantee.^[9] Using smart contracts to construct guarantee rules can effectively solve the above problems. Because smart contracts are legal instruments in the form of code, they can effectively avoid various problems in traditional guarantee rules.

Since the smart contract is designed to fully consider the responsibilities and obligations of the digital RMB as a legal currency, the embedding of smart contracts in the legal system can effectively ensure that the digital RMB guarantee rules have enforcement effect. Moreover, because smart contracts can automatically execute contracts by using computer code technology, the

automatic execution of contract contents can be realized without the negotiation of relevant subjects. In financial transactions, only through negotiation and agreement between the two parties can the transaction be completed and settled. In this case, it is difficult to complete the transaction if the two parties cannot agree on the transaction. However, using smart contracts to construct guarantee rules can automatically execute the contract content and settle the settlement without negotiation. This can not only ensure the successful completion of the transaction, but also ensure the safety and convenience of financial transactions.

5.2. Help to prevent financial risks

At present, the risks of China's financial system mainly come from four aspects: credit risk, market risk, liquidity risk and operational risk. Credit risk and market risk can be controlled by guarantee rules. However, operational risk and liquidity risk need to be controlled by smart contracts.

The use of smart contracts to construct guarantee rules can be prevented from many aspects, thereby reducing the financial risks of digital RMB issuance and circulation.^[10] Firstly, the use of smart contracts to construct guarantee rules can verify the user's identity information, transaction content and amount, so as to effectively prevent forged transactions. Secondly, the use of smart contracts can control every link in the circulation of digital RMB issuance. In this way, every link in the circulation of digital RMB issuance can be controlled, so as to ensure that digital RMB is not illegally copied or reused. In addition, the use of smart contracts can also be achieved by setting a margin system to ensure the guarantee function of digital RMB. Because the introduction of the margin system in the guarantee process can reduce the transaction risk caused by the lack of guarantee rules. Because users are not allowed to withdraw digital RMB cash or withdraw it to other accounts within the guarantee period, thus effectively preventing financial risks caused by insufficient liquidity.

5.3. Smart Contract Technology Provides the Possibility for the Improvement of Digital RMB Guarantee Rules

At present, the risks of China's financial system mainly come from four aspects: credit risk, market risk, liquidity risk and operational risk. Credit risk and market risk can be controlled by guarantee rules. However, operational risk and liquidity risk need to be controlled by smart contracts.

In the traditional guarantee rules, the formulation of the guarantee rules requires the agreement between the guarantee institution, the security right holder and the guarantor, and then the guarantee institution writes the guarantee information into the guarantee rules. Although this method improves the efficiency of guarantee to a certain extent, due to the lack of legal effect and implementation of guarantee rules, the risk of financial transactions is high. Moreover, due to the inability to achieve effective supervision of the digital RMB in this way, there are certain financial risks.

6. Conclusions

The guarantee rule system of digital RMB is a system that needs to be constantly improved. Its core is to establish the legal status and guarantee rules of digital RMB, and build the guarantee rule system of digital RMB on this basis. In the existing electronic currency, Internet finance and other fields, there has been a relatively mature system of guarantee rules, and the digital RMB as China's legal currency, its guarantee rules should also be clarified by law. At present, China has not yet established a digital RMB guarantee rule system. We can improve the digital RMB guarantee rule

system by embedding smart contract technology. Through the transformation of existing guarantee rules, smart contracts are embedded in the whole process of digital RMB issuance, circulation and destruction, providing more enforceable guarantees for digital RMB and escorting the circulation of digital RMB. At the same time, the digital RMB guarantee rule system constructed by smart contract technology should be based on the existing legal system and connected with the existing guarantee rule system in other fields. Only in this way can the digital RMB better play its monetary function and promote the high-quality development of China's economy.

Acknowledgements

Fund Project: 2016 Guangdong Provincial Department of Education Key Cultivation Discipline Project, Guangdong Education Research Letter.

Research on RBF Neural Network Adaptive and Sliding Mode Control of Robot Research (No.2021ZDZX1049).

References

- [1] Bossu, Wouter, et al. (2020) *Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations*. International Monetary Fund (IMF) Research Paper Series, 254.
- [2] Barrdear, John, and M. Kumhof. (2021) *The Macroeconomics of Central Bank Digital Currencies*. *Journal of Economic Dynamics and Control*, 104-148.
- [3] Fegatelli, P., Mcmillin, D., & Palivos, T. (2022). *A central bank digital currency in a heterogeneous monetary union: managing the effects on the bank lending channel*. *Journal of Macroeconomics*, 71.
- [4] Nabilou, H., & Singh, D. (2020). *Testing the waters of the Rubicon: the European Central Bank and central bank digital currencies*.
- [5] Allen, S., Capkun, S., Eyal, I., Fanti, G., Ford, B. A., & Grimmelmann, J., et al. (2020). *Design choices for central bank digital currency: policy and technical considerations*. Working paper series: Monetary economics (TN.27634).
- [6] Gengxuan, C., Qinmin, J., & Hao, L. (2023). *Rethinking the rise of global central bank digital currencies: a policy perspective*. *Contemporary social sciences (English)*, 8(1), 1-16.
- [7] Fegatelli, P. (2021). *The one trillion euro digital currency: how to issue a digital euro without threatening monetary policy transmission and financial stability? BCL working papers*.
- [8] Belenchuk, S. I. (2021). *New type of money €" central bank digital currency*. *RSUH/RGGU BULLETIN. Series Economics. Management. Law*.
- [9] Ming Li, Lin Sun, Chenhui Wang. (2021). *Research on security risks and countermeasures of digital currency cased on blockchain technology*. *China Information Security*,48-50.
- [10] Li Bin, Fang Pan. (2021) *Research on the legal issues of the central bank 's legal digital currency issuance*. *Journal of Xi'an Shiyou University (Social Science Edition)*, 2021, 30(01):87-92+99.