

# ***Research on the Application of Blockchain Technology in Credit Risk Control of Chinese Commercial Banks***

**Haolan Deng<sup>1, a, \*</sup>**

*<sup>1</sup>School of Economics and Management, Hunan Institute of Science and Technology, Yueyang, 414006, China*

*a. 14195501578@vip.hnust.edu.cn*

*\*corresponding author*

**Abstract:** China is actively promoting the development of blockchain-related technologies, and hopes to apply the technology to commercial banks. Nowadays, blockchain technology has become one of the most important research directions of financial technology for Chinese commercial banks. Under the traditional model, it is difficult for banks to reasonably evaluate customers before lending, update customer information during lending, and make timely adjustments to unfavorable conditions after lending. These are the difficulties faced by banks in the traditional mode. Blockchain technology can screen customers for banks before lending, monitor customers' status in real time during lending, and deal with problems in time after lending. However, if this technology is to be introduced perfectly, China needs to solve the problems of imperfect laws and mechanisms, low maturity of technology, insufficient performance and scalability, unprotected security, and excessive cost and mismatch with revenue.

**Keywords:** blockchain technology, commercial banks, credit risk

## **1. Introduction**

Commercial banks, as an important part of China's financial system, credit risk has always been one of the biggest risks they face. However, the traditional credit model has many problems such as information asymmetry and cumbersome operation, which makes risk management extremely complicated [1]. In the face of this situation, the emergence of blockchain technology provides a brand new solution for commercial bank credit risk control.

Blockchain mainly contains three core technologies: cryptography, consensus algorithm, and network, which make blockchain technology traceable, anonymous, decentralized, etc. [2]. Blockchain technology belongs to the category of financial technology, which can naturally be well applied in the financial field.

Liu and Lin elaborated the necessity of blockchain technology applied to Chinese commercial banks and provided an outlook on the application of this technology in commercial banks [3]; Guo and Jiang pointed out that the technology and nature that blockchain technology possesses make the use of blockchain by commercial banks have a great advantage in terms of protecting privacy, improving efficiency, lowering the transaction cost, and controlling credit risks, etc. have great advantages [4].

The purpose of this paper is to summarize the current situation of Chinese commercial banks applying blockchain technology in credit risk control and to look forward to the future development trend. Firstly, this paper will review the problems and challenges of credit risk in Chinese commercial banks under the traditional model. Subsequently, this paper will introduce the application of blockchain technology in China's credit risk control and discuss its potential advantages in commercial bank credit risk control. Finally, this paper will shed light on the challenges that China still needs to overcome if it wants to introduce blockchain technology.

This paper is a review of the relevant literature on the application of blockchain technology in commercial banks, which contributes to the better application of blockchain technology in the banking industry and can play a role in improving the ability of commercial banks in credit risk control. With the continuous improvement and application of blockchain technology, the technology will bring new ideas and solutions for credit risk control of commercial banks, and inject new momentum into the development of the financial industry.

## **2. Problems and Challenges of Credit Risk in Chinese Commercial Banks under the Traditional Model**

Credit risk is one of the most important risks of commercial banks, and effective control of credit risk is an important foundation for commercial banks to sustain sound operation and guarantee the safety of credit assets. Under the traditional mode, Chinese commercial banks have many difficult problems and challenges, this paper summarizes the following aspects after reading a lot of literature:

In the traditional mode China's commercial banks' credit risk internal control system is not sound. The credit process of commercial banks includes three ways: pre-credit investigation, credit review and post-credit management, but the division of labor among departments is not clear, and the articulation of each stage is not tight.

In the pre-credit investigation stage, although the traditional centralized credit system can inhibit the information asymmetry problem to a certain extent, banks still have problems in assessing credit such as inaccurate, incomplete, and undirected assessment, and the phenomenon of information asymmetry still exists [5]. Many banks' information systems are not perfect, and they cannot obtain the latest and comprehensive information about their customers, which leads to the fact that banks are unable to reasonably assess the risk of their customers, which may make some of their customers, especially small and medium-sized enterprises (SMEs) with weak strength and scale and incomplete disclosure of information, unable to obtain a loan, and the loans made under unreasonable risk assessment may also cause bank losses [1]. At the same time, the bank practitioners may not be skilled in the operation of the loan audit is not comprehensive, relying on experience and other overly subjective judgments, or in order to perform the need to slacken the supervision and so on, leading to an increase in non-performing loans [6].

In the loan stage, the bank tracking and early warning mechanism is not perfect, because the information is not updated in time, and the bank wants to comprehensively collect customer information cost is high, and rely on the bank staff to understand the difficult to be comprehensive and accurate, the staff if the professional quality of the staff is not high is easy to be influenced by bribery and other influences, thus leading to the judgment is not objective. Moreover, under the traditional model, many data need to be entered manually by employees, so the data obtained is inefficient and the accuracy is difficult to guarantee. Therefore, it is difficult for banks to carry out real-time supervision of customers, which leads to the emergence of unfavorable conditions for the interests of banks [7].

In the post-loan period, due to information asymmetry, delays in updating the customer's financial status, and difficulties in securing the actual use of the loan, the bank is unable to get the

latest news from the customer, which prevents the bank from immediately recognizing the problem and responding to it in a timely manner. A variety of problems at all three stages may increase the likelihood of credit risk for the bank [7].

### 3. Application of Blockchain Technology in Credit Risk Control in China

Blockchain has the characteristics of decentralization, openness and transparency, and information can not be tampered with, and with the support of these characteristics using the hash algorithm as well as asymmetric encryption algorithm and other algorithms, and then through the distributed storage, so that each node in the blockchain share interaction, real-time data updates, and to solve the problem of asymmetric information. At the same time of improving business efficiency, blockchain technology can also avoid the subjective errors of employees, effectively reducing the operational risk and moral risk [8], which all make blockchain technology can be well applied in the credit risk control of commercial banks. Blockchain technology can play a role in all stages of credit management.

In the pre-credit, commercial banks need to assess the customer's credit, need to be all-round, multi-dimensional consideration, the traditional transaction must be built on the basis of mutual trust between the two sides can be carried out [3], and through the blockchain meticulous arithmetic and peer-to-peer technology, the customer's privacy and information security can be safeguarded, and can reduce the process of fraud and other behaviors, the two sides of the transaction will change from the trust of each other or of intermediaries to the trust of blockchain technology [9]. Both sides of the transaction will change from trusting each other or the intermediary to trusting the blockchain technology [9]. Moreover, blockchain technology can efficiently, transparently, directly and comprehensively provide the information of the enterprise's financial transactions, asset status, or personal consumption records, tax status and so on to the bank, which can greatly reduce the cost of information collection by the bank, improve the efficiency of the bank's work [10], and rapidly select high-quality potential customers for the bank, avoiding the phenomenon of imperfect collection of information by the bank. appear, solving the situation that SMEs are difficult to obtain loans [11], and also reducing the possibility of operational errors, thus reducing the credit risk of banks [12].

In lending, blockchain allows banks to have a more comprehensive understanding of their customers. Using the blockchain consensus mechanism, its decentralized characteristics can make the data updated in real time, so that banks focus on the economic trends of customers do not have to go through the traditional center of the credit system, which can well break the situation of data silos [13], so that banks can access the complete information of customers, can directly access the complete information of the customer, real-time supervision of the customer, and effectively reduce the bank's search for information consumed by the resources and solve the information asymmetry situation [14]. When a large amount of customer assets are transferred, it can be detected by the bank in a timely manner, and its open and transparent nature can also avoid the phenomenon of customers borrowing from multiple places [15].

In the post-loan, the bank can also use the timeliness of blockchain data to pay close attention to the customer's flow of funds and other close attention to its repayment ability can be assessed in real time, the customer has anomalies when the bank can be immediately found, for the customer to change the customer can be immediately adjusted in the case of abnormalities in the customer's assets in a timely manner to reduce the bank's losses [16].

Blockchain technology applied to commercial banks will enable banks to better control credit risk. Screening customers before lending, real-time supervision during lending, and timely stop-loss after lending, each step is interlinked to maximize the bank's interests and jointly reduce the possibility of credit risk for commercial banks.

#### 4. Challenges in Introducing Blockchain Technology

Ideally, the application of blockchain technology to commercial banks can obviously play a role in reducing traditional credit risks, but in practice, the introduction of blockchain technology may also be accompanied by the creation of new risks [17]. As of now, there are still many unsurmounted difficulties in China that want to utilize blockchain technology, making it impossible to immediately integrate blockchain technology into the use of commercial banks.

Incomplete laws and regulations, mechanisms: At present, China's mechanisms and laws and regulations for blockchain technology have not been perfected, supervision is insufficient, and there is a lack of unified norms and standards [15], such as uploading the data there are problems but after uploading the uploading can not be changed how to deal with the problem of how to deal with the situation there is no solution to deal with this situation.

Insufficient technological maturity: although blockchain technology has the characteristics of decentralization and non-tampering, the current application in commercial banks is still in the primary stage, and the maturity of the use of various technologies is limited [18]. In addition, due to the openness of the blockchain, there are risks such as network attacks and data leakage. At the initial stage of blockchain technology, the algorithm and the number of blocks cannot reach the expected effect, and the possibility of tampering with data by wrongdoers still exists, which may cause losses to banks and customers.

Performance and scalability to be improved: the performance and scalability of blockchain technology is also one of the limitations of commercial bank applications. Blockchain contains a huge amount of information, and its time-sensitive characteristics mean that it is calculated all the time, which is very much a test of the database's storage capacity and computational capacity [19], so aspects such as artificial intelligence and network communication technology also need to make progress together. Commercial banks should comprehensively consider the extent of the introduction of blockchain technology to avoid the occurrence of high latency or even paralysis due to the inability to carry large-scale information volume.

Security is difficult to guarantee: commercial banks need to consider privacy protection and compliance when handling user data. In the initial period of blockchain technology, the small number of blocks due to the small number of participating subjects in the blockchain means that when an unscrupulous person owns 51% of the arithmetic power, he can tamper with the records on the blockchain and the data will be leaked [20]. The characteristics of blockchain technology determine the transparency and openness of its data, which poses a challenge to protect user privacy and meet compliance requirements.

Disproportionate costs and benefits: China's financial system is a huge system, if China wants commercial banks to introduce blockchain technology need to invest a large amount of capital, human and material resources, which is highly demanding for financial as well as many other industries, and the costs consumed to make good use of blockchain technology are huge [3]. Considering the current level of many industries and the maturity and feasibility of blockchain application technology, commercial banks need to weigh the balance between inputs and expected benefits.

#### 5. Conclusion

The main research problem in this paper is the research on the application of blockchain technology to the credit risk control of commercial banks. In the traditional mode, Chinese commercial banks have not a small problem in credit, before the loan due to the existence of information asymmetry, the bank is difficult to carry out a real-time comprehensive assessment of the customer, so that the bank can not carry out a good cooperation with the customer, and the staff may bring certain

subjective problems; in the loan of the bank for the customer's information to update the difficulty of the cost is high; and in the loan of the customer's loan use, financial status, etc. can not be timely feedback, the bank is likely to be damaged as a result. The bank is likely to be damaged because of the timely feedback of the customer's loan usage and financial status. Blockchain applied to credit risk control of Chinese commercial banks can enable banks to screen out high-quality customers and provide them with comprehensive and accurate information; the decentralized characteristics of blockchain technology can update customer information in real time, improve efficiency and reduce consumption; after the loan, banks can pay close attention to the status of the customer, and deal with the problems immediately. However, if China want to perfectly integrate blockchain technology into the banking industry, China still need to overcome many difficulties, such as: relevant laws and mechanisms are not perfect, the maturity of technology is not high, the performance and scalability is insufficient, the security is not guaranteed, the cost is too large and does not match with the revenue and so on.

If China wants to introduce blockchain technology in the future, China needs to address the following issues: Relevant laws and regulations need to be improved. At present, China is still in the initial stage, the relevant laws and regulations are not perfect, and the industry standards are not unified, so it is necessary to establish relevant laws and regulations and set up a supervisory department. The technology needs to be more mature. With enough participants, the data in the blockchain cannot be changed once it is entered, which means that errors cannot be dealt with. Therefore, such issues must be resolved before the blockchain can be used, for example, if an authority can control a large enough amount of arithmetic power to make changes, or if other commands can be entered to indicate that an incorrect command has been modified. This will require China to increase its research on blockchain technology and improve its algorithms.

## References

- [1] Ge Z. (2022) *Evaluation of Credit Risks Existing in Chinese Commercial Bank*. 7th International Conference on Social Sciences and Economic Development, DOI:10.2991/aebmr.k.220405.287.2022. (ICSSSED 2022), Atlantis Press.
- [2] Cai, X., Deng, Y., Zhang, L., et al. (2021) *Blockchain principles and its core technologies*. *Journal of Computing*, 44(1), 84-131.
- [3] Liu, T., Lin, D. (2021) *Application and Prospect of Blockchain Technology in China's Commercial Banks*. 6th International Conference on Financial Innovation and Economic Development, 449-453.
- [4] Guo, X., Jiang, L. (2020) *Research on the application of blockchain technology in commercial banks*. *Southwest Finance*, 6, 13-26.
- [5] Fang, Y., He, D. (2017) *Exploration of the development of blockchain technology in commercial bank industry chain finance*. *New Finance*, 4, 24-27.
- [6] Guo, X., Lian, Y. (2020) *Exploration of digital transformation of credit risk management in commercial banks*. *Finance and Finance*, 6, 12-15+21.
- [7] Lin, Y., Li, G. (2018) *Research on Risk Management of Credit Business of Commercial Banks*. *Modern commerce industry*, 39(26), 82-83.
- [8] Yang, L. (2018) *Discussion on building credit information system of Chinese commercial banks based on blockchain technology*. *Wuhan Finance*, 5, 70-73.
- [9] Zhang, T. (2019) *Application and Prospect of blockchain technology in China's commercial banks*. *new finance*, 7, 50-57.
- [10] He, Q. (2021) *Application of Blockchain Technology in Commercial Banks*. *E3S Web of Conferences*, 235.
- [11] Zhao, Y., Li, H. (2022) *Block Chain Technology, Credit Rationing and SME Financing: Theoretical Basis and Application Scenario*. 2022 International Conference on mathematical statistics and economic analysis, 1424-1431.
- [12] Safiullin, M.R., Burganov, R.T. (2020) *Abdukaeva A A .Development of a Model for Assessing the Potential Impact of Blockchain Technologies on Economic Growth Dynamics in Financial Markets*. *International Journal of Financial Research*, 11.

- [13] Xie, L., Yao, S. (2018) *Exploration on the application of blockchain technology in the field of credit collection. Credit Collection*, 36(08), 26-30.
- [14] Guo, Y., Liang, C. (2016) *Blockchain application and outlook in the banking industry. financial innovation*, 2, 1-12.
- [15] Wang, R., Jiang, J., Xu, W. (2019) *Exploration of the application of blockchain technology in commercial bank credit management. China economic and trade guide (in Chinese)*, 10, 65-68.
- [16] Chen C. (2022) *The Role of Blockchain Technology In the Digital Transformation of Traditional Banking Industry. the Frontiers of Society, Science and Technology*, 4(1)
- [17] Du Q. *Exploration of the impact of financial technology on credit risk management of commercial banks. China Price*, 11, 63-66.
- [18] Zhang, Y., Ye, S. (2022) *Research on Construction of Smart Scenario Finance in Commercial Banks. 2022 International Conference on Artificial Intelligence, Internet and Digital Economy*, 595-602.
- [19] Gao, q. *Research on the application of blockchain in commercial banks and countermeasures. China Business Journal*, 2022(17):85-87.
- [20] Yuan, Y., Wang, F.Y. (2016) *Current status and outlook of blockchain technology development. Journal of Automation*, 42(4), 481-494.