Research Article

Bank Credit Risk Avoidance and Countermeasures Based on Wireless Communication

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Credit risk management refers to the main operating risks faced by banks, and its effective management is directly related to the bank's operating performance. The main link of the credit risk management system is the measurement of bank credit risk, and this connection will run through the entire process of the bank's credit risk management system. The measurement results directly affect the actual operation of the bank and therefore also affect risk management and business management. This article aims to study bank credit risk management in the context of wireless communication and big data. Based on the analysis of the characteristics of credit risk, the theory of credit risk and information asymmetry, and the credit risk measurement model, Bank S is taken as an example to construct Bank S's credit risk influencing factor model. Finally, the bank is compared with three banks.

1. Introduction

Credit risk, also referred to as default risk, refers to the potential financial loss caused by a trading partner's inability to fulfill their contractual obligations. The credit risk of commercial banks has a long history and appears in the form of margin trading, and financial market activities such as loans and debt trading inevitably carry this risk [1, 2]. Therefore, the credit risk of commercial banks is widespread in the current financial system and is a very critical form of risk.

In recent years, many scholars at home and abroad have conducted relevant research on bank credit risk management and have achieved good results. Researchers have applied the VaR method to the market risk and credit risk caused by financial market price changes in the management of Chinese financial institutions. After a lot of empirical analysis and research, the effectiveness of the VaR method has been gradually realized [3, 4]. Some researchers have carried out a classified comparative study on the main methods of commercial bank credit risk analysis since the 1930s. In order to reduce the credit risk of commercial

banks, as well as the loss and opportunity cost caused by the error analysis of commercial bank credit risk [5, 6], some researchers have reanalyzed the credit risk assessment methods of commercial banks that existed in the past 20 years and summarized the advantages, disadvantages, and status quo. They believe that Chinese commercial banks have referred to the most advanced foreign credit assessment methods to form a correct China [7, 8]. Some scholars conducted a comprehensive analysis and evaluation of Merton and KMV models from the perspective of option theory, expounding the characteristics of the difficulty of credit risk management and claims of settlement of Chinese commercial banks, and then carried out research on China's credit risk management model and its application has been studied [9, 10]. In addition, according to the latest Basel City Capital Contract, some researchers introduced new commercial bank credit risk management methods by studying the latest development trend of commercial bank credit risk concepts and the transformation of commercial bank credit risk management characteristics, and finally the system has implemented management and control [11, 12]. Although the above all represent the current maturity and perfection

of the credit risk management system of commercial banks, they also have certain shortcomings [13, 14]. It is necessary to study the new development trend and implementation of the credit risk management system of commercial banks in the future [15].

On the basis of consulting a large number of relevant references [16], this paper combines the characteristics of credit risk, credit risk and information asymmetry theory, and credit risk measurement model [17], selects Bank S as the research object, and constructs the bank's credit risk influencing factor model [18].

This paper studies the bank credit risk management under the background of wireless communication and big data, analyzes bank credit theory and corresponding models, and uses a bank as a case study. Through comparative analysis, determine the bank credit management method in the case, so as to obtain a universal credit management method.

2. Research on Bank Credit Risk Management under the Background of Wireless Communication and Big Data

2.1. Characteristics of Credit Risk

2.1.1. Controllability of Credit Risk. Although credit risk cannot be completely removed in the actual management process, people usually feel that it is completely irrelevant to credit risk. Reasonable measures can be taken to enable commercial banks to manage credit risk within an acceptable range, such as risk diversion and diversification, and reallocation of liabilities. When a commercial bank finds that the financial condition of the borrower has dropped significantly, or even fails to repay the loan on time, the commercial bank will increase the collateral against the lender or return the credit in time [19].

2.1.2. Lag of Credit Risk. Generally speaking, the appearance of credit risk is mostly related to the internal reasons of the lender. Once external reasons occur, such as an unusually drastic change in our country's macroeconomic situation, it will affect the normal business activities of the lender, and the lender will not be able to repay the loan in time, so that the borrower can repay the loan according to the agreement [20]. It turns into nonperforming loans. The formation of this risk must go through a specific signal transmission period, that is, the time lag period of commercial bank credit risk. The time lag effect of commercial bank credit risk exposure is mainly due to the information asymmetry between lenders and lenders; that is, because lenders are more familiar with their own economic conditions than commercial banks, commercial banks cannot change borrowers in a timely and correct manner. Therefore, in the unmanaged part of commercial bank credit risk, it is necessary to have a more accurate, faster, and more scientific commercial bank credit risk management method than commercial banks. Once commercial banks react too late, credit risk will cause huge losses of commercial bank assets [21–24].

2.2. The Organizational Structure and Prevention System of the Credit Risk Management of Our Country's Commercial Banks. Commercial banks have formulated comprehensive risk management strategies and special credit risk management strategies based on their own business strategies and have built a special risk system from this. After formulating strategic goals, commercial banks have highly absorbed international experience and actively invested in the reform of the risk management organization structure. Some commercial banks adopt a matrix risk management organization structure, divide profit centers by region (as shown in Figure 1), and summarize and manage risks.

In order to guide the rise of risk management barriers, some banks have begun to implement parallel functions between risk managers and business managers to generate representative behaviors. In addition, some major commercial banks are gradually adopting a matrix risk reporting path. This reference path allows more control at the business level. Specifically, the risk management department assigns the organization to the basic business unit, the organization reports risk information to the management department and the head of the unit, and the lower-level risk management department is the leader. Of course, you also need to report to the bank leaders at the same level and take responsibility. For example, the first and second managers of China Construction Bank need to report to both parties of the risk management project in the comprehensive jurisdiction. Such a risk management department is not only an independent system, but also a nationwide vertical organization with layers of dispersion.

2.3. Credit Risk and Information Asymmetry Theory

2.3.1. Moral Hazard Theory. Moral hazard refers to the relationship between people. Due to the information asymmetry mechanism, the loss of people can benefit the agent. Therefore, under the influence of this mechanism, the client usually signs a loan agreement with the client. Moreover, as an intermediary platform, banks are often unable to guide the borrower's business conditions or ability to repay loans in a timely manner. Therefore, to a certain extent, banks must bear a higher risk of loss. In this process of guaranteeing and taking risks, the risks that arise are called moral hazards to some extent.

2.3.2. Rent-Seeking Theory in the Credit Market. The analysis of rent-seeking theory in the credit market is mainly based on the relationship between bank internal representation and distribution. In other words, capital usually has more information and resources. Although the use of high loan spreads to measure overall credit risk is new, the use of statistical strategies is widely used in financial risk management.

2.4. Credit Risk Measurement Model

2.4.1. Credit Metrics Model. The credit metrics model (credit measurement model) is a risk management product
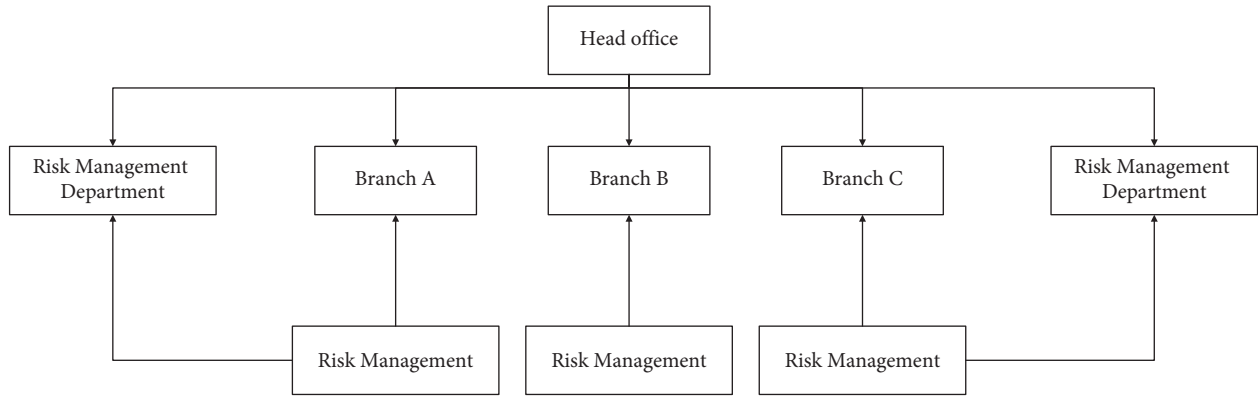
FIGURE 1: Matrix risk management organization structure.

launched by J. P. Morgan in 1997 to quantify credit risk. Like risk metrics, which was launched in 1994 to quantify market risks. Credit metrics adopts the analysis method of portfolio investment, focusing on the direct analysis of the correlation between changes in the credit status of enterprises, so it is more consistent with modern portfolio investment management theories. On the other hand, kmv starts with the price change information of a single credit company in the stock market and focuses on analyzing the company's own credit status reflected in the stock price change information and does not give enough analysis of the relevance of the company's credit changes.

2.4.2. CPV Model. The CPV model is based on the credit index model, which evaluates the debtor's credit risk from three perspectives: default risk, probability default probability distribution, and probability transfer rating distribution. GDP growth and CPI levels are negatively correlated with the market default probability, and the unemployment rate and interest rate levels are positively correlated with the market default probability. Evaluate the changes in the transition table by simulating changes in different business cycles. The advantage of CPV model for credit risk assessment over other models is that more credible results can be obtained.

2.4.3. Credit Risk + Model. The credit risk + model provides an actuarial analysis of credit risk and losses in a credit portfolio. The model first evaluates the bank's loan situation and processes it in groups. Second, the distribution of the default probability of the loan portfolio is calculated:

$$k_r(m) = \frac{\gamma^m e^{-\gamma}}{m!}. \tag{1}$$

Here, $k_r(m)$ represents the probability that the debtor will violate a treaty.

In a word, the advantage of this model is as follows: fewer estimates and input data are required, only the default and risk exposure data of debt instruments are required, the application of the model is relatively simple, no assumptions about the reasons for default are required. The inclusion of the volatility of the default rate into the model reflects the characteristic of the uncertainty of the default rate itself. By using the default volatility parameter, the model is simplified without considering the characteristics of default correlation.

2.4.4. KMV Model. KMV simulation uses technical indicators such as corporate default, stock price volatility, and stock value to measure the asset price and volatility of a company so as to calculate the distance to default and predict the probability of default. The advantage of this simulation is that it is up to date and can effectively offset market information. The KIV model can accurately measure the default risk of a company. The so-called default risk refers to the borrower's inability to pay the loan under the agreement and the creditor's loss. It conducts comprehensive monitoring of the stock market conditions of listed companies and uses technical methods to conduct statistical and quantitative analysis to evaluate how to judge the risk of bank credit risk status.

The KMV model can be divided into two important steps. The first is to calculate the company's volatility and value through the option pricing model based on the income of the listed company's stocks on the stock exchange. The second is to calculate the company's probability of default (EDF) based on the default distance. According to the price formula of B-S-M option, obtain the market value of listed companies and the volatility of their value. The resulting formula is as follows:

$$F_e = F_a M(\lambda_1) - e^{-rt} DM(\lambda_2). \tag{2}$$

3. Experiment

3.1. Data Sources. In this article, we have selected all the quarterly, semiannual, and annual reports of Bank S from December 2018 to September 2020 as the empirical test data set, and the observation time is at the end of each quarter.

3.2. Variable Selection

3.2.1. The Explained Variable

Default Distance. We will select default or default variables to determine the level of default risk. That is, the longer the default distance, the lower the risk of default.

3.2.2. Explaining Variables. This chapter reflects the company's operating conditions. Next, combine the factors in the macroeconomic market to create a factor model. Overall, it will affect the bank's default risk.

Based on the selection of the above variables, Table 1 shows the factor model that affects the credit default risk of Bank S.

Based on the above selection and settings, this paper constructs the influencing factor model. The descriptive statistics of the influencing factor variables in the sample are shown in Table 2 and Figure 2.

4. Discussion

4.1. Experimental Results. In this article, we will select domestic Bank A, Bank B, and Bank C, compare them with Bank S, and summarize the return on equity and capital adequacy ratios of these four banks, as shown in Table 3.

From Table 4 and Figure 3, it can be seen that in order to avoid credit risk, Bank S should increase its efforts to increase its net income level, increase its profit level, and reduce potential credit risks.

4.2. Countermeasures to Strengthen Credit Risk Management of Chinese Banks

4.2.1. Creating a Good Credit Culture and Establishing Appropriate Management Concepts. The credit culture of a bank is the spirit and core of the bank's business process and is the basic concept and model that can be formed and determine the direction of the bank's development under the background of the market economy. Bank credit culture is formed within the bank, based on ethics, customs, values, ideals and beliefs, cultural concepts, and historical traditions that have a decisive influence on other cultural elements.

4.2.2. Construction and Perfection of Credit Risk Management Database. Data is the cornerstone of the credit risk evaluation and management of commercial banks. Through extensive collection and data analysis, whether it is the establishment of an internal evaluation system or the research and formulation of credit risk measurement models, it depends on the compilation and data analysis of a large amount of historical data. Due to the lack of corporate risk management experience, the existing data processing capabilities of Chinese commercial banks are insufficient, and the quality of data processing is low, and the large amount of data processing is unreliable, which makes it impossible to form a credit risk measurement model for Chinese commercial banks. Therefore, Chinese commercial banks must have mature database system technology and advanced information processing capabilities to prepare for the reform of commercial bank credit risk management mode so that the technical level of the credit risk management system of Chinese commercial banks can reach the advanced level of foreign countries.

4.2.3. Strengthening the Incentive Mechanism. We must first modify the current performance evaluation system of commercial banks, take performance as the core, meet the requirements of risk management, and establish a performance evaluation mechanism that comprehensively considers the overall income and management risks of the bank. Currently, some commercial banks have integrated RAROC into the performance evaluation system for evaluating the quality of liabilities. Therefore, some indicators that can affect performance can be defined as the core content of expert evaluation. While improving performance to a certain extent, it can significantly reduce credit risk.

4.2.4. Improving Regulatory Transparency. Supervision transparency is an important part of the financial industry supervision system, which can improve the communication and cooperation within the supervision organization. At present, there is a phenomenon of cross-supervision within Chinese regulators, which will cause waste of supervision resources, overlap supervision, or create supervision gaps. Therefore, enhancing supervision transparency can effectively avoid the occurrence of such phenomena, thereby improving the control and control of different supervision organizations. In addition, the disclosure of a large amount of supervision information in the supervision process can maximize the scope of external supervision so as to achieve a reasonable restriction on supervision power.

4.2.5. Establishing an Independent Risk and Credit Evaluation Agency. Although the credit risk can be mitigated to a certain extent only on the basis of the establishment of a sound credit risk management system within the commercial bank, unless the society attaches great importance to credit risk, defaults will continue to occur. Therefore, we need to, speed up the construction of the social credit system.

TABLE 1: The model of influencing factors of credit default risk of Bank S.

Credit risk	Probability of credit default
Bank operations	Profit level ROE
	Leverage level Reciprocal of core capital adequacy ratio
	Liquidity level Loan-to-deposit ratio
	Asset quality Bad agency rate
Macro environment	Shanghai Composite Index

TABLE 2: Descriptive statistics of influencing factors.

|	Average	Median	Standard deviation	Minimum	Maximum	Observations
Probability of credit default	1.507	1.482	0.684	0.581	2.952	16
Profit level	10.776	9.653	6.162	2.811	22.871	16
Leverage level	11.573	11.876	0.951	9.902	12.812	16
Liquidity level	1.816	1.869	0.153	1.496	2.009	16
Asset quality	1.712	1.452	0.488	1.012	2.473	16
Shanghai Composite Index	3059.903	3047.719	246.196	2493.833	3539.169	16
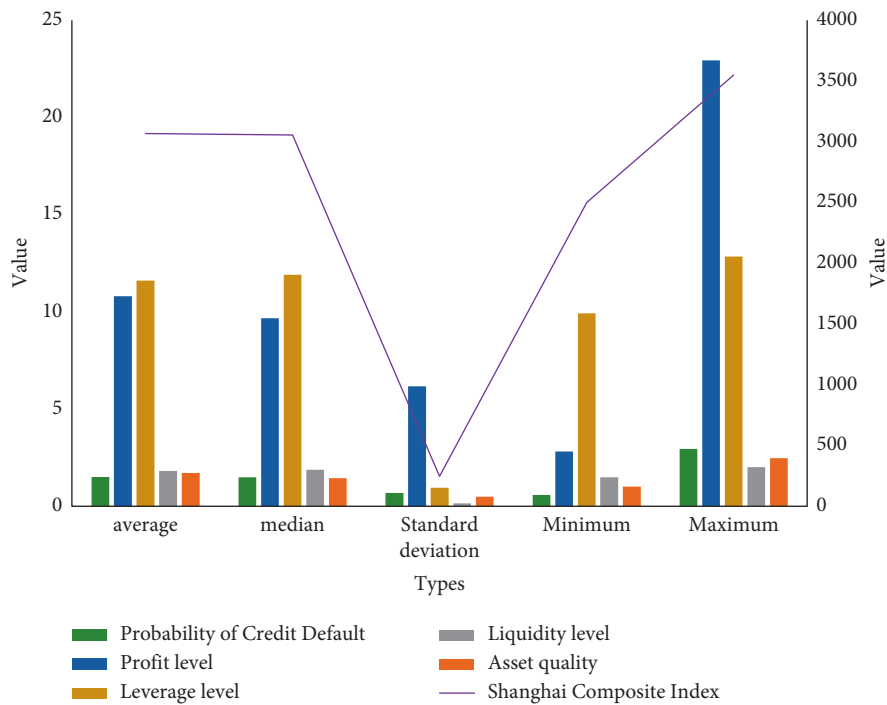
FIGURE 2: Descriptive statistics of influencing factors.

TABLE 3: Intraindustry comparison of return on assets.

	Bank A	Bank B	Bank S	Bank C
Dec-18	14.91	9.82	15.21	20.82
Feb-19	14.72	8.43	14.73	18.41
Apr-19	14	8.11	13.97	17.78
Jun-19	13.45	6.29	11.72	17.45
Aug-19	14.53	6.57	9.64	14.52
Oct-19	15.32	7.24	9.29	0
Dec-19	18.26	7.67	9.36	−7.15
Feb-20	15.11	7.13	9.18	−5.53
Apr-20	13.82	6.89	8.75	−4.88
Jun-20	13.14	6.42	8.43	−3.66

TABLE 4: Intraindustry comparison of core capital adequacy ratio.

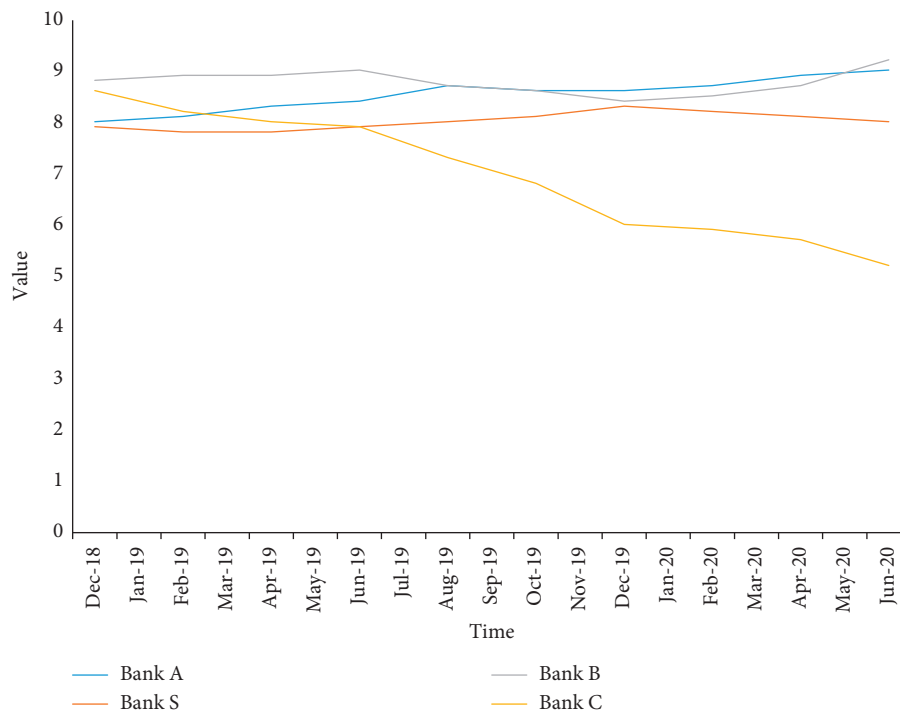|	Bank A	Bank S	Bank B	Bank C
Dec-18	8.11	7.92	8.86	8.61
Feb-19	8.13	7.88	8.92	8.26
Apr-19	8.32	7.85	8.94	8.35
Jun-19	8.46	7.96	9.34	7.92
Aug-19	8.73	8.33	8.74	7.34
Oct-19	8.69	8.12	8.63	6.82
Dec-19	8.62	8.35	8.42	6.67
Feb-20	8.78	8.27	8.58	5.92
Apr-20	8.91	8.13	8.77	5.72
Jun-20	9.13	8.22	9.23	5.26

FIGURE 3: Intraindustry comparison of core capital adequacy ratio.

5. Conclusions

Given that the overall development conditions for credit risk management work are not yet complete, we will summarize the experience of foreign commercial banks' advanced management techniques and methods, development results and reports, and advanced domestic and foreign management experience based on the actual characteristics of our bank's development. Effective measures were put forward to further improve bank credit risk management. Finally, the goal of strengthening credit risk management has been achieved.

This paper studies the bank credit risk management in the context of wireless communication and big data. The characteristics of credit risk, credit risk and information asymmetry theory, and credit risk measurement model are analyzed, and Bank S credit risk influencing factor model is built with Bank S as an example. Then, the comparison of the three banks is completed. The final conclusion is that Bank S should increase its efforts to increase the return on net assets, increase the level of profitability, and appropriately reduce the leverage ratio, thereby greatly reducing the probability of credit risk.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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