

## Research Article

# Enterprise Financial Asset Risk Measurement Based on Embedded Microprocessor Security Analysis

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As the volatility of financial markets continues to increase, the risk structure involved in financial derivatives has become more and more complex. The harmful effects of financial risks can put the company in trouble. Only by understanding the correlation between financial assets can we more accurately measure the risk of a company's financial assets. This article is aimed at studying the company's financial asset risk measurement method based on integrated microprocessor security analysis, so that enterprises can effectively manage the risk of financial assets. This paper randomly selects 10 variables related to demographic characteristics, customer needs, and consumption characteristics of 850 customers from the historical customer data of a bank that has been abandoned for customer market segmentation research. Based on the theoretical basis of customer value evaluation, the factor analysis method refers to a multivariate statistical analysis method that starts from the internal dependence relationship of the research index correlation matrix and reduces some variables with overlapping information and intricate relationships into a few unrelated comprehensive factors. The basic idea is to group variables according to the size of the correlation, so that the correlation between the variables in the same group is higher, but the variables of different groups are not correlated or correlated, and each group of variables represents a basic structure—the common factor. This paper uses the factor analysis model in statistical principles to analyze the main factors affecting the pricing of deposit products, and we can obtain three quantitative common factors: customers related to the customer's willingness to pay demand value, customer loyalty factor, and customer cost factor. Then, the variance contribution rate of the three factors to all observable variables is weighted and converted into the net customer relationship value, at the same time, the embedded microprocessor evolved from the CPU in the general-purpose computer. Its characteristic is that it has a 32-bit or more processor and has high performance. In actual embedded applications, it only retains closeness to embedded applications. Related functional hardware, removing other redundant functional parts so that the special requirements of embedded applications can be realized with the lowest power consumption and resources. Before constructing the structural equation model, it is necessary to test the reliability and validity of the sample data. The data selected in this paper are panel data. In order to judge whether the data is stable, the panel unit root test should be carried out. This article chooses LLC to verify the stability of the panel data. Individual fixed effects and linear time trends are added to the test, and the lag order of the difference lag is 0. Among the intermediary business income of joint-stock commercial banks, bank card fee income accounts for the largest proportion, with China Everbright Bank accounting for 70.12% and China CITIC Bank accounting for 54.16%. The research results show that with the continuous increase of Internet penetration rate, the impact of corporate finance on commercial banks shows phased characteristics. The corporate financial risk measurement method studied in this paper can provide effective help for risk monitoring and early warning. Risk measurement is a management activity that uses certain methods to determine and quantify the possibility of a company's future financial results deviating from expected financial goals due to various uncertain factors. In practice, it is generally analyzed by a combination of qualitative and quantitative, subjective, and objective methods.

## 1. Introduction

The financial market is a complex and huge system consisting of a variety of markets including currency markets, capital markets, financial derivative markets, foreign exchange markets, and insurance markets. The financial market guides the flow of surplus capital by providing investors and fundraisers with financial and financial products, so as to achieve the goal of improving the efficiency of fund allocation in the entire society. Therefore, financial market activities have direct or indirect effects on individuals, enterprises, and all aspects of economic activities [1].

As risk measurement is a key element of financial risk management, its complexity, uncertainty, and huge social harm will inevitably become the focus and difficulty in the field of financial risk management. The purpose of risk measurement is to explore the time series of financial data, quantify the risks of financial assets in a specific period in the future, and better complete the prediction, monitoring, control, and avoidance of financial risks. Creating a dynamic risk measurement framework is the fundamental way to solve the lack of current dynamic risk measurement methods, and it is an important issue that cannot be ignored in the field of risk measurement; the embedded microprocessor integrates many tasks completed by the board in the general-purpose CPU inside the chip, thereby ensuring that the data channel quickly executes each instruction with high efficiency and reliability.

With the opening of financial markets, interest rate marketization has become the main content of financial market reforms, and it is also one of the basic signs of the transformation of the national economic operation system to a market economy. Chen et al. believe that big data systems for reinforcement learning often have problems when their components involve the randomness of reliability and quality continuous control behavior. Through in-depth research on big data, the accuracy of financial analysis can be guaranteed. The complexity and randomness of big data systems pose a challenge of uncertainty. He proposed a dynamic consistency quality measurement method based on an axiom framework, which evaluates whether the information conveyed by big data effectively interacts with the integrated system to achieve the expected performance by describing the probability of key errors. He considered two new metrics to calculate the higher-than-expected error, namely, the conditional expectation of tail error and excessive error, as the quality metric of the big data system. Although his research is robust, it lacks specific research methods [2]. Qi and Deng believe that the application of computer technology, especially the emergence of some statistical software and graphical representation technology, makes research in many fields require a lot of data analysis. He discussed the relationship between R&D investment and corporate financial performance and used these technologies to further study the impact of environmental regulations on this relationship. Although his research has certain accuracy, it lacks necessary research data [3]. Al-Ali et al. believe that increasing energy costs and demands have led many organizations to find smart ways to monitor, control, and save energy. He proposed an energy management system for smart homes. In

this system, each household device interfaces with a data acquisition module, which is an Internet of Things object with a unique IP address, thereby forming a large mesh wireless network of devices. The data collection system-on-chip (SoC) module collects energy consumption data from each device in each smart home and transmits the data to a centralized server for further processing and analysis. Financial assets include all financial tools provided to the financial market. Research on the transmission of computer technology technology can enhance the persuasiveness of this article. This information from all residential areas is accumulated on the server of the utility as big data. Although his research is relatively comprehensive, it is not accurate enough [4]. Guo et al. believe that in the sharing economy, people provide idle social resources to others in a shared manner. However, big data analysis that matches optimal service requirements usually runs on traditional multiprocessors in intelligent systems, the so-called "system on a chip." He designed a new type of computer architecture based on the optical network on chip (ONoC). To further accelerate the matching of supply and demand among citizens in the sharing economy, the ONoC-based accelerator can quickly calculate the optimal service demand matching by processing the computing tasks on the parallel cores, that is, the task core mapping. In addition, in order to improve the reliability of the accelerator, he also designed a task core matching algorithm. He designed an accelerator based on ONoC to further accelerate the matching of supply and demand of citizens in the sharing economy. He uses this algorithm to process computing tasks on parallel cores, which can quickly and reliably perform task core mapping. Although the system designed by him is highly reliable, it lacks necessary system testing [5].

RAROC is an improved technical method used by international advanced banks to evaluate the performance of business management. The main functions of RAROC risk management technology are risk management and performance evaluation. This article uses the RAROC model to study and compare existing corporate loans. Traditional loan pricing methods cannot truly measure the unexpected risks of loans. The RAROC model is used to price corporate loans, taking risks into account in the pricing process, and the return of loans should include the cost of risk, so that the return and risk can be balanced. Based on the practical characteristics of Internet finance, this article analyzes the broad prospects of big data applications based on specific cases of big data in Internet finance practice and has a certain degree of innovation in the combination of theory and practice. Among the intermediary business income of joint-stock commercial banks, bank card fee income accounts for the largest proportion, with China Everbright Bank accounting for 70.12% and China CITIC Bank accounting for 54.16%.

## 2. Enterprise Financial Asset Risk Measurement Method Based on Embedded Processor

*2.1. Embedded Microprocessor.* Microcontrollers usually have rich computing capabilities for embedded applications. The addressing space of embedded processors can range

from 64 kB to 16 MB, the fastest processing speed can reach 2000 MIPS, and the package ranges from 8 pins to 144 pins. Microcontrollers are generally rich in computing for embedded applications. They mainly implement control functions without requiring a lot of complex calculations. They are widely used in the field of industrial control, so they are called microcontrollers. The embedded microprocessor is a simple microprocessor. Embedded microprocessor is a simple microprocessor. The design of embedded microprocessor is similar to that of ordinary desktop computer in the basic principle, but it has higher working stability and lower power consumption. Temperature, humidity, electromagnetic field, vibration, etc. have strong adaptability, smaller size, and more integrated functions. In the early days, most of them were 8-bit and 16-bit. Embedded systems are widely used in many fields such as industrial measurement and control, smart meters, and smart homes. With the continuous expansion of embedded system applications and the increasing popularity of network applications, more and more embedded systems require network functions. Currently, some companies classify some of their 32-bit processor products as embedded microcontrollers. The performance of current embedded microprocessors is usually very efficient. They are different from computer processors. In real embedded applications, only embedded-related functions are retained, and other unnecessary functions are removed [6]. This allows reducing power and resources to achieve the special requirements of embedded applications. Foreign research on embedded microprocessors started earlier, and there have been many advances in theory and application. For example, Embedded Digital Signal Processor (EDSP) is a processor dedicated to signal processing. It is specially designed in terms of system structure and instruction algorithm and has high compilation efficiency and instruction execution speed. Through the analysis and research on embedded microprocessors, it is found that foreign research on embedded microprocessor analysis is mainly applied research, with many innovative topics and more detailed research. For example, in 1982, the world's first DSP chip was born, and it has been widely used in speech synthesis and codecs.

**2.2. Internet Finance.** In the early days of formation, as well as subsequent expansion and changes, a lot of emerging technologies were highly used, for example, big data, combined with diversified network platforms, etc., to create a brand-new financial development model [7]. Third-party payment is a scene that can be seen everywhere nowadays; it is integrated into daily life, and it has been comprehensively used online and offline [8]. The model can fit the data well and accurately predict the price sensitivity of customers and then solve the optimal differential pricing under the condition of maximizing bank revenue. Through empirical testing, it is found that this method can not only help banks achieve revenue optimization, but also it can achieve the purpose of enhancing the loyalty of high-end customers. Because companies have information advantages in customer procurement, settlement, payment, etc., with the assistance of relevant financial institutions, they have further expanded their service areas [9].

The product here refers to a variety of financial products issued by banks. The investment includes a variety of fields. Different risk levels can meet the needs of multiple users. The different closed periods of a variety of closed financial products can meet the needs of different situations. Suppose internal fund transfer price is  $f$ , deposit interest rate is  $r$ , unit annualized fee rate is  $s$ , unit annualized deposit cost rate is  $c$ , and the probability of customers buying deposit products [10].

$$p(C) = \frac{1}{1 + \varphi^{(f+c-r+s)}}. \quad (1)$$

Among them:

$$s = \frac{\sum_{i=1}^n s}{365}, \quad (2)$$

$$c = \frac{\sum_{i=1}^n r}{365}. \quad (3)$$

On this basis, we can establish a revenue optimization model for deposit product pricing:

$$\text{Max } (f, c, r, s) = \beta(f, c, r, s)\gamma(f, c, r, s). \quad (4)$$

Among them,  $\beta(f, c, r, s)$  is the internal fund transfer price  $f$ , and the deposit interest rate is  $r$  [11, 12].

$m(f, r, s, c)$  is the internal fund transfer price of  $d$ , unit deposit funds is  $f$ , the deposit interest rate is  $r$ , the unit annualized fee rate of return is  $s$ , and the unit annualized deposit cost rate is  $c$  [13]:

$$m(f, r, s, c) = b(f - r + s + c). \quad (5)$$

In summary, the available profit function is

$$L(f, r, s, c) = b(f - r + s + c) \left[ \frac{1}{1 + \kappa^{f-r+s+c}} \gamma \right]. \quad (6)$$

**2.3. Big Data Finance.** From the previous traditional work model, it has developed to the Internet + model. The cloud computing of big data is applied to work. The use of big data cloud computing has greatly improved the efficiency of work and made the handling of many problems more precise. Data cloud computing is a supercomputing model based on cloud computing and cloud storage, which allows corporate financial managers to effectively use various accurate data and financial resources stored in the "cloud" to achieve in order to deal with financial-related issues more efficiently, scientifically, faster, and more accurately. In the new environment, companies need to quickly obtain valuable information from a large amount of disordered data in order to complete the real-time realization of related data and information assets. Both of these capabilities are based on cloud computing. Companies such as Ali are among the industry leaders. These two capabilities are based on cloud computing. Among them, the financial sharing management model is the result of the organic integration of cloud computing, mobile Internet, big data, and other technologies [14]. The

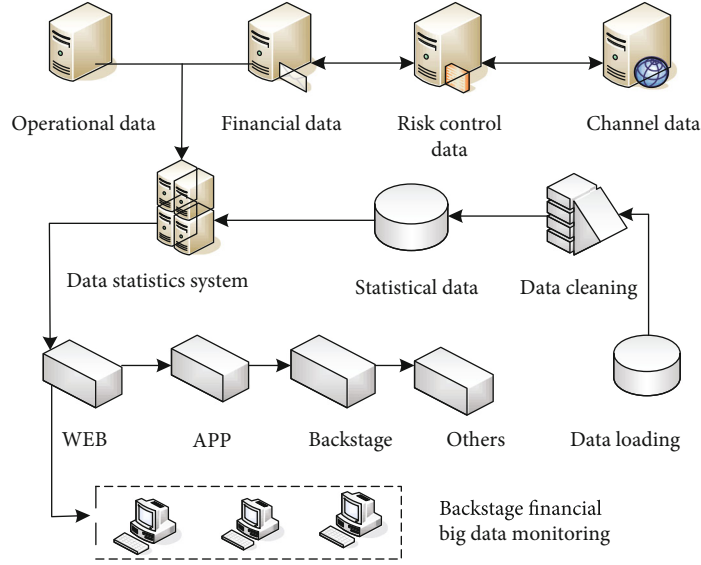


FIGURE 1: Big data financial architecture.

establishment of a centralized and unified corporate financial cloud center can realize financial sharing services and financial management. The three centers of capital management are integrated into one, supporting multiterminal access mode, and realizing the collaborative application of “accounting, reimbursement, capital, and decision-making” within the whole group. The big data financial architecture is shown in Figure 1. The amount of data, the processing speed, and the richness of data types are the main characteristics of the large amount of data generated by the network, including not only structured data such as digital data but also unstructured data [15, 16]. The arrival of big data has also increased the information resources of financial accounting and management [17]. Under fair value measurement, assets and liabilities are measured according to the amount of voluntary asset exchange or debt settlement in a fair transaction between the two parties who are familiar with market conditions, including the most important financial instruments, fair value data. Fair value is an extension of historical fair value. These data not only have original fair value information but also have universality and uniqueness. The adoption of the fair value measurement model in transaction matters overcomes the defect of underestimating the value of the company’s assets due to the adoption of the cost valuation model, so that it can more truly reflect the value of the company’s assets and business performance. In addition, the fair value accounting information at all levels has been processed, and on the basis of current social reforms, detailed research has been carried out, combining a large amount of data with fair value accounting [18, 19].

The price reaction function  $J$  and the profit function  $L$  are

$$J = \frac{1}{1 + \phi^i}, i = f + s - r - c, \quad (7)$$

$$L = d \left[ \frac{1}{1 + e^a} \right]. \quad (8)$$

Assuming that  $L$  is the profit function of unit deposit,  $d$  can be ignored (unit deposit is 1). In order to maximize the profit, the derivative of  $i$  can be obtained by the equation, and the optimal opportunity rate can be obtained by solving the equation [20].

$$1 + e^a - ib^{bi} = 0. \quad (9)$$

**2.4. Risk Measurement.** The VAR method is used for risk control. At present, more than 1,000 banks, insurance companies, investment funds, pension funds, and nonfinancial companies have adopted the VaR method as a means of financial derivative risk management. Using the VaR method for risk control can enable each trader or trading unit to know exactly how risky financial transactions they are, and set VaR limits for each trader or trading unit to prevent excessive speculation. If strict VaR management is implemented, major losses in some financial transactions may be completely avoided. The essence of risk measurement is to use combing methods to intuitively and quantitatively express the magnitude of risk in the form of numbers. Among them, contrast volatility is used as an indicator to measure risk. The main disadvantage is that it treats both positive and negative volatility equally, which leads to errors in the measurement results. However, in reality, higher-than-expected rate of return fluctuations are not risks, and risks will only appear when the rate of return is lower than expected. At present, the methods used to measure financial risks are still based on the static risk measurement framework, and dynamic risk measurement is not carried out. The establishment of dynamic risk measurement is an important task.

Economies of scale reflect the change in the input-output ratio caused by the economic scale, not just the reduction in cost. The scale economy effect is a kind of dynamic economic effect, which is the scale of the economic effect produced by the change of economic scale. The increase in economic effect is only the increase in economic scale

relative to itself in different periods. In the environment of interest rate marketization, this product is the bank's first attempt to implement a differentiated deposit strategy. More importantly, this is an important measure implemented by the bank in the face of the marketization trend of interest rates and strengthening the pricing level. In addition, in order to enhance the flexibility and convenience of deposit pricing, it has specifically set up relevant pricing management specifications, combined with market competition, market structure, and customer types to implement differentiated pricing and chooses a combination of two pricing methods, marked price and customized pricing. The strategy is to implement a pricing method that combines rising interest rates for important customers or businesses with listed interest rates [21]. Because large banks have just started to invest heavily and have strong asset strength, with the expansion of their business scale, unit deposit fees continue to decrease, showing significant economies of scale. With the expansion of business scale, unit deposit handling fees have continued to decline, showing significant economies of scale. Restricted by asset strength, small- and medium-sized banks have limited unit fees and limited business volume. Economies of scale are due to the large reduction in the long-term average management cost of the annuity plan itself and the increase in economic efficiency and income due to the expansion of scale. Due to the constraints of asset strength, small- and medium-sized banks have little reduction in unit expenses and limited business volume. Especially in the case of rising deposit pricing, if the unit deposit fee cannot be efficiently reduced, it will gain less income and suffer great losses [22]. Assuming that the common factor of customer demand value is the variable  $F$ , the customer cost factor is the common factor  $X$ , and the customer loyalty is

$$Z = U + AF_1 + A_2F_2 + A_3F_3 + \chi. \quad (10)$$

Assumptions:

$$A = \begin{bmatrix} A_{11} & \cdots & A_{13} \\ \vdots & \ddots & \vdots \\ A_{311} & \cdots & A_{313} \end{bmatrix}, \quad (11)$$

$$F = (F_1, F_2, F_3)'. \quad (12)$$

Then, the matrix form of the factor model is

$$X - U = AF + \varepsilon. \quad (13)$$

In contrast, savings deposits have lower liquidity for customers and higher interest income and lower operating costs and higher interest costs for banks. The key to its pricing is to determine the amount of money to cover operating costs and interest costs [23]. For handling fees and interest, fixed deposits do not have immediate liquidity, and interest is higher. For banks, their operating costs are lower, and the main cost is interest costs, so there is greater interest price elasticity. The key to pricing is to determine the starting

point for opening an account to make up for operating costs and determine the interest rate difference [24, 25].

Let  $X = (X_1 \cdots X_p)$  be a  $p$ -dimensional random vector, and the comprehensive index vector is [26]

$$\begin{pmatrix} F_1 \\ F_2 \\ \vdots \\ F_p \end{pmatrix} = \begin{pmatrix} a_{11} & \cdots & a_{p1} \\ \vdots & \ddots & \vdots \\ a_{1p} & \cdots & a_{pp} \end{pmatrix} \begin{pmatrix} X_1 \\ X_2 \\ \vdots \\ X_p \end{pmatrix}. \quad (14)$$

At present, the income of China's domestic commercial banks basically comes from the difference between deposits and loans. Therefore, the marketization of interest rates is bound to cause many uncertain effects on banks. In the increasingly complex environment of competition among different banks, the loan-to-deposit ratio of banks will inevitably rise. This is mainly reflected in the case of interest rate growth; the increase in deposit interest rates exceeds the increase in loan interest rates, or in the case of interest rates decline, the decrease in deposit interest rates is less than the decrease in loan interest rates; no matter what the situation, the deposit and loan interest rates, the gap will be reduced, the cost of capital of the bank will increase, and the rate of return will fall [27]. Therefore, from an overall point of view, interest rate marketization will intensify interbank competition and restrict the expansion of banks. The decline in deposit and loan interest rates and the narrowing of the interest rate gap are irreversible trends. Therefore, it is very important for banks to determine the deposit and loan interest rate benchmark, especially for deposits. It is urgently waiting for banks to implement adjustments in deposit pricing procedures, methods, and policies, so as to effectively respond to industry competition [28].

### 3. Enterprise Financial Asset Risk Measurement Experiment Based on Embedded Microprocessor Security Analysis

*3.1. Selection of Customer Data.* Since bank customer data is protected by strict information security policies and without violating any laws and regulations, this article randomly selects 850 customers from historical customer data that has been abandoned by a bank that involve demographic characteristics, customer needs, and consumption characteristics. 10 variables are used for customer market segmentation research. For the convenience of factor analysis, some variables have been standardized and converted, and the 10 observable variables are shown in Table 1. Factor analysis refers to the study of statistical techniques for extracting common factors from variable groups. By adopting different variables, the measurement of corporate financial asset risk is more persuasive [29]. Among them, customer profitability is the annual profit that the bank obtains from the customer calculated by using the activity-based costing method. The calculation method is to accumulate the bank's income from each product minus the cost of the bank for the customer.

The sample size selected in this article is 850, which is 85 times the number of variables selected, 10-25 times greater than the general requirement, and conforms to the principle that the larger the total sample size, the better [30].

**3.2. Risk Measurement Model.** Generally speaking, the calculation data sample should be long-term, cross-economic data, in order to smooth the impact of the economic cycle on the fluctuation of the default rate. In view of the fact that the time for data accumulation in my country is still relatively short, coupled with historical reasons, the available data is not very complete, but the hell in my country is vast; the economic development level and credit environment of various regions are quite different, and the data and simulations of different regions. The results can simulate the different development stages of the entire country to a certain extent [31]. Therefore, cross-sectional data refers to the data of different objects collected at a certain point in time. It corresponds to a one-dimensional data set composed of different spaces (objects) at the same time point. It studies a certain economic phenomenon at a certain time point and highlights the differences of spaces (objects). The outstanding feature of cross-sectional data is its high dispersion. Cross-sectional data reflects the individual's personality and highlights individual differences. Usually, cross-sectional data shows irregular rather than truly random changes; in the current situation of insufficient time series data, my country's commercial banks, especially cross-regional national commercial banks, can use a flexible approximate processing method, that is, large-capacity cross-sectional data instead of time series data for simulation [32]. Compared with time series data, the difference lies in the data arrangement standard, which does not require the same statistical objects and the same range, but requires the same statistical time. Based on the theoretical basis of customer value evaluation, this paper uses the factor analysis model in statistical principles to analyze the main factors affecting the pricing of deposit products, and we can obtain three quantitative common factors: customers related to the customer's willingness to pay demand value, customer loyalty factor, and customer cost factor. Then, the variance contribution rate of the three factors to all observable variables is weighted and converted into the net value of customer relationship [33].

**3.3. Data Verification.** Before constructing the structural equation model, it is necessary to test the reliability and validity of the sample data. Reliability mainly refers to the level of consistency reflected by different testers using the same tool, while examining the degree of similarity of repeated measurement results under the same conditions [34]. Validity refers to how effective the measurement tool (scale) can reflect the content under investigation. Validity can be tested from content validity and structure validity [35].

**3.4. Stationarity Test.** The data selected in this paper are panel data. In order to judge whether the data is stable, the panel unit root test should be carried out. This article chooses LLC to verify the stability of the panel data. Individual fixed effects and linear time trends are added to the test,

and the lag order of the difference lag is 0. In order to test the stationarity of the sample sequence, this paper uses the Stata software to perform ADF unit root test on the sample data. At a significance level of 10%, the data of Depot, HDepo, CDepo, Loan, HLoan, CLoan, TIP, YER, M2, GDP, Rate, and CAR do not belong to the stationary series. CIR and BLR belong to the stationary series, so the sample is differential processing. The difference series of all sample data reject the existence of unit roots at the significance level of 1%, so they are all stationary series [36, 37].

## 4. Results and Discussion

The descriptive statistics of the overall commercial banks are shown in Table 2. The average value of the nonperforming loan ratio is 1.4490, and the maximum value is 16.69. From the data, the nonperforming loan ratio has an upward trend. The average loan-to-equity ratio is 0.5484, which accounts for a small proportion of the bank's total assets, indicating that the bank's main business model is gradually changing from the traditional deposit and loan model to the intermediate business model to ensure that the bank's profits remain unchanged under the impact of Internet finance.

This paper uses the RAROC model to measure the loan pricing of sample enterprises. In the corporate loan business database of Bank of China N Branch, 5 manufacturing companies with overdue loans in 2016-2018 were randomly selected as default samples. Based on the loan amount of the default samples, 5 normal loans were randomly selected as nondefault samples. The loan amounts of the default sample and the nondefault sample are the same or similar, as shown in Figure 2. Judging from the loan execution price of the above randomly selected sample group, the loan interest rate of the default sample is mostly greater than the loan interest rate of the nondefault sample. In actual operation, the financial status of the company will be reflected in the credit rating, and when the Bank of China implements loan pricing, it will increase according to the credit rating of the company to a certain extent. For companies with lower credit ratings, the increase will be greater.

The comparison of ROA of the three types of sample commercial banks from 2006 to 2019 is shown in Figure 3. Before 2008, my country's national economy as a whole grew rapidly, and the return on assets (ROA) of commercial banks continued to rise. In 2008, when the global financial crisis occurred, the banking industry was also severely affected, resulting in a trend demarcation point. City commercial banks and joint-stock commercial banks were hit more severely. Since 2012, the return on assets (ROA) of commercial banks has rebounded slightly. From 2012 to 2019, the profitability of my country's commercial banks has shown a gradual upward trend.

The stationarity test results are shown in Table 3. After the stationarity test, it is found that the variables are not stable at the original level and then the second-order difference of the variables; we can see that each variable is stable at the 90% confidence level. It can be seen that the variables are single integer time series of the same order. It can be seen from the data in the table that the stability of each variable

TABLE 1: Empirical analysis variable table of commercial bank customer market segmentation.

Target composite value	Observable variable classification	Observable variable name
Customer relationship net worth	Demographic characteristics	Age (X1)
		Number of consecutive working years with current employer (X2)
		Years of residence at current address (X3)
	Customer needs and historical contribution	Credit rating (X4)
		Family annual income (X5)
		Annual deposit increment (X6)
		Yearly cross purchase increment (X7)
		Customer profitability (X8)
		Annual credit card spending (X9)
		Annual consumption in other ways (X10)
Consumption characteristics		

TABLE 2: Descriptive statistics of overall commercial banks.

Variable	Observations	Average value	Standard deviation	Minimum	Max
NCF	470	0.0030	0.0025	-0.0038	0.0122
INF	470	95.0011	186.2328	0.00002	1471.4940
WIF	470	0.5979	0.4908	0	1
CAR	470	12.9925	2.1903	3.24	33.67
NPL	419	1.4490	1.4671	0	16.69
LNK	470	3.5332	0.8624	2	5.4425
CUN	470	0.8253	0.9480	0.0625	8.9453
DAI	470	0.5484	0.5552	0.0490	5.7820
NV	469	0.7846	0.4115	0	1

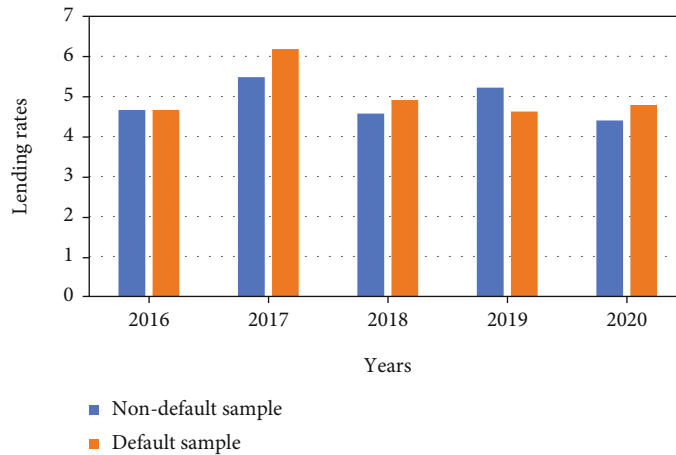


FIGURE 2: Sample loan interest rates of manufacturing companies in Bank of China branch.

is different. Except for AD, LD, and RE, the other variables are all stable. The relevant data should be processed by first-order difference to make the data stable. Except for AD, all other variables can pass the ADF test and IPS test at a confidence level of 99% after the first-order difference, and the first-order difference of AD can also pass the IPS test at a confidence level of 90%.

Figure 4 shows the situation of bank loans in some industries. By analyzing the status table of some industries

of bank loan placement from 2013 to 2016, it can be known that bank loan placement is mainly concentrated in several industries, such as manufacturing, wholesale and retail, and real estate. In 2016, the loan amount of these industries accounted for about 80% of the loan amount of bank companies, of which the manufacturing industry accounted for the highest proportion of 14.35%. It can be seen that banks are more concentrated in lending. Most of the loans are in several key industries. The more concentrated the loan

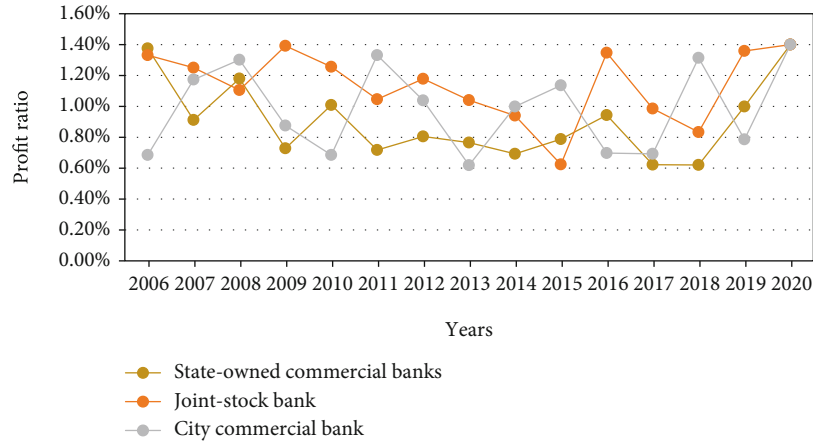


FIGURE 3: Comparison of ROA of three types of sample commercial banks from 2006 to 2019.

TABLE 3: Stationarity test results.

Index	ROA	DFR	AD	LD	RE
ADF inspection	3.768	1.7869	2.5578	4.8365	23.4431
IPS inspection	-2.6413	-3.5461	2.1894	5.6178	4.9853
Stability	Smooth	Smooth	Unstable	Unstable	Unstable

issuance, the greater the potential risk and the less able to diversify risks. And with the advancement of supply-side reforms, de-capacity and de-stocking have become policies that must be strictly implemented in various industries. Manufacturing and construction industries, as industries with severe overcapacity, have a high probability of corporate bankruptcy. Therefore, the bank must adjust the loan placement strategy in time and reasonably set the loan price according to the credit risk level of each enterprise to reduce the occurrence of default risk.

Figure 5 shows the comparison of ROROC pricing, actual pricing, and interest rates after 3% adjustment. According to the difference between the results calculated by the RAROC model and the actual pricing of the bank, one is due to the fact that the pricing method adopted by the commercial bank during the data sample period is still the benchmark interest rate floating pricing method based on the credit rating, and there is no effective calculation of the unexpected default loss of the loan. As a result of the potential risk exposure, the loan interest rate level is low; second, as a local commercial bank, although it has completed the shareholding system reform, it has not yet truly achieved internal scientific and refined management, resulting in an operating cost rate of 2%, higher than the market average (the operating cost ratio of Shanghai Pudong Development Bank during the same period was about 1.5%). This also affects the pricing based on the RAROC model. Under the same credit conditions, the benchmark pricing of commercial banks is slightly higher than the market pricing; third, the price calculated by the RAROC model does not consider bank-enterprise partnerships, government-oriented loans, and industry policy-supported loans. Loan price concessions caused by factors such as placement.

The growth trend of assets per customer for different age groups is shown in Figure 6. As of December 31, 2014, the number of commercial banks' existing customers was nearly 7 million, an increase of nearly 1 million over the end of 2013, an increase of 16.67%, of which the number of effective customers was approximately 4.7 million, an increase of 6.8% over the end of the previous year. Generally speaking, the number of customers has shown a steady upward trend, but the growth of active customers has slowed down. Among them, there are about 1.81 million electronic channel customers. In recent years, the development of Internet finance has been strong. Commercial banks increased the construction of electronic channels in 2014 and actively promoted the application of online banking and mobile banking. 620,000 households nearly double the number of new electronic channel customers in 2013. Customers are mainly concentrated in the 40-60 years old, accounting for 60% of the total number of customers and contributing nearly 50% of the bank's liabilities. Customers between 20 and 40 years old have more frequent transactions and low asset contribution, and since 2013, domestic Internet finance since the booming development, the loss of customer assets in this age group has been more obvious, and the average customer assets of different age groups have declined to varying degrees.

The results of group regression analysis are shown in Table 4. Internet finance will have an impact on the profitability of different types of listed banks, and they will all have significant negative effects. And from the above results, it can be seen that the impact on state-owned banks is greater than the impact on joint-stock commercial banks. The reason for this is that because state-owned banks originally occupy a larger share in the financial market, when Internet finance has a strong conflict with them, the impact can be imagined. The correlation coefficient of the asset load ratio of state-controlled banks is the largest, which proves that state-owned banks are more sensitive to financial risks. But this risk should also be within the controllable range, so it is necessary to introduce the relevant content of the standard deviation as an indicator to measure the stability of returns, and because of the larger market share, the corresponding



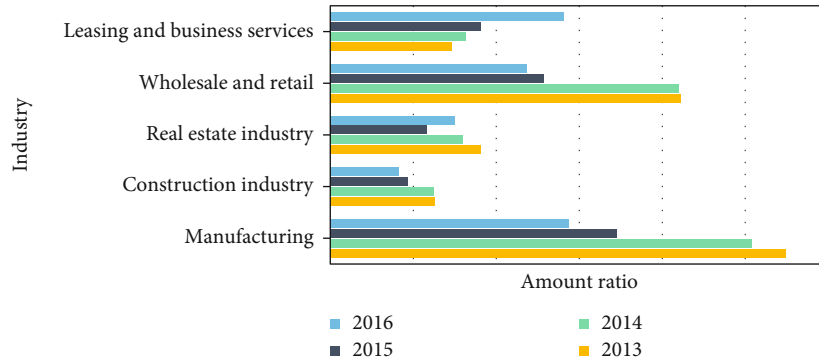


FIGURE 4: Part of the industry situation of bank loans.

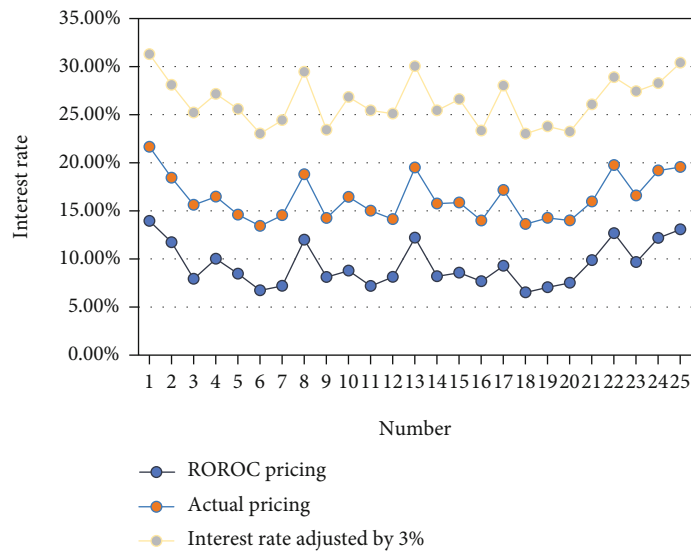


FIGURE 5: Comparison of ROROC pricing, actual pricing, and interest rates after 3% adjustment.

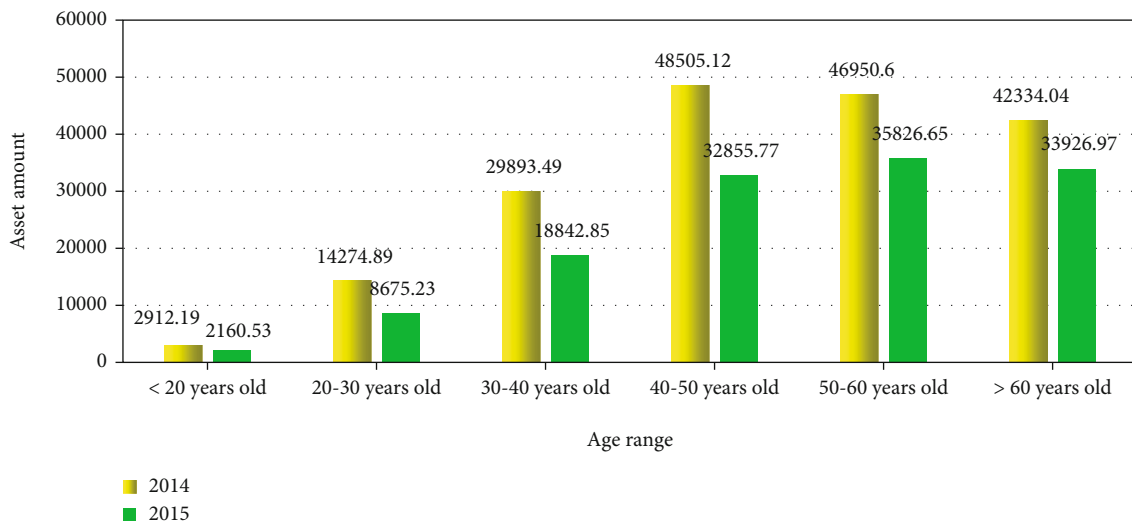


FIGURE 6: Growth trend of assets per customer in different age groups.

risk is definitely higher than that of large joint-stock banks, but this risk should also be controllable within the range. The correlation coefficient of the economic level of state-

owned banks is slightly higher than that of large joint-stock banks, indicating that the economic development level has little difference between the two in the time frame

TABLE 4: Grouping regression analysis results.

	State-controlled bank	Large joint-stock bank
NII	-1.072	-0.767
GDP	130.491	126.679
NPL	-0.269	-0.204
LDR	-0.001	-0.018
CIR	-0.005	-0.002
ALR	0.249	0.244
NIM	0.213	0.188
CAR	0.005	0.003

selected in this article. However, large joint-stock banks have more opportunities to expand their business. If the opportunity is grasped, the profitability of large joint-stock banks will be stronger. Embedded microprocessors evolved from CPUs in general-purpose computers. Its characteristic is that it has a 32-bit or more processor, with higher performance, and of course, its price is correspondingly higher. But unlike computer processors, in actual embedded applications, only functional hardware closely related to embedded applications is retained, and redundant functions are removed.

Table 5 shows the proportion of intermediate business income of some commercial banks. According to the data in the table, we can see that the agency business income accounted for the largest proportion of the intermediary business income of state-controlled commercial banks, with Agricultural Bank accounting for 46.37% and Bank of China 35.42%, followed by bank card fee income, Bank of China accounting for 33.19%, and agricultural Bank accounted for 21.26%. In the intermediary business income of joint-stock commercial banks, bank card fee income accounts for the largest proportion, with Everbright Bank at 70.12% and China CITIC Bank at 54.16%, followed by consulting fees and custody commission income; agency settlement income is here. The proportion of such commercial banks is relatively low. Different types of business have different sources of income. Different commercial banks have different types of intermediary business, which also determines the different proportions of their income.

Figure 7 shows the expected loss rate and unexpected loss rate of each industry. The expected and unexpected default rates of the information transmission industry (Y6) and the leasing service industry (Y9) are both high, indicating that their default risk is relatively high. It is predicted that banks should charge relatively high loan interest rates to compensate for their default. On the contrary, the default risk of the water conservancy and environmental industry (Y10) is the lowest among the ten major industries, and it is predicted that its theoretical loan interest rate should not be too high. There is a strong correlation between the yields of certain industries, such as the manufacturing industry and the construction industry, transportation, information transmission, and other industries all show a high positive correlation, indicating that the manufacturing industry occupies the industry in my country. It has an important position and has a high degree of relevance to the real economy. The mining industry has varying degrees of negative correla-

tion with other industries except power and construction. Among them, the negative correlation with the transportation industry and the leasing business service industry is relatively large, indicating that the mining industry and these two industries are highly profitable. The hedging characteristics of this kind of hedging feature give commercial banks a clear opinion on the operation and management of banks. When banks allocate loans to various industries, they should focus on optimizing the allocation to hedge industry risks. That is, commercial banks should fully consider the effect of risk diversification when carrying out resource allocation, to minimize the overall loss of default risk.

Table 6 shows the comparison between the RAROC pricing results before and after the improvement and the actual pricing results. Whether it is a large enterprise or a small- and medium-sized enterprise, the enterprise weighted average loan pricing calculated based on the RAROC loan pricing model is higher than the actual loan contract price; the risk-adjusted rate of return on capital (RAROC) is an indicator used to measure the risk of earning returns. It is an effective tool for measuring risk-adjusted financial performance. It has been used to measure the risk of a bank's investment portfolio and make the bank's depositors the total amount of equity capital that can effectively avoid risks with creditors is time-constrained in terms of time. But the enterprise weighted average loan pricing calculated based on the improved RAROC model is more in line with the actual situation. The principle is to sell the right products to the right customers at the right time and at the right price, so that the company can get the maximum benefit from its products. Among them, in the case of large enterprises with the same credit rating, the loan interest rate higher than the traditional RAROC pricing method ranges from 19.59% to 55.17% higher than the actual loan interest rate; in the case of SMEs with the same credit rating, the loan interest rate higher than the traditional RAROC pricing method is 17.88% to 36.16% higher than the actual loan interest rate; the loan interest rate calculated based on the improved RAROC pricing method is lower than the actual loan interest rate that ranges from 11.86% to 28.41%; it can be seen from the weighted average interest rate that the current loan interest rate of commercial banks is low, and the interest income cannot cover the possible risk costs of the loan; although the credit rating is the same, the small- and medium-sized the loan interest rate of enterprises is still higher than that of large enterprises; the RAROC loan pricing model can carry out more accurate and differentiated pricing for loan customers with different credit ratings. The product market is the carrier or reality of the operation of the commodity economy, so how to control the pricing of products in the pricing market is also very important. The loan interest rate for customers with low credit rating is high, and the loan interest rate for customers with high credit rating is low.

## 5. Conclusion

The microprocessor method is used to perform an arithmetic operation and includes using a first instruction

TABLE 5: Proportion of intermediary business income of some commercial banks.

	Agency business income	Settlement fee	Bank card handling fee	Consultancy fee	Escrow business commission
Agricultural Bank of China	46.37	19.18	21.26	10.02	3.17
Bank of China	35.42	16.21	33.19	9.16	6.02
Everbright Bank	9.03	5.23	70.12	7.42	8.18
CITIC Bank	17.21	4.28	54.16	17.23	7.12



FIGURE 7: Expected loss rate and unexpected loss rate of various industries.

TABLE 6: Comparison of RAROC pricing results before and after the improvement with actual pricing results.

Enterprise size	Pricing method	Maximum (%)	Minimum (%)	Weighted average (%)
Large enterprise	Traditional RAROC pricing interest rate	8.07	6.05	7.20
	New RAROC pricing interest rate	7.09	5.80	6.46
	Actual loan contract interest rate	6.31	4.35	5.36
SMEs	Traditional RAROC pricing interest rate	7.96	6.73	7.26
	New RAROC pricing interest rate	7.65	6.15	6.87
	Actual loan contract interest rate	6.56	5.16	5.80

execution unit to generate an intermediate result vector and a plurality of operation control indicators, wherein the plurality of operation control indicators indicate that a final result is generated from the intermediate result vector. The intermediate result vector and the plurality of operation control indicators are stored in memory provided externally to the instruction execution unit, and then, a second instruction execution unit reads the completed arithmetic operation. In the context of the rapid development of Internet finance, the regulatory authorities have gradually relaxed the control of the financial market. The penetration of Internet financial services into traditional commercial banks has had a greater impact on the banks, and the economic benefits have been severely challenged, forcing banks to take the initiative. Higher-risk loan projects, etc., commercial bank loan pricing is a very practical problem. The specific situations faced by various corporate banks are different. Risk measurement research is to meet the needs of financial risk

management, help companies carry out risk management of financial assets, enable companies to make more correct investment portfolio decisions, diversify and reduce nonsystematic risks, and minimize their own risks. It is helpful for enterprises to carry out more reasonable asset pricing. Only by fully understanding and grasping the correlation between assets can enterprises estimate the overall risk of financial assets and finally realize the discovery of the true value of financial assets and realize effective corporate financial risks.

### Data Availability

No data were used to support this study.

### Conflicts of Interest

The authors declare that they have no competing interests.

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