



Research on the Factors Influencing the Performance of Chinese Listed Commercial Banks Based on Factor Analysis

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Abstract: Commercial banks, as a special kind of profit-making enterprise, are the main financial institutions in the development of modern economy. The operation and development of the financial market are closely related to the performance of banks. Based on the financial data of 29 listed commercial banks, this research constructs an evaluation index system for the financial performance of listed commercial banks in my country from the three aspects of profitability, safety and growth, and then uses factor analysis to conduct empirical analysis. Improve risk management capabilities, improve credit mechanisms; strengthen innovation-driven solutions to solve the lack of motivation, explore new financial fields and other related suggestions to improve the financial performance of listed commercial banks in my country.

Keywords: Listed Banks; Factor Analysis; Performance Evaluation;

1. Introduction

2019 is the most difficult year for the development of the banking industry. Against the background of increasing downward pressure on economic growth and deepening of structural adjustments, the banking industry is faced with a narrowing of interest margins, a sharp increase in debt costs, and accelerated exposure of non-performing loans. In terms of problems, the overall profit growth rate dropped sharply. Since 2017, the rising trend of bank non-performing loan ratio has slowed down, and the downward pressure on bank asset quality has further eased, but the pressure on the growth of non-performing loans still exists. In 2019, the China Banking and Insurance Regulatory Commission successively issued documents to strengthen supervision, to achieve comprehensive control over the non-performing loan ratio, provision coverage ratio, capital adequacy ratio, and liquidity ratio of commercial banks, and to increase penalties for violations of regulations and laws and improper operations. Strengthening supervision will be the main tone of the banking industry in the future. Commercial banks must pay more attention to universal risks such as credit risk, liquidity risk and operational risk.

2. Literature Review

Bank performance evaluation system research has always been a research hotspot, and related theoretical systems have been continuously improved in recent years. Zhu Chunfu^[1](2002) constructed a new index system to evaluate the competitiveness of banks, taking full account of the common influence of the bank's internal and external environments. Zhai Shouqiang^[2](2008) used 12 listed commercial banks in my country as a research sample, used factor analysis to evaluate bank performance, and found that listing is an important reason for the performance gap of commercial banks. Fang Xianming^[3](2014) took my country's listed commercial banks as the research object and used factor analysis to analyze and evaluate their competitiveness. Lu Yiqiao^[4](2011) uses factor analysis to evaluate the risk level of commercial banks and finds that the risk level of banks changes in the same direction as operating expenses. Zhu Wenli^[5](2012) and Chen Huimin^[6](2011) focused their perspectives on the financial aspects of banks and evaluated

the financial competitiveness of commercial banks based on factor analysis. Chen Jingpu's [7](2014) research body expanded from banks to all A-share listed financial companies and used factor analysis to measure the financial performance of these companies.

3. Index System Construction

3.1 Index selection

The selection of indicators should be analyzed from the three perspectives of profitability, safety, and growth. There are a total of 9 data indicators for analysis. Among them, the indicators selected from the perspective of profitability are: total asset net interest rate (X_1), return on net assets (X_2), business Profit margin (X_3) and cost-to-income ratio (X_4) are four indicators. Non-performing loan ratio (X_5), provision coverage ratio (X_6) and leverage ratio (X_7) are selected from the perspective of safety, which are selected from the perspective of growth The net profit growth rate (X_8) and the net asset growth rate (X_9). The data comes from the wind financial database.

3.2 Standardized Processing

In the above-mentioned index system that constitutes the evaluation of the bank's operating performance level, except for the two cost-based indicators, the remaining indicators are all profit-based. In order to solve the problem of the impact on the model caused by the differences between different indicators, the indicators are first standardized to make the indicators uniform.

First, construct a matrix, denote the i-th research object by X_i , denote the j-th data index by X_j , and denote the j-th index value of the i-th evaluation object by X_{ij} , thereby obtaining the initial matrix X.

By using the 0-1 standardized processing method, the following formula is obtained:

$$\text{Cost index : } x_{ij}^* = \frac{M_j - x_{ij}}{M_j - m_j}$$

$$\text{Profit indicator : } x_{ij}^* = \frac{x_{ij} - m_j}{M_j - m_j}$$

Among them, $M_j = \max\{x_{ij}\}$, $m_j = \min\{x_{ij}\}$. After the variables are processed, they all obey the 0-1 distribution.

3.3 Descriptive Statistics

A descriptive analysis of the indicator data of the above 29 listed commercial banks from a macro perspective. First, the average non-performing loan ratio of these commercial banks is 1.46%, which is far below the 10% baseline. The lowest is Bank of Ningbo, which is 0.78%, the highest is Jiangyin Bank, which is 2.15%. It can be seen that the non-performing loan ratio indicators of various banks are controlled reasonably. Secondly, the average leverage ratio of the aforementioned commercial banks is 6.67%, which is greater than the 4% standard line and meets the minimum requirements of the China Banking Regulatory Commission. From the perspective of asset return indicators, the weighted average return on net assets ranked first at the Bank of Ningbo, at 18.72%; and at the bottom was Bank of Qingdao at 12.72%. Through profit growth indicators, it is found that Bank of Ningbo has the fastest growth rate with 19.93%, and the slowest growth rate is Minsheng Bank.

4. Factor Analysis

4.1 Common factor extraction

The common factor extraction is performed by using the orthogonal rotation factor of the maximum variance, and the eigenvalues of the extracted m principal components should be greater than 1. If the eigenvalue is less than 1, the interpretation strength of the principal component is lower than the average interpretation strength of directly using an original variable. Generally, when the eigenvalue of the principal component is greater than 1 and the cumulative

contribution rate exceeds 80%, it can reflect most of the information of the research object. Extracting three common factors, the cumulative variance contribution rate is 80.026%, indicating that these three common factors can well explain the information of the original 9 indicators 80.026%. Therefore, choosing these three common factors can more fully reflect the selected The operating performance level of listed banks. The initial eigenvalues of the three common factors are 3.990, 2.169, 1.044, and the new eigenvalues obtained by rotation are 3.530, 2.521, and 1.151 respectively^[8].

4.2 Rotation and naming of factor loads

The third step is to rotate the factor loading of the sample data according to the principle of maximizing variance, which can better explain the economic meaning of the common factor. According to the rotated factor loading matrix table, it is found that three common factors can be extracted, because component 1 is in the net Profit growth rate and net asset growth rate have a large load, so component 1 is called growth factor, reflecting the growth level of listed commercial banks; component 2 has a large load on total asset net interest rate and operating profit margin, so Component 2 is called the profit factor, which reflects the profitability of listed commercial banks; Component 3 has a relatively large leverage ratio, so it is named the safety factor, which reflects the risk level of listed commercial banks.

4.3 Factor score

Finally, F1, F2, and F3 are used to represent the scores of growth factor, profit factor and safety factor, and the following formula can be obtained from the eigenvalue and rotation component matrix:

$$\begin{aligned}
 F_1 &= 0.103X_1 + 0.105X_2 - 0.058X_3 + 0.218X_4 - 0.196X_5 + 0.286X_6 \\
 &\quad + 0.065X_7 + 0.227X_8 + 0.267X_9 \\
 F_2 &= 0.217X_1 + 0.287X_2 + 0.380X_3 - 0.354X_4 - 0.070X_5 - 0.039X_6 \\
 &\quad + 0.006X_7 - 0.050X_8 - 0.115X_9 \\
 F_3 &= -0.147X_1 + 0.347X_2 - 0.064X_3 + 0.119X_4 + 0.027X_5 + 0.119X_6 \\
 &\quad + 0.862X_7 - 0.078X_8 + 0.061X_9
 \end{aligned}$$

Based on the above expression, and then taking the proportion of the variance contribution rate of each main factor as the weight, the final comprehensive score is calculated as:

$$F = 55.39\%F_1 + 30.11\%F_2 + 14.49\%F_3$$

By analyzing the growth factor scores, it is found that the growth level of banks is from low to high in order of joint-stock banks, state-owned banks, rural banks, and city banks. By analyzing the profit factor scores, it is found that the profitability of banks from low to high is regarded as rural banks, Joint-stock banks, city banks, state-owned banks. Among them, Jiangyin Bank, Bank of Hangzhou, and Ping An Bank have low profit levels, with the lowest profit factor score of Jiangyin Bank being -0.0985; while China Merchants Bank, Construction Bank and Industrial and Commercial Bank have higher profit levels, with the highest profit factor score of China Merchants Bank 0.5132. Finally, by analyzing the scores of the safety factor, it can be seen that the anti-risk ability of the bank's operations is rural banks, joint-stock banks, city banks, and state-owned banks in descending order. Among them, Jiangyin Bank, Construction Bank and Industrial and Commercial Bank of China scored the highest.

Judging from the ranking results, Bank of Ningbo has the best financial performance in 2018, ranking first among the 29 commercial banks in terms of comprehensive score, and the growth factor of 0.7628 is also at a relatively high level, which shows that Bank of Ningbo has a better development prospect , But you need to pay attention to the level of risk, you can reduce the rate of non-performing loans by optimizing capital institutions, thereby improving risk resistance. Ping An Bank's financial performance was the worst, with a comprehensive score of only 0.1386, and its profit factor and safety factor scores were also at a low level, indicating that there were certain problems with its credit granting. We should make full use of superior resources, find high-quality customers, reduce the rate of non-performing loans, and improve the level of internal risk management.

5. Policy Suggestion

For a long time, an important indicator to measure the quality of commercial banks' financial assets is the non-performing loan ratio, which is the unfavorable result caused by the failure of commercial banks to properly handle lending. To solve the poor quality of loan assets of commercial banks, the first thing to do is to properly configure the loan structure of commercial banks, establish a complete credit inspection system, find more scientific and reasonable evaluation methods, and fundamentally improve the quality of loan assets. Whether it is financial indicators, operating performance, and even corporate governance structure are closely related. All in all, listed commercial banks must speed up the establishment and improvement of a more scientific and reasonable asset-liability structure supervision system in order to respond to the risky modern financial society and serve the wider and deeper social public.

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