

Performance evaluation analysis of city business firms based on rank-sum ratio comprehensive evaluation method

Wenlong Cao¹, Rongrong Fan²

¹School of Economics, Central University of Finance and Economics, Beijing, 102206, China

²School of Economics & Management, Shanghai Maritime University, Shanghai, 201306, China

Abstract: The good development of city commercial banks is conducive to the stability of national economy, and the good financial performance has a higher promoting effect on the good development of city commercial banks. This paper uses the entropy weight method and rank-sum ratio comprehensive evaluation method to evaluate the financial performance of 17 city commercial banks from the four aspects of profit-making, risk, growth and business. Among them, the weight of business index is the largest, and in general, the performance of banks in the central and western regions is lower than that in the eastern region. Finally, this paper puts forward the policy suggestions of perfecting laws and regulations, strengthening supervision and preventing and controlling risks.

Keywords: City commercial bank; Rank sum ratio comprehensive evaluation method; System of evaluation

1. Introduction

City commercial banks are an important component and special group of China's banking industry. With the development of China's financial industry, urban credit cooperatives have gradually exposed many problems in risk management in the process of development. Small and medium-sized enterprises still face the situation of difficult and expensive financing, so many urban credit cooperatives have gradually transformed into current urban commercial banks to provide better financial services for the local economy and local residents. Bank financial performance evaluation is an important step for banks to evaluate their overall business performance. Good financial performance evaluation plays an important role in preventing risks and realizing the balance of "three characteristics". Therefore, financial performance evaluation is of great significance to the healthy development of the banking industry. Ge Yongbo et al. selected rural banks and other new rural financial institutions as the evaluation objects to build an index system, used the business performance evaluation model and studied the factors affecting the performance. [1] Based on the analysis of the impact of loan diversification on the performance of commercial banks, Wang Xiuguo et al. showed that the regional diversification of loans had no significant impact on their performance from the perspective of EVA [2]. Jia Ruirui et al. focused on China's rural commercial banks, used SBM method to comprehensively evaluate the operating performance of rural commercial banks in China, and analyzed the external factors affecting the operating performance of rural commercial banks in different regions [3]. As a local financial institution, the main function of city commercial banks is to better serve local resident enterprises and solve the problem of difficult and expensive financing for small and medium-sized enterprises. At present, there are many theoretical studies on the performance evaluation system of banks, but there are few articles on the performance evaluation of city commercial banks. Based on the development events of city commercial banks, this paper evaluates and analyzes the overall development of city commercial banks from the perspective of financial performance.

2. Construction of the performance evaluation system of city commercial banks and data sources

In terms of the construction of the performance evaluation system of urban commercial banks, according to the Internal Guidelines for Supervision and Rating of Commercial Banks (Trial) formulated by the CBRC in 2016, the indicator system includes six factor indicators, including capital adequacy, asset quality, management, profitability, liquidity and market risk. Ge Yongbo studied the operating performance of rural banks in China from four aspects: profitability index, safety index, liquidity index

and development index [1]. Combined with the local reality, this paper selects a series of indicators to evaluate the performance of city commercial banks from the urban dimension. Combined with relevant literature, this paper divides the factors affecting the performance evaluation process of the whole city commercial bank into four important aspects: profitability index, risk index, growth index and business index.

The establishment of the performance evaluation system of city commercial banks is based on the profitability index, which determines the existence and long-term future development of commercial banks and has a very important impact on the local financial institution system [4]. This paper adopts return on equity, return on total assets and net profit as evaluation indexes. In this paper, with the support of risk indicators, city commercial banks respectively evaluate the risk indicators of capital composition in performance from equity multiplier and equity ratio, measure asset risk with non-performing loan ratio, and use asset-liability ratio and capital adequacy ratio as liquidity risk indicators in performance rating system. Risk control of financial institutions is crucial, and the control of liquidity and capital composition risks is a stabilizer for the stable development of banks [5]. The performance evaluation system needs to take into account the growth of banks. This paper adopts the year-on-year growth of total operating revenue, net profit attributable and net profit deducted to measure the growth of city commercial banks. This paper takes the year-on-year growth of total operating revenue as an index to evaluate the long-term growth of city commercial banks, and commercial banks with long-term stable growth are conducive to the stability of financial institution system and social livelihood [6]. The sound development of commercial banks requires a good operating system and a good dividend policy, so operational indicators are particularly important. In this paper, investment income, basic earnings per share, net fee income and net interest income are used as indicators to measure the dividend policy and operation system of banks. The research objects of this paper are mainly 17 city commercial banks such as Bank of Beijing, Bank of Shanghai and Bank of Nanjing, which are ranked relatively high. The sample data come from the financial statements of various banks, the Oriental Fortune Network and the wind database. The sample data mainly include the data of city commercial banks in 17 regions.

3. Empirical analysis of performance evaluation analysis of city commercial banks

3.1 Research ideas

In the case of a large number of indicator systems, a more reasonable weight is needed to intuitively evaluate the performance of city commercial banks. In order to eliminate the influence of subjectivity, this paper chooses the entropy weight and rank sum ratio method. The model in this paper is mainly a horizontal analysis of the performance evaluation of city commercial banks in each city, and the entropy weight and rank sum ratio method better solve the problem of horizontal comparison among the indicators.

3.2 Research Methods

The entropy weight method uses the variation degree of the index itself to determine the size of the amount of information reflected, so as to determine its corresponding weight, which can objectively determine the weight of the evaluation index, the greater the degree of change of the index, the greater the weight. Entropy reflects the disorder degree of a system, which is a common comprehensive competitiveness evaluation method used for objective empowerment. Rank Sum Ratio (RSR) rule is a comprehensive evaluation method that takes the average rank of each evaluation index as the basic unit to evaluate the evaluation object. According to the amount of information carried by the evaluation index, the weight of each index of the performance evaluation of each city's firms is determined, so as to determine the final score of the performance of each city's firms. In the process of ranking, in order to retain the information of the original data, this paper adopts the method of non-integer rank for ranking.

3.3 Results of the performance evaluation system of city commercial banks

Table 1 shows the specific weights of each index obtained through the entropy weight method. The secondary indicators that account for the largest proportion are non-deductible net profit, net income from commission fees and investment income. The differences in non-net profit deduction are mainly due to the differences in the understanding of financial institutions and financial knowledge of urban residents and the degree of urban financial development. In terms of fees, the proportion of city firms charged is similar. The main reason for the gap is the amount of deposits and loans. Big cities and cities

with a good financial foundation have a great demand for deposits and loans, both for corporate loans and personal loans. However, some small and medium-sized banks are faced with problems such as scale failure and difficulty in attracting deposits, which eventually leads to the gap in scale and net income of fees. The investment direction of city commercial banks is mainly focused on bonds, followed by financial funds and trust products. The investment scale mainly depends on the debt scale. Too high leverage ratio of investment will lead to increased risks. When the scale of interbank liabilities shrinks more than expected, it will lead to asset selling, so banks have to balance assets and liabilities and liquidity. Due to the different scale and customer groups of city commercial banks, there are great differences in investment scale and investment ratio, resulting in a high weight of investment income on performance evaluation. The indicators that account for a relatively small proportion mainly focus on risk indicators. In terms of capital adequacy ratio and asset-liability ratio, due to the Basel Accord and other relevant regulations, there are relatively unified and authoritative standards for the banking industry, so different city commercial banks have less fluctuation range of specific data. In addition, under the competitive pressure of other banks such as the Big Four banks, city commercial banks have almost the same degree of tightening of lending, so the gap in non-performing loan ratio is also very similar. The leverage control of city commercial banks in the proportion of property rights is mainly concentrated at about 10%-13%. After the 2008 financial crisis, countries' awareness of bank risk control has been enhanced, and city commercial banks have fluctuated within the prescribed range in the control of leverage ratio, making the proportion of such indicators relatively small.

Table 1: Results of the performance evaluation index system of city commercial banks

First level indicator	Weight	Second level indicator	Weight
Profitability indicator	0.088	Return on equity	0.030
		Return on total assets	0.026
		Net interest rate	0.032
Risk indicator	0.185	Equity multiplier	0.048
		Proportion of property rights	0.043
		Non-performing loan ratio	0.030
		Asset-liability ratio	0.026
		Capital adequacy ratio	0.038
Growth indicator	0.315	Total operating income	0.100
		Net profit attributable to	0.106
		Deduction of non-net profit	0.109
Business performance indicator	0.415	Investment income	0.113
		Basic earnings per share	0.059
		Net fee income	0.143
		Net interest income	0.100

The Table 2 shows the analysis results of the rank-sum ratio comprehensive evaluation method, including the standardization coefficient and adjusted R^2 of the model, which are used for model testing. The goodness-of-fit R^2 of the model is 0.871, and the model performs relatively well, so the model basically meets the requirements. The formula of the model is given in (1).

$$RSR = -0.719 + 0.22 * Probit \quad (1)$$

Table 2: Linear regression results

	RSR
Probit	0.220 (0.022)
constant	-0.719 (0.114)
R^2	0.871
Adjust R^2	0.863
n	17

Note: ***, **, * represent significance levels of 1%, 5%, and 10% respectively

Table 3 shows the performance evaluation and analysis scores of city commercial banks calculated according to the weights. The higher the grading level is, the better the overall performance level of the bank is. It can be seen from the results that the development trend of city commercial banks presents normal distribution. In 2006, the Measures for the Management of the Branches of City Commercial Banks in different Places stipulated that city commercial banks can develop across regions, which opened up the development difference between the leading city commercial banks and other peers, and this

difference is expanding day by day due to the differences in the geographical location, strategic pattern and management strength of city commercial banks.

Table 3: Performance evaluation and analysis scores of commercial banks in the three cities

Bank	RSR ranking	Probit	RSR fitted values	Grade of division
Bank of Ningbo	1	7.178	0.858	Excellent
Bank of Beijing	2	6.565	0.724	Excellent
Bank of Shanghai	3	6.187	0.64	Good
Bank of Jiangsu	4	5.929	0.584	Good
Bank of Nanjing	5	5.722	0.538	Good
Bank of Hangzhou	6	5.541	0.499	Good
Bank of Chengdu	7	5.377	0.463	Good
Bank of Guiyang	8	5.223	0.429	Good
Bank of Changsha	9	5.074	0.396	Good
Bank of Chongqing	10	4.926	0.363	Medium
Bank of Zhengzhou	11	4.777	0.331	Medium
Bank of Suzhou	12	4.623	0.297	Medium
Bank of Xi'an	13	4.459	0.261	Medium
Qilu Bank	14	4.278	0.221	Medium
Bank of Xiamen	15	4.071	0.175	Medium
Bank of Qingdao	16	3.813	0.119	Medium
Bank of Lanzhou	17	3.435	0.036	Poor

4. Analysis of performance evaluation and evaluation system results of city commercial banks

From the total score of performance evaluation analysis of city commercial banks, Bank of Ningbo is a regional listed bank in 2021 and one of the 19 systemically important banks in China. In the operation of 2021, its return on equity, investment income and basic earnings per share rank the highest among the 17 banks studied. In terms of investment income, Bank of Ningbo has the highest investment income, and its basic earnings per share and return on equity are also the highest, far ahead of the other 16 banks. The overall score of Bank of Beijing ranked second. As one of the earliest city commercial banks in China, the total operating revenue of Bank of Beijing ranks the highest among the 17 banks studied in this paper. From the perspective of grading grade, the grading grade of eastern banks is higher than that of central and western banks in general, and the performance level of eastern banks is higher than that of central and western banks in general.

From the perspective of profit index, in terms of return on equity, Bank of Chengdu is the highest while Bank of Lanzhou is the lowest. In terms of return on equity, Bank of Chengdu has greater advantages, which makes Bank of Chengdu the bank with the highest performance in the western region, and net interest rate is one of the important factors causing the score gap of profit-making indicators. From the perspective of net interest rate, Guiyang Bank has the highest net interest rate. It ranks third among banks in southwest China, second only to Bank of Chengdu. From the analysis of risk indicators, although risk indicators play an important role in the normal operation of banks, under the supervision and restriction of Basel Accord and China's Banking and Insurance Regulatory Commission, each bank has maintained a relatively reasonable level. From the specific data, the asset-liability ratio of 17 banks is within the limit of Basel Accord. Different city commercial banks have less fluctuation range of specific data, capital adequacy ratio is mainly concentrated in 11%-15%, asset-liability ratio is around 90%, so the difference is very low; Since China's banks are subject to the supervision of China Banking and Insurance Regulatory Commission (CBIRC) and to meet their own needs to maximize profits, each bank also has strict targets and restrictions on the non-performing loan ratio, so the difference is small; From the growth indicators, it can be seen that the total operating income of each bank has a large difference among each bank due to its own scale. In the cities with strong financial foundation such as Bank of Shanghai, Bank of Beijing, Bank of Jiangsu and Bank of Ningbo, due to the active local economy, strong financing demand and high regional consumption level, the rapid growth of individual loans leads to high net profits of city commercial banks. In addition, the money creation of banks increases the loan scale significantly, and some banks even make net profits exceeding 10 billion yuan. From the perspective of business indicators, Bank of Shanghai has the highest net profit attributable to, deducting non-net profit and commission income. Its business volume ranks first in 2021, making Bank of Shanghai

also rank third among 17 banks in performance. Big cities and cities with a good financial foundation have great demand for deposits and loans, both for corporate loans and personal loans, while some small and medium-sized banks are facing difficulties in scale. Problems such as difficulty in attracting deposits, high operating costs, high non-performing loan ratio, and low profitability eventually lead to the gap in scale, which in turn leads to the gap in net fee income. The commission income of 9.047 billion yuan of Bank of Shanghai is compared with about 380 million yuan of Bank of Xiamen and Bank of Lanzhou, which shows the impact of financial development in different cities on it.

5. Conclusions and policy opinions

As a special financial enterprise, the bank pursues the maximization of its own profits on the premise of ensuring safety. Growth indicators and business indicators account for a high proportion in the evaluation system, while profit indicators and risk indicators account for a low proportion. In the performance evaluation of city commercial banks, Bank of Shanghai and Bank of Ningbo obtained the highest rating due to their good business capacity. The development trend of city commercial banks presents a normal distribution, and the policy that city commercial banks can develop across regions has opened up the development difference between the leading city commercial banks and other peers. In general, the performance of banks in the central and western regions is lower than that in the eastern region. Based on the above conclusions, this paper puts forward the following policy suggestions.

1) For the benign development of city commercial banks, they first meet their best interests on the basis of meeting security and liquidity. In the performance evaluation, Bank of Ningbo obtained the highest rating with good operating performance and investment income.

2) The sound development of city commercial banks requires the sound development of laws and regulations, the development of a good financial ecology in accordance with laws and regulations, and sound laws and regulations are also conducive to preventing bank credit and liquidity risks. At present, there is a certain gap between China's banking supervision and that of developed countries, so it is still necessary to strengthen legislation and improvement to ensure the sound development of city commercial banks.

3) In the course of operation, banks should enhance the awareness of risk control, control the leverage ratio, strengthen the examination of loans, and strictly control the non-performing loans of banks.

4) In terms of the healthy development of banks, the performance of banks in the central and western regions is generally lower than that in the eastern region. In macroeconomic regulation and control, we should strengthen the supervision of banks in the central and western regions to prevent their credit and liquidity risks.

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