The Empirical Analysis of Chinese Commercial Banks' Comprehensive Performance

Siwei Wang [a], Yu Wu [b]

Xi'an University of Science & Technology, Xi'an, 710054, China.

[a]1873571533@qq.com, [b]656321936@qq.com

Abstract

Commercial banks' comprehensive performance can affect not only the competitiveness and sustainable development, but also the contribution on Chinese regional economic development. The paper builds comprehensive performance evaluation index system from profitability, liquidity, develop ability and so on. the paper empirically analyzes 16 Commercial banks' comprehensive performance in 2016. The results show that: in recent years, Chinese Commercial banks' comprehensive performance is low; there is obvious discrepancy among Chinese Commercial banks' comprehensive performance, city commercial banks' comprehensive performance is highest. Therefore, Chinese Commercial banks should enhance security capabilities, improve the profit level, and maintain moderate liquidity and so on, in order to improve their comprehensive performance, enhance their competitive ability.

Keywords

Commercial Bank; Comprehensive Performance; Factor Analysis.

1. Introduction

In recent years, the development of Chinese financial industry is very rapid; the birth and development of internet finance impact on the traditional profit model of commercial banks; and, with the opening of Chinese financial industry, the competitive pressure of Chinese commercial banks is increasing. In order to keep invincible in the fierce competition, Chinese commercial banks must improve their comprehensive performance. In recent years, the comprehensive performance of China's commercial banks has been improved year by year, but comparing with the foreign developed countries, its comprehensive performance is still low, which restricts the promotion of its competitiveness to some extent and its promoting effect on the regional economy and macroeconomic development of China.

In recent years, domestic and foreign scholars have studied the comprehensive performance of commercial banks and formed the following viewpoints:

The comprehensive performance of Chinese commercial banks is low and there is a clear gap. Y. Li (2014), H. J. Qin and L. J. Sun (2015), Q. C. Lei and F. F. Li (2016)pointed out that the comprehensive performance of Chinese commercial banks is lower, and the comprehensive performance of state-owned banks is the lowest, and the City commercial banks and joint-stock commercial banks have higher overall performance.

The comprehensive performance level of China's commercial banks is increasing year by year. X. Fu (2016) used Malmquist production index method based on DEA to analyze the comprehensive performance of 14 commercial banks in 2007-2015, and the results show that the comprehensive performance of 14 commercial banks is increasing slightly. The main reasons are the technical level of commercial banks, product innovation, and service efficiency improve year by year, but the speed of improvement is slow.

The influencing factors of the comprehensive performance of commercial banks. George. J. Engston et al. (2004) argued that the return on net assets is positively related to the overall performance of commercial banks. Giuliano Iannotta et al. (2007) empirical analysis of the impact of ownership

structure on the overall performance of commercial banks and found that the ownership structure did not have a significant impact on the overall performance of commercial banks. Jelena et al. (2012) pointed out that the net interest rate of assets, the proportion of loans to assets, the proportion of expenditure and other factors all have significant impacts on the financial performance of commercial banks. M. Q. Huang (2015) believed that profitability, risk control, the ability of assets safety and security and so on affects the comprehensive performance of commercial banks.

The above research has studied the comprehensive performance of commercial Banks from different angles and has certain reference significance. However, there are few indicators selected by existing literature, which cannot comprehensively and accurately measure the meaning of comprehensive performance, and reflect the characteristics of commercial Banks. Therefore, this paper will build the comprehensive performance index system of commercial banks, and empirically analyze the comprehensive performance of Chinese commercial banks in different years, and analyze its development trend.

2. Sample selection

16 commercial banks are selected, including the Chinese bank, agricultural bank of China, industrial and commercial bank of China, construction bank of China, traffic bank, Pudong development bank, China merchants bank, Societe generale bank, Minsheng bank, China everbright bank, citic bank, Huaxia bank, ping' an bank, Ningbo bank, Beijing bank and Nanjing bank. The 16 banks cover both large state-controlled commercial banks and joint-stock commercial banks, including urban commercial banks, so the selection of samples reflects the principle of comprehensiveness and comparability. All the indicators used are from the annual report of the commercial banks for 2016.

3. Selection of indicators

According to the connotation of comprehensive performance and the characteristics of commercial banks, 12 secondary indexes, selected in this papaer, to construct comprehensive performance evaluation index system of commercial banks from four aspects of profitability, liquidity index, safety index and development ability. As shown in table 1,the indexes are cost -to-income ratio(X1), return on net assets (X2),earnings per share (X3),operating income margin(X4),mobility ratio(X5), loan- to-deposit ratio ratio (X6), asset-liability ratio(X7) ,non-performing loan rate(X8),capital adequacy ratio (X9), equity multiplier(X10), operating income growth rate(X11), net profit growth rate (X12).

Table 1 comprehensive performance index system of commercial banks

	Indicator name	Indicator symbol	Nature
Profitability indicator	cost -to - income ratio(%)	X1	Reverse index
	return on net assets(%)	X2	Positive index
	earnings per share(￥)	X3	Positive index
	operating income margin(%)	X4	Positive index
Liquidity indicator	mobility ratio(%)	X5	Moderate index
	loan-to-deposit ratio ratio(%)	X6	Inverse index
	asset-liability ratio(%)	X7	Inverse index
Safety index	non-performing loan rate(%)	X8	Inverse index
	capital adequacy ratio (%)	X9	Positive index
	equity multiplier(%)	X10	Inverse index
Developmental index	operating income growth rate(%)	X11	Positive index
	net profit growth rate (%)	X12	Positive index

Among the 12 indexes selected in this paper, there are both positive and reverse indicators; in the data unit, there is a percentage form and a unit of "Yuan", so before test, the data should be homogenized and standardized to be analyzable. With the Positive index as the standard, the reciprocal of the reverse index is taken as the standard, in which the cost income ratio, loan - to - deposit ratio ratio, asset-liability ratio, non-performing loan rate and equity multiplier index data are processed ($1 / X_i$, $I = 1, 6, 7, 8, 10$).And then the normalized data using spss21.0 software for standardized processing, and the standardized values of each evaluation index of commercial banks were obtained.

4. Inspection of KMO and Bartlett

Before the factor analysis, it is necessary to carry on the correlation test of the original variable index, only having certain correlation, and the conclusion of factor analysis will have practical significance. This paper uses SPSS 21. 0 system to test KMO and Bartlett.

In table 2, the test value of KMO in 2016 is 0.561, greater than the critical value of 0.5; The approximate chi - square of Bartlett ball test was 192.412, and the significance was 0.000, which was less than 0.05. Both of these two test results show that the 12 index variables selected in this paper are relevant and suitable for factor analysis.

Table 2 Inspection of KMO and Bartlett in 2016

Samples are sufficient to measure the Kaiser-Meyer-Olkin metric		.561
Bartlett's Spherical Test	Approximate chi - square	192.412
	df	66
	Sig.	.000

5. Extraction of principal components

In this paper, the principal component analysis method is used to extract the data from 16 commercial banks of China after standardized processing. According to the extraction standard, the common factor of eigenvalue greater than 1 is selected as the main component.

As can be obtained from table 3, there are four eigenvalues greater than 1 in 2016, namely 4.980, 2.522, 1.459 and 1.093, and, therefore, four principal components are selected as C1, C2, C3 and C4, respectively. The cumulative contribution rate of sample variance is 83.775 %, indicating that the four main components contain most of the original index variables, and can interpret the original index information comprehensively.

Table 3 total variance explained in 2016

Components	Initial eigenvalue			Extract the sum of squares and loads			Rotation Sums of Squared Loads		
	Total	variance of %	cumulative %	Total	variance of %	cumulative %	Total	variance of %	cumulative %
1	4.980	41.496	41.496	4.980	41.496	41.496	3.596	29.966	29.966
2	2.522	21.014	62.510	2.522	21.014	62.510	3.086	25.718	55.684
3	1.459	12.157	74.667	1.459	12.157	74.667	2.215	18.456	74.140
4	1.093	9.108	83.775	1.093	9.108	83.775	1.156	9.635	83.775
5	.804	6.697	90.471						
6	.523	4.362	94.833						
7	.434	3.615	98.448						
8	.122	1.018	99.466						
9	.031	.260	99.726						
10	.024	.197	99.924						
11	.009	.076	100.000						
12	6.318E-006	.000	100.000						

Extraction method: principal component analysis.

Since the load values of the 12 variables corresponding to the four principal components in the original composition matrix are not significant, the representative variables of the principal components are not prominent and have little effect on the interpretation of the principal components. Therefore, the principal component is extracted and named after the rotation component matrix which is rotated by orthogonal rotation of the original component matrix.

The 2016-year index data is subjected to Kaiser's normalized orthogonal rotation method, and the rotation is converged after 7 iterations. The rotated factor component matrix is shown in Table 4:

Table 4 Rotation composition matrix for 2016

	Components			
	1	2	3	4
cost -to - income ratio(%)	-.054	.271	.537	.537
return on net assets(%)	.400	-.110	.773	-.115
earnings per share(￥)	.062	-.334	.865	.058
operating income margin(%)	.003	.816	.219	-.071
mobility ratio(%)	.029	-.221	-.067	.903
loan-to-deposit ratio ratio(%)	.937	.038	-.037	.026
asset-liability ratio(%)	-.383	.792	-.367	-.056
non-performing loan rate(%)	.954	.097	.040	.027
capital adequacy ratio (%)	.200	.869	-.259	-.027
equity multiplier(%)	-.386	.789	-.368	-.056
operating income growth rate(%)	.715	-.330	.270	-.140
net profit growth rate (%)	.890	-.222	.340	.053

Extraction method: main component.

Rotation method: orthogonal rotation method with Kaiser Standardization.

A. The rotation converges after 7 iterations.

From Table 4, C1 in the non-performing loan ratio X8, loan-to-deposit ratio, ratio X6, operating income growth rate X11, and net profit growth rate X12 has a higher factor loading coefficient. Among them, the net profit growth rate and operating income growth factor on the maximum load factor, combined with the two indicators point to the growth of commercial banks, so C1 will be named as growth factor. C2 in the capital adequacy ratio X9, equity multiplier X10 on the factor load factor, is large; these two indicators reflect the commercial bank assets security, so C2 will be named as a safety factor. C3 in the net asset yields X2, earnings per share on the X3 factor load the largest, and these two indicators are reflected in the profitability of commercial banks, so the C3 named profit factor. C4 in the flow ratio X5 on the factor load the largest, so the C4 named flow factor.

6. Factors score and ranking

The principal component factor formula is expressed as:

$$F = \beta_1 ZX_1 + \beta_2 ZX_2 + \beta_3 ZX_3 + ... + \beta_{12} ZX_{12} \tag{1}$$

In the above formula (1), βi (I = 1, 2, 3, 12) represents the component score coefficient of the 12 indicators, and ZX_i (I = 1, 2, 3, and 12) represents the normalization of the original variable. Then the factor score coefficient was introduced into the above formula, and the factor score of 16 commercial Banks was calculated.

According to the composition score coefficient of Table 2, the calculation formula presents the factor scores of the four principal components in 2016:

Table 5 composition score matrix for 2016

	Components			
	1	2	3	4
cost -to - income ratio(%)	-.063	.204	.325	.442
return on net assets(%)	.014	.087	.396	-.154
earnings per share(￥)	-.115	.006	.451	-.029
operating income margin(%)	.004	.346	.258	-.049
mobility ratio(%)	.041	-.060	-.150	.797
loan-to-deposit ratio ratio(%)	.317	.052	-.151	.060
asset-liability ratio(%)	-.042	.232	-.040	-.003
non-performing loan rate(%)	.315	.087	-.099	.058
capital adequacy ratio (%)	.140	.305	-.049	.038
equity multiplier(%)	-.042	.231	-.041	-.004
operating income growth rate(%)	.178	-.061	.021	-.133
net profit growth rate (%)	.238	.007	.039	.042

Extraction method: main component.

Rotation method: orthogonal rotation method with Kaiser standardization.

To form a score.

According to the rotation variance contribution rate of the four factors in table 3 in 2016, the comprehensive score f of each commercial bank in 2016 is obtained.

$$F=(29.966\%F1+25.718\%F2+18.456\%F3+9.635\%F4)/83.775\% \qquad (2)$$

The calculated results and factor scores are shown in table 6:

Table 6 16 commercial bank factor scores and ranking in 2016

Bank name	Growth factor	safety factor	profit factor	liquidity factor	comprehensive performance	Comprehensive ranking
Chinese bank	-0.17	1.37	-1.07	0.17	0.14	8
Agricultural bank of China	-0.41	-0.64	-1.30	-0.42	-0.69	16
Industrial and commercial bank of China	-0.44	2.27	0.34	-0.67	0.54	3
Construction bank of China	-0.02	1.56	-0.02	-0.10	0.46	4
Traffic bank	-0.24	0.63	-1.29	0.33	-0.14	10
Pudong development bank	-0.64	0.02	1.98	-0.46	0.16	7
China merchants bank	-0.63	-0.44	0.84	0.96	-0.06	9
Societe generale bank	-0.36	-0.36	1.84	1.62	0.35	5
Minsheng bank	-0.43	-0.91	-0.03	-0.95	-0.55	13
China everbright bank	-0.39	-0.88	-0.84	1.51	-0.42	11
Citic bank	-0.59	-0.77	-0.81	-0.31	-0.66	15
Huaxia bank	-0.53	-0.73	0.50	-2.30	-0.57	14
Ping' an bank	-0.25	-1.03	-0.75	0.43	-0.52	12
Ningbo bank	2.39	-0.66	0.30	-1.00	0.60	2
Beijing bank	0.08	0.37	0.29	0.53	0.27	6
Nanjing bank	2.62	0.19	0.03	0.67	1.08	1

From the empirical analysis results in Table 6, we can get the following conclusions:

(1)The contribution rate of Chinese Commercial Banks is different.

The contribution of the four factors to the comprehensive performance of Chinese Commercial Banks is different. The empirical analysis shows that in 2016, the contribution rate of growth factor is 29.966%, the contribution rate of safety factor is 25.718%,the contribution rate of profit factor is 18.456%, and the contribution rate of liquidity factor is 9.635%.It shows that the growth factor has the greatest contribution to the comprehensive performance of Chinese Commercial Banks in 2016, that is to say, the growth ability of commercial banks having the most significant impact on its comprehensive performance, then the security ability, followed by the profitability of commercial banks, and the commercial banks' liquidity contributes the least to its overall performance.

(2)The overall level of comprehensive performance of Chinese Commercial Banks is low.

At present, the overall level of comprehensive performance of Chinese commercial banks is low. As shown in Table 6, of the 16 commercial banks in 2016, only 8 commercial banks of the overall performance is greater than 1.00, among them, Nanjing Bank has the highest comprehensive performance, with a value of 1.08 and a slight higher than 1.00. Ningbo Bank came in second, with a value of 0.60. Industrial and commercial bank of China was third with 0.54. The overall performance of the other 8 commercial banks was below 1.00, with Agricultural Bank of China having the lowest overall performance, at minus 0.69. At the same time, the average value of the comprehensive performance of 16 commercial banks is only -0.00062, which is far below the comprehensive performance of commercial banks in developed countries. Therefore, the Chinese Commercial Banks should think about learning the development concept of foreign outstanding commercial banks, take corresponding improvement measures, keep up with the economic and social development, improve their comprehensive performance and enhance the market competitiveness.

(3)There is an obvious gap between the comprehensive performances of Chinese Commercial Banks.

According to Table 6, it can be seen that there is a clear gap between the comprehensive performances of Chinese Commercial Banks. First, the overall performance level of urban commercial banks is higher than that of state-owned commercial banks and joint-stock commercial banks. This is because although the city commercial banks are small, in their business, they can be based on the advantages of regional markets, flexible adjustment of business, fast and accurate to keep up with the economic situation, to achieve better operating results. In state-owned commercial banks and joint-stock commercial banks, the state-owned commercial banks use their stable financial support and accumulated reputation to make their comprehensive performance higher than the joint-stock commercial banks. Furthermore, there are obvious gaps within the various commercial banks. In the city commercial banks, the comprehensive performance of Nanjing Bank was the highest. In the state-owned commercial banks, industrial and commercial bank of China's comprehensive performance level was the highest. In the joint-stock commercial banks, industrial bank has the highest comprehensive performance value and the most competitive.

In a word, at present, the overall performance level of Chinese Commercial Banks is low, fluctuating year by year, and there is a clear gap. In the three major banks, the overall commercial status of urban commercial banks is better.

7. Conclusions and revelation

This paper first constructs the comprehensive performance evaluation index system of commercial banks from four aspects, profitability, liquidity, safety and development ability, and then uses the factor analysis method to analyze the comprehensive performance of 16 commercial banks in China in 2016. The main conclusions are as follows: First, the contribution rate of the main components influencing the comprehensive performance of Chinese commercial banks is different, among which the contribution rate of growth factors is the highest. Second, in recent years, the overall level of comprehensive performance of Chinese Commercial Banks is low. Thirdly, there are obvious differences in the comprehensive performance of Chinese Commercial Banks, and the comprehensive performance of urban commercial banks is the highest.

In order to improve the comprehensive performance of Chinese Commercial Banks, commercial banks should take the following measures: Establish a credit management system and risk control mechanism suitable for China's specific national conditions, establish and improve the deposit insurance system, and enhance the security capability; Effective control of costs, in strengthening the traditional business of commercial banks on the basis of continuing to accelerate the development of intermediary business, effectively improve the profitability; The establishment of capital demand forecasting mechanism and the scientific and effective risk early warning mechanism, optimizing the reserve structure of commercial banks to maintain a moderate liquidity; and make a differentiated development strategy, layout the county market actively, strengthen the leading role of information technology, vigorously promote the development of large data technology, accelerate the construction of information technology banks, improve development capacity.

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