Research on Regional Economic Growth based on Factor Analysis

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Abstract: Financial agglomeration plays an important role in promoting economic growth. This paper constructs the evaluation system of financial agglomeration by using comprehensive indicators, evaluates the level of financial agglomeration in 30 provinces and cities of China by using factor analysis method, and expounds the relationship among them. This paper evaluates the degree of financial agglomeration in China's provinces and cities by factor analysis method. The results show that there are some financial agglomeration conditions in the Yangtze River Delta, Pearl River Delta and Bohai Rim region. Beijing, Guangdong and Shanghai are the regions with the highest degree of financial agglomeration and are the financial centers of a region. The development level of China's financial agglomeration is not balanced, the overall trend is decreasing from east to west, and there are differences among several financial agglomeration areas.

1. Introduction

For financial institutions, through financial agglomeration, financial institutions (such as banks and investment funds) can concentrate the idle funds scattered in different regions more efficiently, and promote the efficient flow of funds. At the same time, financial institutions can redistribute the idle funds returned to the financial system through loans and investment, so as to effectively reduce the time for working capital, the related costs have also been greatly reduced. While optimizing the allocation of resources, the utilization rate of resources has also been improved. Financial institutions provide various services for enterprises and individuals, transmit the collected information to investors, transfer and control financial risks through the combination of financial instruments, and improve the liquidity of financial resources, so as to facilitate the sharing and exchange of financial resources among different regions.

2. Financial agglomeration and regional economic development

The promotion of financial industry agglomeration on economic development and the possible path mechanism can be summarized from the following aspects:

(1) Financial industry agglomeration can cause external scale effect to a certain extent. The external scale effect caused by financial industry agglomeration has been concerned by scholars in related fields earlier. Some scholars believe that financial industry agglomeration can not only benefit the financial industry and related industries, but also cause economic externality in different degrees. For example, the financial industry cluster area has gathered a large number of industries, enterprises and a large number of employment population, which may lead to certain chain effect. In order to create the card effect of financial agglomeration, local governments will increase infrastructure investment and redistribution of public resources in different scales, thus forming a series of external scale effects. It can attract more financial institutions and other financial institutions to develop in the same region.

(2) Financial industry agglomeration can lead to a certain degree of diffusion scale effect. The diffusion scale effect caused by financial industry agglomeration refers to the formation of a geographical region with a number of large financial institutions and large industrial and commercial enterprises as the core due to the agglomeration of financial industry. The radiation resource range generated by the geographical region as the core is often greater than the effect of industrial

dispersion. With the continuous development, aggregation and integration of the financial industry, high-quality financial resources, such as large-scale financial institutions and high-end talents, continue to focus on the central region. At the same time, the allocation of social resources by the government departments will continue to tilt to the central region. On the contrary, the inferior, uncompetitive and low-income resources are eliminated to the marginal areas. In this process, the financial resources change from dispersion to integration, and then to the formation of the central radiation structure. In addition, a large number of funds are exported from the financial center to the surrounding areas, and the demands of vigorously developing the economy and upgrading industries in the surrounding areas are fully met. In addition, financial centers provide high-end financial services and integrate high-end financial resources, so as to promote the industrial upgrading of the region, give play to the diffusion effect, and promote the coordinated development of the economy. There are many financial innovation and research institutions gathered in the financial center, so new technologies continue to spread to the surrounding areas, so the technology diffusion effect is fully played.

3. Construction of evaluation index system

Financial industry includes many types of industries, such as banking industry, securities industry, insurance industry, fund and trust, etc. Referring to the existing research, this paper selects the data of banking industry, securities industry and insurance industry as the basic variables of financial agglomeration index system. The reasons are as follows: firstly, banking, securities and insurance are the main participants in the financial market, which constitute the core elements of the financial industry. Secondly, from our country's point of view, the existence of CBRC and CSRC corresponds to these three departments respectively, forming a complete financial market supervision system; Third, banking, securities and insurance industries are the antecedents for the formation of financial markets and financial industries. Without one of these three industries, a complete financial industry can not be formed. It has been proved that the agglomeration of financial industries often starts from the agglomeration of banking, securities and insurance industries. Based on the above reasons, this paper selects banking industry, securities industry and insurance industry as the evaluation index of financial industry agglomeration. At the same time, in order to more objectively reflect the development of the financial market and the financial industry, and avoid the deviation caused by different system conditions and regional economic development level, this paper further selects the overall situation of the financial industry as an indicator, thus forming a total of four evaluation indicators.

In this paper, the evaluation index selection of financial agglomeration degree is constructed according to the overall situation of financial industry, banking, securities and insurance industry, each of which includes different factors. Specifically, in the overall situation of the financial industry, the GDP of the financial industry and the proportion of the GDP of the financial industry in the total GDP are selected by the provincial units as the first evaluation index. The number of banks in a region, the deposit balance and the loan balance are used to measure the development of the banking industry in a region, The securities industry uses the total amount of stock financing and the number of listed companies to measure the development of the securities industry in a region. The insurance industry uses the number of insurance companies and insurance density to build an index system. The evaluation indexes of factor analysis in this paper are described in the table below:

Table 1 Index System Construction

Variable	Direction	Influence factor	Company
Financial agglomeration	General situation of financial industry	Financial industry GDP	100 million yuan
		Proportion of financial industry to GDP	%
	banking	Number of regional banks	individual
		Deposit balance	100 million yuan
		Loan balance	100 million yuan
	securities business	Total equity financing	100 million yuan
		Number of listed companies	individual
	Insurance industry	Number of insurance companies	individual
		Insurance density	Yuan Dynasty people

4. Measurement of financial industry agglomeration degree based on factor analysis

Financial industry agglomeration is a comprehensive index, and the existing research constructs financial agglomeration evaluation indicators based on different methods, such as factor analysis, analytic hierarchy process and so on. This paper selects the statistical data of 30 provinces and autonomous regions (except Tibet) in China from 2008 to 2018. Tibet is not comprehensive because of its special policy culture. In the model design, removing Tibet will not have a great impact on the results. The statistical data are from China Statistical Yearbook and regional statistical yearbook from 2009 to 2017, financial operation reports of all provinces and cities in China, and economic and social development statistical reports of all provinces and cities in China. The evaluation index system of the degree of financial agglomeration should be a comprehensive index system, which needs to consider many factors, and uses factor analysis method to extract principal components to measure the degree of financial agglomeration.

Based on the statistics of China Statistical Yearbook from 2009 to 2017, there should also be manual sorting out the financial operation reports of China's provinces and cities and the economic and social development statistical reports of all provinces and cities in China. For all kinds of data collected, factor analysis method is used to process the data. Since the data collected in this paper are panel data, and factor analysis can only process cross-section data, this paper takes provinces in different regions as the basic unit, calculates the average value of different variables in each year according to the year, and carries out factor analysis through the average value. Based on the correlation coefficient matrix, factor analysis is used to extract common factors from multiple variables. Factor analysis is one of the most common empirical methods in economics, education, public management, even demography and sociology. In the process of factor analysis, this paper mainly adopts the method of principal component analysis to reduce the dimension.

4.1 KMO test

Firstly, the KMO test is carried out on the data. The closer the KMO value is to 1, it means that the stronger the correlation between variables, the more suitable for factor analysis. The KMO test value of the data collected in this paper is 0.853, which is suitable for factor analysis.

Table 2 KMO test results

KMO test	
Kaiser-meyer-o1kin test value	0.853
Bartlett test chi square value	2599.403
df	45
Significance	0.000

4.2 Factor extraction

Spss19.0 software was used to analyze the data by principal component analysis, and the common factors of 9 influencing factors were extracted. It can be concluded from table 3 that the first and second principal components are extracted. The eigenvalue of the first principal component is 5.012, and the eigenvalue of the second principal component is 1.717. The eigenvalues of both principal components are greater than 1 and the cumulative contribution value reaches about 75%, which can be used as the principal component of nine influencing factors. Principal component 1 is named financial capital scale, which is counted as F1, and principal component 2 is named as number of institutions and counted as F2.

Table 3 Factor extraction results

Component	Initial correlation eigenvalue			Extract square and load			Rotate square and load		
	total	variance	accumulate	total	variance	accumulate	total	variance	accumulate
1	4.899	54.107	55.011	5.743	55.772	55.772	5.109	54.987	55.709
2	1.723	19.114	74.189	1.801	19.034	75.48	1.854	19.041	75.017
3	0.865	9.103	83.091						
4	0.512	6.224	91.213						
5	0.297	4.732	94.012						
6	0.209	2.901	95.997						
7	0.150	1.110	98.701						
8	0.137	1.576	99.154						
9	0.050	0.514	100.000						

4.3 Factor rotation

In order to study the relationship between factor and measure term, the factor is rotated. By comparing the correlation between the two principal components and the influencing factors in Table 4, it is found that the correlation between most of the influencing factors and the two principal components is high and the other is low. Among them, except for the number of insurance companies and the number of listed companies, the correlation degree between other indicators and financial capital scale of principal component 1 is greater than 0.5, showing a strong positive correlation. The correlation degree between the number of variable bank financial institutions, the number of listed companies and the number of insurance companies and the number of principal component 2 institutions is greater than 0.5, showing a strong positive correlation, The correlation between the proportion of variable financial industry in GDP and the number of principal component 2 institutions is less than - 0.5, showing a strong negative correlation.

Table 4 Rotation component matrix

	Financial capital scale	Number of institutions
Financial industry GDP	0.910	0.103
Proportion of financial Industry to GDP	0.689	-0.577
Number of regional banks	0.473	0.887
Deposit balance	0.997	0.154
Loan balance	0.900	0.123
Total equity financing	0.210	0.889
Number of listed companies	0.732	-0.117
Number of insurance Companies	0.057	0.719
Insurance density	0.812	-0.501

4.4 Total score of calculation factor

The total factor score is the weighted average of the two factors extracted above, and its weight is the percentage of their respective eigenvalues in the sum of the eigenvalues of the two factors. According to the table, the weights can be calculated as 0.75 and 0.25 respectively, and then the total

factor score can be calculated:

$$F=0.75*F1+0.25*F2$$

Among them, f is the proxy index of financial agglomeration, F1 is the financial capital scale of principal component 1, and F2 is the number of principal component 2 institutions.

Calculate the total factor score of each province and divide the result into six intervals. Beijing, Guangdong, Shanghai, Jiangsu and Zhejiang have the highest degree of financial agglomeration. Generally speaking, the degree of financial agglomeration in China decreases from the east to the West. The degree of financial agglomeration in the eastern region is much higher than that in the western region, and the financial agglomeration degree in the central and western regions is relatively low except for Sichuan Province. There are obvious financial agglomeration in Yangtze River Delta and Pearl River Delta, and the degree of financial agglomeration is high. Shanghai is the financial center of the Yangtze River Delta. The financial market system of Shanghai is relatively perfect, the degree of opening to the outside world is high, and the number of foreign financial institutions is large. Shanghai gives full play to the radiation effect of the financial center and drives the development of the financial industry in the surrounding areas. The financial agglomeration level of Jiangsu and Zhejiang regions is also in the forefront among the provinces and cities in China, and the financial development level of the Yangtze River Delta region is generally high.

Shenzhen is the financial center of the Pearl River Delta region. Since the reform and opening up, the national policy has been vigorously supporting the economic construction of Shenzhen. The financial industry in Shenzhen has been developing rapidly, driving the financial development of the surrounding cities, and making the financial agglomeration degree of Guangzhou reach a higher state. Financial agglomeration also exists in the Bohai Rim region, and Beijing is the financial center. There is an obvious phenomenon of financial agglomeration in Beijing. The financial industry has developed well. There are many headquarters of banks, securities and insurance companies in Beijing, and the financial status is constantly improving. However, there is a big gap between the degree of financial agglomeration in the surrounding areas of Beijing, such as Tianjin and Hebei, which indicates that the agglomeration effect of the financial industry in Beijing is greater than the radiation effect, the high-quality financial resources in the surrounding areas are gathering in Beijing, which leads to the unbalanced development of the financial industry in the surrounding areas of Beijing.

5. Conclusion

Based on the panel data of 30 provinces and cities except Tibet from 2008 to 2018, this paper establishes a comprehensive index system and evaluates the degree of financial industry agglomeration by using factor analysis method. The results show that there are certain financial agglomeration conditions in the Yangtze River Delta, Pearl River Delta and Bohai Rim region. Beijing, Guangdong and Shanghai are the cities with the highest degree of agglomeration and are the financial centers of a region. The development level of China's financial agglomeration is not balanced, the overall trend is decreasing from east to west, and there are differences among several financial agglomeration areas.

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