

Research on Financial Agglomeration and Ecological Efficiency

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Abstract: This paper selects the economic development data of 31 financial center cities in China from 2011 to 2017. The spatial effects of financial agglomeration on eco-efficiency were studied by principal component analysis, Moran's I index, and spatial econometric analysis. The results of the study show that there is a significant difference in financial agglomeration between different regions. There is a significant spatial correlation between financial agglomeration and eco-efficiency, and there is a positive spillover effect on the eco-efficiency of the region and adjacent regions.

1. Introduction

Since the reform and opening up, China's economy has achieved considerable development. At the same time, extensive economic growth has seriously undermined China's ecological environment. According to the latest World Bank data, China is currently the world's largest emitter of CO₂ and SO₂. The contradiction between economic growth and the ecological environment is very prominent. As the core driving force of the modern economic development, the financial industry has attracted widespread attention. As the basic form of modern financial industry organization, financial agglomeration promotes economic growth, promotes industrial structure upgrading, and promotes energy conservation and emission reduction and ecological environment economic development under the new normal.

At present, most research on financial agglomeration focuses on the relationship between financial agglomeration and industrial structure and economic growth. By studying the spatial spillover effects and influence paths of regional financial agglomeration of Beijing-Tianjin-Hebei region on economic growth, Li Yanjun¹ found that there is a significant spatial spillover effect in the financial agglomeration of Beijing-Tianjin-Hebei region. Tonggong Zhang² analyzed the relationship between financial agglomeration of 15 sub-provincial cities and regional economic growth, and concluded that there is a gap in the promotion of economic growth in different regions.

Ecological efficiency refers to the input-output ratio of the resource environment and the wealth value of output in the process of social and economic development.³ Therefore, various scholars and organizations have carried out research on ecological efficiency. At present, academic research on ecological efficiency focuses on the measurement and evaluation of ecological efficiency. Linxin Chen⁴ used the synergistic idea to establish a coupling coordination degree model, and analyzed the coupling and coordination characteristics of China's provincial financial agglomeration, economic development and ecological efficiency from 2005 to 2015. Caiquan Bai⁵ conducted an empirical analysis of the coordinated development of financial agglomeration and eco-efficiency in 31 provinces in China during 2007-2010. The study found that the coordinated development of financial agglomeration and eco-efficiency in economically developed regions is significantly higher than that in economically underdeveloped regions. With the deduction of time, the overall trend of the provinces is to shift to a higher type of coordinated development.

In summary, research on financial agglomeration and eco-efficiency at home and abroad has been relatively mature, and a large number of viewpoints with reference value have been formed. However, the systematic research results of linking financial agglomeration with ecological efficiency are few⁶.

Based on this, this paper conducts an in-depth study on the spatial spillover effects of financial agglomeration on ecological efficiency improvement.

The possible contribution of this paper. Compared with provincial data, the research conclusions based on city data are more realistic and reliable. In the research method, fully consider the geospatial effect. At the same time, in the spatial weight setting, the geographic distance between cities is used as the spatial weight matrix to replace the adjacency matrix, which makes the research conclusion more accurate.

2. Research area overview, mechanism analysis and index system construction

2.1 Overview of the research area

At present, a total of 31 cities in China have explicitly proposed the construction of regional amount centers, including 4 municipalities (Beijing, Tianjin, Shanghai, Chongqing) and 20 provincial capitals (Dalian, Shenyang, Changchun, Harbin, Jinan, Shijiazhuang, Hangzhou, Nanjing, Guangzhou, Fuzhou, Wuhan, Zhengzhou, Changsha, Hefei, Nanchang, Chengdu, Xi'an, Kunming, Urumqi, Nanning) and seven core cities (Shenzhen, Qingdao, Suzhou, Ningbo, Wuxi, Wenzhou, Xiamen).

2.2 Mechanism analysis

There is a virtuous cyclical relationship between financial agglomeration and ecological efficiency. On the one hand, financial agglomeration optimizes industrial structure through resource supply and technical support, guides rational allocation of resources, improves environmental quality, and enhances regional ecological efficiency. On the other hand, good ecological efficiency will reduce the cost of economic activities, improve the level of economic development and promote financial agglomeration.

2.3 Construction of indicator system

On the basis of fully considering the interaction mechanism of the two, following the principles of systematic selection and operability, this paper draws on the previous research results and constructs a financial agglomeration and eco-efficiency measurement index system. The financial agglomeration is refined into four aspects: the overall financial scale, the banking industry, the securities industry, and the insurance industry. The ecological efficiency is refined into four aspects: economic efficiency, energy consumption, environmental pollution and circular economy. Finally, select 25 representative indicators as the basis of this study.

3. Research methods and model construction

3.1 Financial agglomeration and ecological efficiency measurement

In order to reduce the influence of subjective factors and to better reveal the relationship between financial agglomeration and eco-efficiency while preserving the main information of the original variables, this paper uses principal component analysis to calculate the measurement values of financial agglomeration and eco-efficiency. The specific process is as follows:

First standardize the data. In order to eliminate the influence of dimension on the data, this paper uses the range method to standardize the data. Then find the eigenvalues and eigenvectors of the correlation coefficient matrix. Third get the principal component expression. Finally get the measured values of each system.

3.2 Moran's I Index

In general, spatial correlation analysis is first required for spatial measurement analysis of economic phenomena. The Moran's I index is an important indicator for testing spatial autocorrelation and can reveal the degree of spatial dependence between variables. First, set the spatial weight matrix. This paper uses the finite distance weight setting method. Moran's I index

ranges from -1 to 1, and a positive value of I indicates that the variable itself has a positive correlation. A larger value indicates that the aggregated elements are similar in nature. A negative value of I indicates that the variable itself has a negative correlation, and a larger value indicates that the aggregated unit has a large difference; a value of I indicates that it is irrelevant.

3.3 Spatial measurement model

The spatial panel model fully considers the spatial correlation of data and the comprehensive properties of time and space, objectively and truly reflecting the spillover effect between variables. According to spatial econometrics, the spatial panel model includes two basic models: Spatial Lag Model (SLM) and Spatial Error Model (SEM).

Because this paper studies the spatial spillover effect of financial agglomeration on ecological efficiency, the ecological efficiency value measured above is the dependent variable, and the financial agglomeration index value is used as the explanatory variable to establish a spatial panel regression model.

4. The results analysis

4.1 Comprehensive analysis of financial agglomeration and ecological efficiency

According to the principal component analysis method, the financial agglomeration and eco-efficiency measure values of cities in 2011-2017 were obtained.

Longitudinal analysis can find that there are obvious regional differences in the level of financial agglomeration. In 2011-2017, Shanghai, Beijing, Shenzhen, Guangzhou and Hangzhou ranked the top five in the country in terms of financial agglomeration, with the average value exceeding 0.5. In terms of landscape, except for Ningbo, Chongqing, Jinan, Qingdao, Harbin, and Shijiazhuang, the level of GDP declined slightly in 2011, and the overall level of Hefei and Wenzhou declined. The level of financial agglomeration in each city basically maintained a stable growth trend during 2011-2017.

It can be found that Shanghai, Beijing, Shenzhen, and Guangzhou, which have relatively developed economies, have relatively high eco-efficiency values. From the perspective of the region as a whole, the average values of North China, East China, Central China and South China exceeded the national average, with Beijing having the highest average value of 0.775 and Wenzhou with the lowest average value of 0.561.

In summary, it can be found that the level of financial agglomeration has a certain correlation with ecological efficiency. The average value of ecological efficiency is also high in Beijing, Shanghai, Shenzhen and Guangzhou with high financial agglomeration. In Nanning, Wenzhou, Changchun, Urumqi, Harbin and Kunming, where the level of financial agglomeration is low, the average ecological efficiency is relatively low.

4.2 Moran's I Index

Based on the financial agglomeration and eco-efficiency measures of 31 financial centers, the Moran's I index is calculated by Geoda095i software.

The Moran's I statistical index of inter-city financial agglomeration and eco-efficiency in 2011-2017 is positive, and both pass the significance test. It shows that the financial agglomeration and eco-efficiency of each city are homogenous. The financial agglomeration and eco-efficiency between cities are not randomly distributed and exist independently, but there is a clear positive spatial dependence. At the same time, it also shows that the spatial agglomeration effect of financial agglomeration and eco-efficiency is obvious. The cities with higher financial agglomeration or eco-efficiency can drive the financial agglomeration or eco-efficiency of surrounding cities, and vice versa will limit the financial agglomeration and eco-efficiency of surrounding cities.

4.3 Analysis of spatial measurement model

By comparing and analyzing the SLM and SEM models, it is found that the spatial autoregressive coefficient ρ and the spatial error coefficient are both significant at 1%, which fully proves the spatial correlation of financial agglomeration. Since the Log-L value of the SEM model (62.5817) is larger than the Log-L value of the SLM model (60.7136), and the AIC and SC values of the SEM model are smaller than those of the SLM model, it is considered that the SEM model fits the spatial effect better. The influence coefficient of the explanatory financial agglomeration index on eco-efficiency in SEM is significantly positive, indicating that financial agglomeration attracts high-quality resources, optimizes resource allocation, brings positive externalities, and significantly improves eco-efficiency between cities. The estimated coefficient of the spatial error autocorrelation coefficient is 0.1085, which is statistically highly significant, indicating that there is a strong spatial spillover effect on the eco-efficiency between cities. That is to say, financial agglomeration in the region and neighboring regions will have a positive effect on local eco-efficiency.

5. Conclusions and recommendations

This paper uses the data of 31 financial center cities in China from 2011 to 2017, and uses the spatial econometric model to study the relationship between financial agglomeration and eco-efficiency, and draws the following conclusions:

From the financial agglomeration and eco-efficiency measurement values, it can be found that there are obvious regional differences in the level of financial agglomeration. At the same time, apart from individual cities, the level of financial agglomeration and the value of ecological efficiency are positively changing. In order to achieve balanced development of the financial industry, administrative barriers should be broken, exchanges and cooperation between cities and regions should be strengthened, resource flows should be promoted, resource allocation efficiency should be improved, and financial agglomeration and eco-efficiency should be promoted.

It can be seen from Moran's I index that there are obvious spatial correlations between financial agglomeration and ecological efficiency of 31 financial center cities in China, and they all show homogeneity. It shows that there is spatial agglomeration in cities with similar levels of financial agglomeration or eco-efficiency. For areas with a low degree of financial agglomeration, financial resources should be integrated according to their actual conditions, financial technology should be promoted to promote technological progress, financial resource utilization efficiency should be improved, industrial structure optimization and upgrading should be accelerated, and regional ecological efficiency should be improved.

From the results of the spatial econometric model, the eco-efficiency is not only affected by the financial agglomeration of the region, but also affected by the financial agglomeration of the neighboring regions. Financial institutions should base themselves on the special advantages of the industry and achieve the goal of improving eco-efficiency by promoting the flow of financial resources to low-carbon, environmentally-friendly emerging industries.

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