

The Impact of Financial Agglomeration on Industrial Structure Upgrading—An Empirical Analysis Based on Threshold Effect

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Abstract. Financial agglomeration is an important factor influencing the upgrading of industrial structure. This paper uses financial agglomeration as a threshold variable, and uses the panel data of 30 provinces in China from 2006 to 2016 to study the impact of financial agglomeration on industrial structure upgrading. The study found that there is not a simple linear relationship between financial agglomeration and industrial structure upgrading. Financial agglomeration has a significant single threshold effect on industrial structure upgrading. When financial agglomeration is below the threshold, financial agglomeration has a stronger role in promoting the upgrading of industrial structure; when the financial agglomeration exceeds the threshold, this promotion will be weakened.

Introduction

At present, China's demographic dividend is gradually decreasing, and resource and environmental constraints are constantly strengthening. We can no longer rely on cheap labor and resources for economic development. China's economy has shifted from a high-speed growth stage to a high-quality development stage. We must accelerate the upgrading of industrial structure to promote economic development. The upgrading of industrial structure depends on certain external resources and objective conditions, and has special needs for capital and financial structure [1]. Financial agglomeration will promote the development and continuous improvement of the financial industry, and accelerate the circulation and rational allocation of financial resources. It can meet the demand for capital and financial structure in the upgrading of industrial structure. The government has adopted a series of preferential policies such as financial subsidies and tax reductions to promote the development of financial agglomeration areas. Therefore, financial agglomeration is of great significance to the upgrading of industrial structure.

Literature Review

The foreign financial industry started early, and foreign scholars have conducted extensive research on the impact of financial agglomeration on the economy and the impact of financial agglomeration on industrial structure upgrading. Kindle Berger believes that as financial talents, institutions and other financial resources are concentrated in a certain region, the region will generate economies of scale. This makes transaction costs lower, investment and financing more convenient. These advantages will attract companies or institutions to settle in, and ultimately achieve financial agglomeration [2]. Aghion believes that the agglomeration and development of the financial industry can effectively support and promote the advancement of technology, thereby promoting the upgrading of industrial structure [3]. Through multiple regression, Binh found that if the financial agglomeration is higher, it will help the emerging technology industries with higher R&D risks to obtain funds, thus promoting the development of emerging technology industries and promoting the upgrading of industrial structure [4].

Domestic scholars have conducted further in-depth research on the basis of foreign scholars' research, trying to find out the mechanism and effect of financial agglomeration on industrial structure upgrading. Guo Bin and Zhang Xiao used the coupling coordination model to find out that China's financial agglomeration and industrial structure upgrading are highly coupled in 2010-2015, and the higher the level of economic development, the higher the level of coupling and coordination [5]. Scholar Li Pinghai used factor analysis to measure the level of financial agglomeration. Through empirical research, he found that financial agglomeration promoted regional industrial structure optimization and upgrading by broadening investment and financing channels and improving capital supply level and allocation efficiency[6]. Yang Yiwu and Fang Dachun subdivided the industrial structure indicators into two dimensions: rationalization of industrial structure and advanced industrial structure. Through the panel var model, it was found that there is a long-term stable equilibrium relationship between financial agglomeration, industrial structure rationalization and advanced industrial structure. Financial agglomeration promotes the change of industrial structure through the advanced industrial structure[7]. Scholar Yu Binbin used the spatial econometric model to find that the financial agglomeration has a significant effect on the promotion of industrial structure in the eastern and central regions, and the spatial spillover effect is significant, but the promotion effect and spatial spillover effect on the western region is not obvious. And the promotion effect and spatial spillover effect are also limited by the stage of industrial development and the size of the city [8].

Through literature review, it can be found that domestic and foreign scholars have used models of multiple regression, panel regression and spatial panel regression when studying the impact of financial agglomeration on industrial structure upgrading. Most people think that there is a simple linear relationship between financial agglomeration and industrial structure upgrading. Financial agglomeration has a positive impact on industrial structure upgrading. But the higher the level of financial agglomeration, the better? If the financial agglomeration in a certain area is too high, it will cause the financial market in the area to be crowded, and there will be excessive competition among financial institutions. Therefore, there may not be a simple linear relationship between financial agglomeration and industrial structure upgrading. This paper uses the 2006-2016 provincial panel data to establish a threshold effect model with financial agglomeration as the threshold variable. Firstly, it is necessary to test whether there is a threshold effect between financial agglomeration and industrial structure upgrading. Then we need to estimate the parameters of the threshold panel model, and finally provide targeted advice to promote the industrial structure upgrade.

Variable Selection and Model Construction

Variable Selection

Interpreted variable: Industrial Structure Upgrade Index (CYJG). Many scholars directly use The proportion of secondary and tertiary industries in GDP to indicate the upgrading of the industrial structure. Since the primary industry has not been included in the calculation index, the process of upgrading the industrial structure cannot be fully reflected. This paper draws on the research of Xu Min et al., and incorporates the primary industry into the calculation of the industrial structure upgrading index[9]. Calculation formula as follows.

$$CYJG_{jt} = \sum_{i=1}^3 y_i \times i = y_1 \times 1 + y_2 \times 2 + y_3 \times 3 \quad (1)$$

Among them, y_i indicates the proportion of i industry output value to total production value. i indicates the weight corresponding to i industry, and $CYJG_{jt}$ indicates the industrial structure upgrading index of j region t period. the value of $CYJG_{jt}$ is between 1 and 3. The closer the value is

to 3, the higher the level of industrial structure upgrade, and the closer to 1 indicates the lower the level of industrial structure upgrade.

Interpret variables and threshold variables: Financial agglomeration (FIN). The main explanatory variables and threshold variables in this paper are financial agglomeration. The indicators for measuring the degree of agglomeration include location entropy and HHI. The location entropy is simple and easy to calculate, and it can reflect the degree of industrial agglomeration very well. Therefore, the most commonly used by scholars is location entropy. Taking into account the feasibility of the data, this paper uses the financial industry output value to calculate the location quotient. The calculation method is as follows:

$$FIN_{it} = \frac{e_{it}/p_{it}}{e_t/p_t} \quad (2)$$

Among them, FIN_{it} represents the financial agglomeration of the i region in the t period, and the larger the value of FIN_{it} , the higher the financial agglomeration. e_{it} represents the financial industry's output value of the i region in the t period. p_{it} represents the regional GDP of the i region in the period t . e_t represents the financial industry's output value of the country in the t period, and p_t represents the gross national product in the t period.

Control variable selection. Human capital (Hr) draws on the practice of scholar Zhou Shaoxuan, and assigns corresponding weights according to the level of education. The literacy, elementary school, junior high school, high school, college and above education level are given the weights of 0, 6, 9, 12, and 16, respectively. Multiply the weight by the proportion of educated people at each stage, and use this number to indicate the level of human capital [10]. The higher the level of human capital, the more knowledge spillovers and innovations, thus promoting the upgrading of the industrial structure. Government support (Gov) will affect the upgrading of industrial structure. The government's support is expressed by the proportion of the provincial government's fiscal expenditure to the GDP of each province. The level of technological progress (Tech) is not well measured. The R&D expenditure intensity (R&D expenditure/local GDP) of each province is used to measure the level of technological progress. The infrastructure level (Infra) is expressed in terms of road mileage per square kilometer of each province. Foreign direct investment (FDI) will bring advanced technology and management experience to the local area, which will facilitate the upgrading of the local industrial structure. This indicator is directly expressed in logarithm of the actual use of foreign direct investment.

Model construction

The threshold of the traditional threshold model is set by the researcher, which is more subjective. This paper uses the panel threshold regression model proposed by Hansen [11]. The threshold value and threshold number of the model are generated endogenously from the sample data, which can avoid the disadvantage that the traditional threshold model is too subjective. if there is a single threshold effect, a single threshold panel model (3) is established. If there is a double threshold or even multiple threshold effects, a double threshold model (4) or a multiple threshold model is established.

$$CYJG_{it} = \mu_i + \gamma_1 FIN_{it} I (FIN_{it} \leq \varphi_1) + \gamma_2 FIN_{it} I (FIN_{it} > \varphi_1) + \beta_2 Hr_{it} + \beta_3 Gov_{it} + \beta_4 Tech_{it} + \beta_5 Infra_{it} + \beta_6 FDI_{it} + \varepsilon_{it} \quad (3)$$

$$CYJG_{it} = \mu_i + \gamma_1 FIN_{it} I (FIN_{it} \leq \varphi_1) + \gamma_2 FIN_{it} I (\varphi_1 < FIN_{it} \leq \varphi_2) + \gamma_3 FIN_{it} I (FIN_{it} > \varphi_2) + \beta_2 Hr_{it} + \beta_3 Gov_{it} + \beta_4 Tech_{it} + \beta_5 Infra_{it} + \beta_6 FDI_{it} + \varepsilon_{it} \quad (4)$$

The financial agglomeration (FIN) is the explanatory variable and the threshold variable. φ_1 and φ_2 are the thresholds to be estimated, and $I(\cdot)$ is the indicative function. μ_i represents individual differences, and ε_{it} is a random disturbance term with independent and identical distribution properties.

Data Sources

This paper selects the panel data of 30 provinces (excluding Tibet) from 2006 to 2016 in China. Since the statistical caliber of fiscal expenditure changed in 2006, the data selected in this paper began in 2006. The data of the variables are all from the China Statistical Yearbook, the provincial statistical yearbooks and the EPS database.

Empirical Analysis

Threshold Effect Test and Threshold Estimation

Since the threshold variable can be either an explanatory variable or another variable in the model, this paper chooses financial agglomeration as both the core explanatory variable and the threshold variable. Then, a single threshold test and a double threshold test are performed in sequence, and the results are shown in Table 1. In the single threshold test, the value of the F statistic is 38.67, and the P value is 0.006. It can be concluded that the single threshold effect is significant at the 1% significance level. In the double threshold test, the value of the F statistic is 14.14, and the P value is 0.466. The double threshold effect is not significant. Therefore, this paper uses a single threshold panel regression model for empirical analysis. It can be seen from Table 2 that the threshold value is 1.3816, and the 95% confidence interval of the threshold value is [1.3618, 1.3999].

Table 1. Threshold effect test

Threshold variable	Threshold	BS	F	P	10%	5%	1%
FIN	Single	500	38.67***	0.0060	28.2248	31.7390	37.5410
	Double	500	14.14	0.4660	26.2676	29.8680	38.5024

Note: Both p-value and F-value are the results of repeated sampling by the Bootstrap self-service method for 500 times; *** represents significant at the 1% level.

Table 2. Threshold estimator (level = 95)

model	Threshold	Lower	Upper
Th-1	1.3816	1.3618	1.3999

Threshold Regression Results and Analysis

Table 3. Analysis of regression results

Variable	Common panel regression model	t value	P value	Panel threshold regression model	t value	P value
Hr	0.0054	0.63	0.528	-0.0007	-0.09	0.932
Infra	0.2015***	5.98	0.000	0.1973***	6.18	0.000
FDI	-0.0055	-1.26	0.207	-0.0033	-0.80	0.425
Gov	0.2900***	4.59	0.000	0.2623***	4.38	0.000
Tech	0.0402***	3.67	0.000	0.0419***	4.05	0.000
FIN(FIN≤1.3816)	-/-	-/-	-/-	0.0952***	7.06	0.000
FIN(FIN>1.3816)	-/-	-/-	-/-	0.0492***	4.24	0.000
FIN	0.0537***	4.40	0.000	-/-	-/-	-/-
_cons	1.9875***	35.67	0.000	1.9882***	37.72	0.000
R2	0.6628			0.6279		

Note: *** represents significant at the 1% level.

In general, the fit of the normal panel regression model is 66.28%, and the fit of the panel threshold regression model is 62.79%, indicating that the fitting effect of the common panel regression model and the panel threshold regression model is not bad. Whether it is the analysis of the results of the normal panel regression or the analysis of the panel threshold regression, financial agglomeration has significantly promoted the industrial structure upgrade, and passed the 1% significance test. On the one hand, financial agglomeration is conducive to promoting the development of the financial industry and the continuous improvement of the financial structure, which is conducive to the emergence of economies of scale. Financial agglomeration provides convenience for financial institutions to collect various investment information, which is conducive to the transfer of funds from industries with low production efficiency to industries with high production efficiency, and promotes rational allocation of resources and upgrading of industrial structure. On the other hand, high-tech industries have the characteristics of large investment in R&D, and their internal funds cannot meet the needs of R&D investment and require the support of external financial funds. Financial agglomeration has facilitated the acquisition of research and development funds by high-tech industries, which is conducive to the emergence of technological innovation, thus promoting the upgrading of industrial structure. When the financial agglomeration is below the threshold, the use of the ordinary panel model will underestimate the promotion of industrial agglomeration by financial agglomeration; when the financial agglomeration is higher than the threshold, the use of ordinary panels will overestimate the promotion of industrial agglomeration by financial agglomeration. effect. Therefore, the panel threshold model is better than the normal panel model. When financial agglomeration exceeds the threshold, the role of financial agglomeration in promoting the upgrading of industrial structure is reduced. Because the high degree of financial agglomeration will not only cause the economies of scale to disappear, but also increase the prices of production factors such as land and labor within the agglomeration area, resulting in an increase in the operating costs of financial enterprises. The competition among internal financial institutions in the agglomeration areas is intensified, which is not conducive to the development of the financial industry. As a result, financial agglomeration has reduced the promotion of industrial structure upgrading.

From the perspective of each control variable, the estimates obtained by the two models are similar. The impact of human capital and foreign direct investment on the upgrading of industrial structure is not significant. It shows that China's human capital level is low, human capital allocation efficiency is not high, and the role of human capital in upgrading industrial structure has not been exerted. Infrastructure, government support, and technological advancement are all conducive to industrial restructuring, and have passed a 1% significant test. The relatively complete infrastructure is conducive to reducing the flow costs of production factors, promoting the flow of production factors between industries, and thus promoting the upgrading of industrial structure.

Government support can help guide the transformation and upgrading of traditional industries, provide taxation and policy convenience for the development of emerging industries, and thus promote the upgrading of industrial structure. Technological progress is an important factor driving the upgrading of industrial structure. Technological advancement will promote the improvement of labor productivity, promote the transfer of labor between industries, and promote the structural upgrading of the industry.

Conclusion and Suggestion

This paper takes financial agglomeration as the threshold variable, and uses the panel data of China's 30 provinces (except Tibet) from 2006 to 2016 and panel threshold model to study the impact of financial agglomeration on industrial structure upgrading. The study found that financial agglomeration has a significant role in promoting the upgrading of industrial structure, but when the financial agglomeration exceeds the threshold, this promotion will be weakened. Infrastructure, technological advancement, and government support are conducive to industrial structure upgrading. The impact of human capital and foreign direct investment on the upgrading of industrial structure is not significant.

Based on the above empirical results, the following suggestions are made: (1) Local governments should establish financial agglomeration areas in places with financial agglomeration trends, provide tax incentives and other preferential policies for industries in financial agglomeration areas, and attract financial institutions to gather in the area. Thereby promoting the upgrading of local industrial structure. However, it is also necessary to control the degree of financial agglomeration and avoid the excessive degree of financial agglomeration to weaken the promotion of industrial structure. (2) Increase government investment and improve infrastructure construction to meet the needs of industrial structure upgrading. Improve the level of independent research and development and innovation efficiency, and promote the improvement of technology. Attach importance to the training of education and talents, and promote the fair and rational allocation of educational resources. Foreign direct investment is mostly used for technological R&D and innovation in emerging industries, thereby promoting the upgrading of industrial structure.

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