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Correlation Analysis between Agglomeration Effect of Producer Service and Manufacture Labor Productivity in China

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Abstract

Agglomeration effect of producer service will affect manufacture labor productivity because of the relationship between the producer service and manufacture. Based on the review of literature, this paper investigates the influence of specialized agglomeration and diversified agglomeration to manufacture labor productivity in China. Through panel data analysis of 31 provinces in China from 2005 to 2011, it is concluded that specialized agglomeration of producer service can promote manufacture labor productivity of eastern and western area, and has a negative effect to manufacture labor productivity of middle area. On the contrary, the diversified agglomeration of producer service has a negative effect on manufacture labor productivity in China's eastern and western area and a positive effect in middle area. These conclusions make some sense to policy making of manufacturing efficiency promotion from the point of producer service.

Keywords

Producer Service Industry, Specialized Agglomeration, Diversified Agglomeration, Manufacturing Industry, Labor Productivity

1. Introduction

The rapid rising of producer service industry is one of the remarkable characters of western developed countries' economy, and is replacing manufacturing industry as the main impetus and source of innovation for economic growth gradually. In China, as the producer service industry developed, the service industry's proportion of na-

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tional economy got increase gradually and the service industry began to push forward the development of manufacturing industry in recent years.

The phenomenon of the industrial agglomeration, as a typical economic activity, was being important research content of economic, management, and economic geography etc. Most research suggests that industrial agglomeration can promote economy and increase the labor productivity. With the advent of the service economy, the service industry is separated from the manufacturing industry by form of outsourcing and becomes the main power of driving economic gain so that the service industry agglomeration effect appears. Service industry agglomeration can promote economic growth, and meanwhile, said by Markusen (1898) [1], the producer service industry is useful to cut cost and enhance efficiency by supporting specialized service. This paper starts with agglomeration effect, and analyzes the influence of specialized agglomeration and diversified agglomeration from producer service industry and to which extent the agglomeration affects the labor productivity of the manufacturing industry. Finally, this paper makes some theoretical guidance on industrial development policy of China.

2. Literature Review

2.1. The Service Industry Agglomeration

According to the view of Hoover, the industrial agglomeration can be divided into the specialized agglomeration and the diversified agglomeration with different influences on firms and industries respectively. The specialized industrial agglomeration is also called localization economies, which refers to profits derived from concentration of firms which produce the same or similar products in a particular area. Firms inner one industry gather in particular area, with imitating mutually and highly skilled workforce's transferring work, new ideas and knowledge are developed and spread quickly so that every firm gets benefits. This kind of benefit of the agglomeration is from firms of one industry. The level of specialized agglomeration is usually measured by location quotient, spatial Gini coefficient and the indexes of the regional concentration. The diversified agglomeration is also called urbanization economies, which refers to extra profits derived from the concentration of firms from different industries. Specifically, the industry diversified economy refers to an area of knowledge spillover among different industries in the external economy. Jacobs (1969) considered the agglomeration of different industries in an area is helpful to the spreading and diffusing for knowledge, the knowledge spillover gives more effect to innovation and growth of industry, meanwhile the agglomeration of different industries promotes regional competition so that productivity can be increased. One firm can get benefits from firms in several industries. Herfindahl index and EG index are usually used to evaluate the degree of the diversified agglomeration.

Based on the model proposed by Glaeser *et al*. (1992), Cainelli and Leoncini [2] examined the effect of the industrial agglomeration to the industry employment growth in Italy from 1961 to 1993. The result showed that the specialized industrial agglomeration appeared instability and diversified agglomeration can promote the local development. Dekle (2002) [3] used total factors productivity to estimate externality of agglomeration, the research indicated that there appears remarkable specialized agglomeration in financial industries, wholesale and retail industries in Japan, but lack of the diversified agglomeration. Bilent & Suedekum (2005) [4] analyzed the agglomeration of growth of employment in 1993-2001's Germany, results showed that the diversified agglomeration existed in manufacturing industries and the specialized agglomeration existed in advanced service industry. In China, numerous scholars acknowledge the positive effect that the industrial agglomeration gives to the industrial growth and labor productivity's increasing. For instance, based on economic census date in Beijing in 2004, Chen Liangwen and Yang Kaizhong [5] explained difference of labor productivity's rate in the view of the economy gathered density, and demonstrated that there exist a positive correlation between the economic density and the rate of labor productivity. Hu Xia and Wei Zuolei [6] discovered that the service industries agglomeration has an obvious promoting to the increasing of productivity of service industries, meanwhile the service industry agglomeration has a positive effect on increasing of service industries. Yuan Yijun and Song Yang [7] used panel data to analyze the localization and urbanization economy, the empirical results showed that the specialization of China's service industry agglomeration effect is significantly positive from 1996 to 2008, while the diversified agglomeration effect is significantly negative.

2.2. Relationship between the Producer Service Industry and the Manufacturing Industry

There are many theoretical analysis of the relationship between the producer service industry and the manufac-

turing industry, such as interaction theory and integration theory, the theory of supply and demand, etc., no matter what kind of theories, they all means the interrelationship between the producer service industry and the manufacturing industry.

The relationship between producer service industry and the manufacturing industry is embodied in two aspects: firstly, the development of producer service industry and the manufacturing industry have interactive features, that is, they are interdependent, interact with each other, and share common development. Many researches are relevant on it, for example, Gao Juemin and Li Xiaohui [8] investigated that the development of the producer service industry promotes the growth of the manufacturing industry, at the same time, the growth of the manufacturing industry significantly promoted the development of the producer service industry, meanwhile, the internal departments of producer service industry and the manufacturing industry both have interactive relationship of development. Secondly, in the process of the interaction between producer service industry and the manufacturing industry, the producer service industry improves the production efficiency for the manufacturing industry. Eswaran and Kotwal [9] believe that the expansion of the service department promoting the development of manufacturing industry is through two ways, one is to deep the division of the labor and rise the specialization in order to promote the manufacturing efficiency, the other one is to promote the manufacturing efficiency by reducing manufacturing intermediate costs. Subsequently, some scholars did the argumentation and reinforcement for Eswaran and Kotwal's researches. Chen Xian, Huang Jianfeng [10] further investigate the dynamic evolution of the relationship between the service and manufacturing industry from the perspective of labor division, analyze the interdependence, interaction between the producer service industry and the manufacturing industry. Feng Taiwen [11] used the panel data of 28 segments of manufacturing industries in China from 1999 to 2006 to analyze the interior theory that development of the producer service industry giving to the increasing of maufacturing efficiency, the results show that the development of the producer service industry promote the manufacturing efficiency, especially in the influence on the financial industry. Gu Naihua, Bi Doudou [12] think that in the period of transformation of economic development in our country, the development of the producer service industry can improve the competitiveness of manufacturing industry, the empirical results show that the producer service industry each grew by 1%, can improve the manufacturing efficiency by 0.022%.

2.3. The Service Industry Agglomeration and Its Efficiency

With the rise of the new economic geography, the progress of researching the industrial agglomeration has become quickly, the study of the relationship between the producer service industry and the manufacturing industry also has gone further. Now that there are interaction of the producer service industry and the manufacturing efficiency, and the development of the producer service industry can promote manufacturing efficiency, can the producer service agglomeration promote the manufacturing agglomeration and the manufacturing efficiency? In theory, the answer is true, because the service agglomeration can promote the rising of its economy and the labor productivity.

From the view that the service industry agglomeration can promote the economic growth and labor productivity in service industry, Cheng Dazhong [13] used the industry relative intensity index to analyze the relationship between the index and the service industry labor productivity, whose results show that except for realty business, there is a positive relationship between the labor productivity and the service industry in our country, which means the higher relative intensity is, the greater the labor productivity in the service industry is. Tong Xinle [14] used provincial panel data in China and three indexes which express the level of concentration of the service industry: the location quotient, concentration factors and the proportion of service in GDP to analyze the degree of the influence on the degree of the service industry agglomeration and then got a similar research result with Cheng Dazhong's, that is to say, the three indexes all have positive influence on the labor productivity in the service industry. On the other hand, we can see from the analysis about the relationship between the producer service industry and manufacturing industry that the producer service industry promotes the manufacturing industry; thereby the service industry agglomeration can promote the manufacturing efficiency as well.

Of course, some scholars researched it from the view of the producer service industry agglomeration's promoting to the increasing of the manufacturing industry agglomeration, or the manufacturing efficiency, but this kind of researches are still rarely. Zhang Yifeng and Li Meiling [15] used the location quotient and based on Chinese provincial data to indicate that the professional and technical personnel agglomeration are helpful for

advanced manufacturing industry agglomeration, meanwhile, the relationship between the producer service industry agglomeration and the advanced manufacturing industry agglomeration is a strong positive correlation. Ji Yahui etc. [16] used Herfindahl index and EG index to analyze the correlation of agglomeration between two big industries according to the data of our country's producer service industry and manufacturing industry from 2003 to 2009, the result shows that the degree of the producer service industry agglomeration has obvious relevance with the manufacturing agglomeration's. Xuan Ye [17] used cities sample's data from 2003 to 2009 and the labor productivity indicators to measure the manufacturing production efficiency, and empirically analyzed that the producer service industry agglomeration can not only enhance the regions' manufacturing efficiency, but also rise around areas' manufacturing efficiency through the spatial spillover effect.

So far, we collect the literature review and draw the chart (**Figure 1**).

Figure 1 shows that diversified agglomeration and specialized agglomeration of the service industry promote the service industry economy and the increasing of the labor productivity, meanwhile the development of the producer service industry can promote the manufacturing efficiency through deepening of the labor division and the specialization and reducing the intermediate service cost of manufacture. According to the literature review, recent researches focus on two adjacent connecting parts, and no scholars researched the relationship between the producer service industry agglomeration and the manufacturing efficiency, so this paper will give the empirical analysis in this perspective.

3. Method

3.1. The Basic Model

No matter specialized agglomeration or diversified agglomeration, the economic effect created by the industrial agglomeration should be seen as economic externality. Hence, if agglomeration factor is expressed by $g(\cdot)$ and producing function is expressed by $f(\cdot)$, the economic growth effect should be:

$$Y = g(\cdot) f(\cdot) \tag{1}$$

The Cobb-Douglas production function with two factors is:

$$Y = g(\cdot) f(K, L) \tag{2}$$

Y means total output of the manufacturing industry, agglomeration factor here also represent the technological level as concluded in literature review. K stands for capital stock, L is input of labor. Issuing no changes in return to scale, both sides of equation are divided by L:

$$\frac{Y}{L} = g(\cdot) f\left(\frac{K}{L}\right) \tag{3}$$

So, we get the labor productivity here. Assuming by the literature review that the increasing of the technological level is derived by the producer service agglomeration, is the producer service industry agglomeration indexes of specialized (S) and diversified (D) respectively. Add these two indexes to agglomeration factors and log both sides of (3), we can get two agglomeration models of the manufacturing industry productivity.

$$\ln\left(\frac{Y}{L}\right)_{i,t} = \beta_0 + \beta_1 \ln D_{i,t} + \beta_2 \ln\left(\frac{K}{L}\right)_{i,t} + \beta_3 size_{i,t} + \beta_4 fdi_{i,t} + u_{i,t} \tag{4}$$

$$\ln\left(\frac{Y}{L}\right)_{i,t} = \beta_0 + \beta_1 \ln S_{i,t} + \beta_2 \ln\left(\frac{K}{L}\right)_{i,t} + \beta_3 size_{i,t} + \beta_4 fdi_{i,t} + u_{i,t} \tag{5}$$

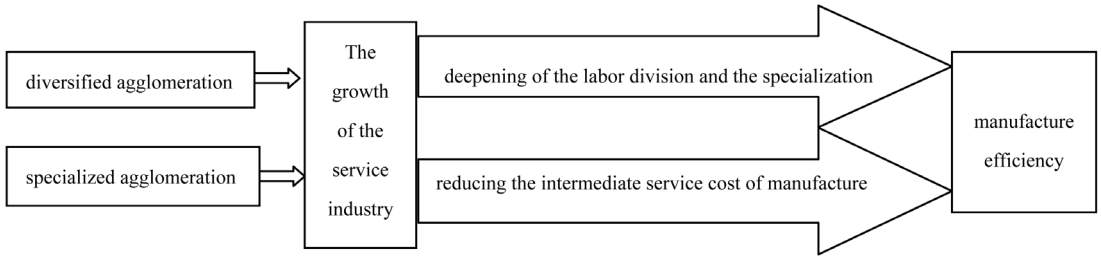

Figure 1. The relationship between the producer service industry agglomeration and the manufacturing efficiency.

We explain the indexes in the model as follows:

1) The specialized agglomeration index in producer service industry. This paper chooses the location quotient index to evaluate the specialized agglomeration level in the area I and use $s_{i,t}$ to express it. It refers to the specialized agglomeration level in area i in the year t:

$$S_{i,t} = \frac{v_{ij}}{v_j} \Big/ \frac{v_{ic}}{v_c} \tag{6}$$

v_{ij} and v_{ic} express respectively that in the year t, the increment of the producer service industry j in area i and in whole country; v_j and v_c refer to in the year t, the increment of the service industry j in area i and the increment of the service industry j in China respectively. If the regression coefficient of this index is positive, it means the specialized agglomeration level in producer service industry has a positive effect on increasing labor productivity.

2) The diversified agglomeration index in producer service industry. The diversified agglomeration level in producer service industry is evaluated by reciprocal of Herfindal centralized index. In other words, the diversity of external environment for the industry is defined as the increment of all other industries of a share of the reciprocal of the sum of the squares except this industry.

$$D_{i,j} = \frac{1}{\sum_{j' \neq j}^{M} \left[\frac{Y_{i,j'}}{Y_i - Y_{i,j}} \right]^2} \tag{7}$$

In the Equation (7), M stands for the total number of the producer service industry, Y_i stands for the increment of tertiary industry, $Y_{i,j'}$ is the increment of the producer service industry except for j. This index reflects the diverse environment that the producer service industry has. If the index is positive, it means the diversified agglomeration level in the producer service industry has a positive effect on increasing labor productivity.

3) $\frac{K}{L}$ stands for the labor capital in the manufacturing industry. K is the capital stock of area i in year t, which is expressed by the total non-current assets in the whole society; L is the population of employment of area i in year t.

4) Size. Considering the influence that the development scale of the service industry has influence on the labor productivity, the size is added to the model to show the service industry development scale which is expressed by the employment population in service industry.

5) FDI. Considering the influence that the foreign direct investment has on the labor productivity of the manufacturing industry, FDI is added to the model as the foreign direct investment scale. It's expressed by the foreign direct investment in the whole non-current assets in the whole society.

3.2. Data Source

This paper uses the panel data from 31 provinces from 2005 to 2011 in China. According to the definition of the producer service industry by the National Statistic Bureau in 2002, and the unity of the data in the statistical yearbook, this paper chooses 5 industries in the producer service industry: scientific research, technical services and geological prospecting industry, transportation, warehousing and postal service, finance, insurance, real estate industry, information transmission, computer services and software. For a further analysis, we divide the country into three parts[1]: east, west and middle. All data is from Chinese City Statistical Yearbook, Chinese Statistical Yearbook and Chinese Industrial Economic Statistical Yearbook.

4. Results

4.1. The Specialized Agglomeration of the Producer Service Industry

The paper uses Hausman test in the software eviews6 to do the pattern recognition, then confirm whether to use

[1]Eastern area includes 11 provinces: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan; Middle area includes 8 provinces: Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan; Western area includes 12 provinces: Neimenggu, Guanxi, Chongqing, Sichuan, Guizhou, Yunnan, Xizang ,Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang.

fixed effect model or random effect model. Result shows that all parts should establish fixed effect model.

After the recognition for panel data, further to determine concrete forms of the model. There are three forms: 1) the variable coefficient panel data model; 2) the variable intercept panel data model; 3) the constant coefficient panel data model. Based on covariance matrix tests, it's easy to construct F statistics used by hypothesis testing, and to distinguish by the result of statistics F. **Table 1** is the result of covariance matrix tests.

It's showed by **Table 1** that the panel data of east, west and mid should all establish variable intercept panel data models, and data for nation should establish variable coefficient panel data model. For comparative purposes, the variable coefficient panel data model of China is showed in **Table 2**.

The regression result in **Table 2** shows that the labor capital, the specialized agglomeration of the producer service industry, the service industry scale and the foreign direct investment all have positive influence on the labor productivity of the manufacturing industry. The influence coefficient of the labor capital is 0.516766.the diversified agglomeration of the producer service industry has positive influence on the labor productivity rate and the coefficient is 0.346878. The development scale of the service industry's influence on it is also positive with a 0.328650 coefficient. The coefficient of direct foreign investment is 0.074851. Results illustrate the development scale of the service industry and the specialized agglomeration of the producer service industry can both promote the labor productivity in the manufacturing industry.

According to the **Table 3**, further analysis can be done:

1) In terms of the agglomeration index on the specialization of the producer service industry, the producer service industry agglomeration level to the east and west has positive impact on the manufacturing industry labor productivity, the elastic coefficient of the western area is 0.350455, which is higher than that in eastern area (0.109518). This shows that the same degree of the specialization agglomeration level of the producer service industry has greater impact on improving the western manufacturing industry labor productivity. But for the central region, the impact is significantly negative, whose elastic coefficient is −0.700984.

2) The capital input in each area is the main reason for improving the manufacturing industry labor productivity. It can be seen through the coefficient of regression that the average labor capital in the three large areas has positive impact on the labor productivity, at the same time, the coefficient of the average labor capital regression of these three areas basically higher than the other variables', this shows that the elastic coefficient of the average labor capital is the biggest and has the biggest impact on the manufacturing labor productivity. In terms

Table 1. Covariance matrix tests to the specialized agglomeration.

regions	S1	S2	S3	F2	F3	Conclusions
China	0.25346	2.64927	11.52231	1.95946	7.67925	Variable coefficient model
The east	0.09884	0.76223	3.68458	1.49179	6.70836	Variable intercept model
The central	0.04195	0.26568	2.43541	1.24853	11.12123	Variable intercept model
The west	0.11373	0.84357	2.55789	1.42157	3.96557	Variable intercept model

Table 2. The regression analysis of the specialized agglomeration.

Variables	Regression coefficient	Standard error	T	P
C	−0.140483	0.505298	−0.278019	0.7813
Ln(k/L)	0.516766	0.026643	19.39609	0.0000
lns	0.346878	0.212666	1.631094	0.0230
lnsize	0.328650	0.084641	3.882858	0.0001
lnfdi	0.074851	0.032629	2.293978	0.1047
	R^2	0.931991		
	Adjusted R^2	0.919166		
	Prob (F-statistic)	0.000000		

Table 3. Regression analysis of the specialized agglomeration in three areas.

Variables	Regression coefficient	Standard error	T	P
C1	−2.163124	0.737497	−2.933060	0.2671
C2	−5.406108	1.228248	−4.401481	0.0001
C3	0.571645	0.691363	0.826837	0.4115
Ln(k/L)1	0.312746	0.046014	6.796792	0.0000
Ln(k/L)2	0.373787	0.039509	9.460913	0.0000
Ln(k/L)3	0.690247	0.038287	18.02809	0.0000
Lns1	0.109518	0.301417	0.363343	0.0378
Lns2	−0.700984	0.372031	−1.884205	0.0563
Lns3	0.350455	0.312929	1.119917	0.0047
Lnsize1	0.496580	0.123027	4.036354	0.0002
Lnsize2	1.123247	0.193852	5.794365	0.0000
Lnsize3	0.258578	0.121809	2.122809	0.0176
Lnfdi1	0.286502	0.064776	4.422964	0.0000
Lnfdi2	0.118122	0.043675	2.704579	0.0098
Lnfdi3	−0.060370	0.043292	−1.394485	0.1681

of the three internal large areas, the western elastic coefficient is the highest at 0.690247, the second highest is the middle area (0.373787), while the eastern elastic coefficient is the lowest (0.312746).

3) The employment scale of the service industry in these areas has positive impact on the labor productivity in manufacturing industry. Among them, the employment scale in the middle area has the greatest impact, the elastic coefficient is 1.123247, the east has the second greatest impact and the west has the lowest. This further illustrates that the development of the service industry plays a positive role on the manufacturing industry efficiency.

4) FDI is also an important reason for the improvement of the manufacturing labor productivity. As the results show that the FDI elastic coefficient in the east is the highest, which has the greatest impact on the manufacturing labor productivity, while the middle has the second greatest impact and the west has the lowest.

4.2. The Diversified Agglomeration of the Producer Service Industry

Similarly, we use Hausman test in software eviews6 to do the pattern recognition for panel data in order to determine whether to use the fixed effect model or the random effect model. Results show that all 3 parts should establish fixed effect models. And after the recognition for panel data, further determining concrete forms of the model. The method of the test is the same with the specialized agglomeration, which is showed in **Table 4**.

We can see from **Table 4** that both analysis of east and west should establish variable intercept panel models while national analysis should use variable coefficient panel model and middle area should establish constant coefficient panel model. **Table 5** shows the result of variable intercept panel model of the whole.

In **Table 5**, labor capital in manufacturing industry, scale of employment in service industry and foreign direct investment all have positive influence on labor productivity of manufacturing. Meanwhile, the elastic coefficient of manufacturing labor productivity to these three element are 0.526680, 0.303259 and 0.080507 respectively. These coefficients are similar with those of specialized agglomeration, this means there is no contradiction. On the other hand, the general influence that diversified agglomeration of producer service has on labor productivity in manufacturing is negative, the elastic coefficient is −0.104158. In other words, in the view of whole nation, diversified agglomeration of producer service industry can't improve efficiency of manufacturing and may limit the increasing of labor productivity in the manufacturing industry.

According to the **Table 6**, further analysis can be done:

Table 4. The covariance matrix test for the diversified agglomeration.

Regions	S1	S2	S3	F2	F3	Conclusions
China	0.24432	2.67645	11.63396	2.062182	8.047626	Variable coefficient model
The east	0.11198	0.74967	3.68426	1.264505	5.901351	Variable intercept model
The central	0.02545	0.27442	0.22994	2.276571	1.554286	Constant coefficient model
The west	0.10823	0.8668	2.54523	1.531852	4.128395	Variable intercept model

Table 5. Regression analysis of the diversified agglomeration.

Variables	Regression coefficient	Standard error	T	P
C	0.225221	0.605879	0.371726	0.7105
Ln(k/L)	0.526680	0.026153	20.13815	0.0000
LnD	−0.104158	0.110057	−0.946395	0.0142
Lnsize	0.303259	0.084748	3.578373	0.0004
Lnfdi	0.080507	0.032511	2.476292	0.0345
	R^2	0.931308		
	Adjusted R^2	0.918355		
	Prob (F-statistic)	0.000000		

Table 6. Regression analysis of the diversified agglomeration in three areas.

Variables	Regression coefficient	Standard error	T	P
C1	−1.435091	0.984772	−1.457282	0.1501
C2	-	-	-	-
C3	0.738550	0.787321	0.938054	0.3519
Ln(k/L)1	0.567879	0.068936	8.237823	0.0000
Ln(k/L)2	0.373787	0.039509	9.460913	0.0000
Ln(k/L)3	0.703954	0.036720	19.17074	0.0000
LnD1	−0.186487	0.166674	−1.118867	0.0075
LnD2	0.469256	0.179976	2.607332	0.0119
LnD3	−0.010512	0.172880	−0.060806	0.0636
Lnsize1	0.441180	0.130316	3.385468	0.0012
Lnsize2	0.316231	0.077925	4.058131	0.0002
Lnsize3	0.227543	0.120488	1.888510	0.0517
Lnfdi1	0.296709	0.062119	4.776469	0.0000
Lnfdi2	−0.252849	0.079612	−3.176030	0.0025
Lnfdi3	−0.057570	0.044280	−1.300131	0.1984

1) The same as the specialization analysis, the average labor capital has positive impact on the labor productivity in the manufacturing industry of each area, and it is also the main factor which affects the labor productivity in manufacturing. The elastic coefficient of the western area is the highest, at 0.703954, the elastic coefficient of the east is the second highest and the middle is the lowest.

2) Except for the middle area, the diversified agglomeration of the producer service industry the eastern and western has significantly negative impact on manufacturing labor productivity, especially in the eastern area, whose elastic coefficient is −0.186487.

3) The employment scale of the service industry in three areas has positive impact on the labor productivity in manufacturing industry. It is the same as the specialized agglomeration analysis.

4) The FDI of the east and the west has negative impact on the labor productivity of the manufacturing industry, but the elastic coefficient of FDI is positive in the eastern area, which means that the impact of eastern FDI on manufacturing labor productivity is significantly positive.

5. Conclusions

This paper analyzes the impact of the agglomeration effect of producer services on labor productivity in the manufacturing sector. From the regression results, eastern, central and western regions, even the whole nation, have a big difference, but there is still some regularity to obey. 1) The specialized agglomeration effect of producer services has a significant positive effect on manufacturing labor productivity of the whole country as well as eastern and western area, while the diversified agglomeration effect has a negative effect on these regions. On the contrary, to the central area, the specialized agglomeration effect of producer services has negative impact significantly on the manufacturing labor productivity, while the diversified agglomeration effect has obvious positive impact. 2) Average labor capital, employment scale of service industry and the specialized agglomeration effect of producer service have an undeniable positive effect on manufacturing labor productivity, and the average labor capital is the main reason of the improvement of the manufacturing labor productivity. 3) For both the country and the region, development scale and degree of service industry have positive effects on manufacturing labor productivity. 4) FDI has different effects on different regions concerning about the manufacturing labor productivity.

So, this paper puts forward some suggestions to improve the labor productivity in manufacturing industry from the perspective of the development of service industry. First of all, the service industry especially the producer service industry can promote manufacturing industry efficiency from many perspectives, and thus the development of Chinese service industry should be promoted. The growth of service industry mainly comes from the growth of producer service industry; therefore, we should support the development of the producer service industry, expand the development scale, and improve the proportion of the service industry especially the proportion of the producer service industry in Chinese industry. Secondly, from the perspective of the producer service agglomeration, we should promote specialized agglomeration in China's eastern and western areas, and enhance the professional level of the productive service industry. For example, the development of western regions is relatively backward, so it is vital to increase the specialized agglomeration of the producer service industry, such as strengthening the development of transport logistics, and improving the manufacturing efficiency gradually from the point to the whole; the developed eastern parts have a diversified characteristic on the development of the producer service industry, so it's important to promote the producer service industry to join the more specialized international competition; the central regions are geographically between east and west, and the central development of the service sectors is also between east and west. Considering the conclusions from the regression, if the central regions strengthen the diversification of the producer service industry, it can improve the manufacturing productivity; therefore, the central regions should be promoted through various measures to enhance the diversification of the producer service industry.

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