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The Impact of Manufacturing Agglomeration on Regional Innovation Capabilities

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Abstract

Supply-side reform is the key direction of national development, and manufacturing is the key to supply-side reform. After reviewing relevant studies, using provincial panel data from 2005 to 2016, we empirically analyze the impact of manufacturing agglomeration on regional innovation capabilities. The results show that manufacturing agglomeration has a significant positive effect on regional innovation capabilities. From the perspective of different regions, the manufacturing agglomeration in the eastern region has a significant positive correlation with the regional innovation capability; the manufacturing agglomeration in the central region has a positive effect on the improvement of the regional innovation capability; The effect of innovation ability is not significant, and there is a trend of negative interaction. Finally, on this basis, corresponding policy recommendations are put forward.

Keywords

Agglomeration; Industrial agglomeration; Regional innovation capability.

1. INTRODUCTION

In recent years, China's economy has slowed down from its long-term high-speed growth and entered a new period of development. At the same time, the state has begun to dynamically adjust the industrial structure and vigorously encourage regional innovation. Manufacturing plays a pivotal role in the national economy, is one of the driving forces for the sustainable and healthy development of the economy, and is also the core of promoting supply -side reform . In order to accelerate the pace of building a manufacturing powerhouse, innovation is an unavoidable issue. Innovation is an important source of development momentum. The innovation and development strategy is the top priority, and a new generation of technological revolution has already begun. From the perspective of the development level of regional innovation, today's various innovation entities have broken through the cooperation of traditional enterprises based on sharing infrastructure and saving costs, and they pay more attention to the sharing and spillover of technology and knowledge. Industrial agglomeration can effectively promote regional economic development. At the same time, it can improve the innovation capability of the entire region, accelerate the dissemination of innovative technologies, and form knowledge spillovers, thereby helping other enterprises in the cluster gain competitive advantages. Innovation is inseparable from industry, so this paper will study the impact of manufacturing on regional innovation capabilities based on China's provincial panel data from 2005 to 2016.

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2. A REVIEW OF RELATED RESEARCH

2.1. Agglomeration

Agglomeration refers to the spatial concentration of population, enterprises, and industries. When the same industry develops in a certain area, and various elements accumulate and converge in this area, industrial agglomeration will be formed. Marshall was the first to notice the relationship between industrial agglomeration and technology spillovers. He believed that the phenomenon of industrial agglomeration was mainly rooted in externalities. Externalities mainly come from three aspects, namely labor sharing, input of intermediate products and technology spillovers. Marshall believes that industrial agglomeration and a specific area are conducive to the rapid diffusion of new ideas, new technologies and new knowledge in a certain range of geographical spaces, and further lead to more innovations through the collision and stimulation of ideas. Then, in the 19th century, Weber put forward the theory of location agglomeration to study the impact of transportation costs on industrial layout, and then the impact of labor costs on industrial agglomeration. Schumpeter's main contribution is to put forward the theory of innovative industrial agglomeration, the core of which is that technological innovation and industrial agglomeration complement each other. Edgar Hoover's perspective focused on the scale of industrial agglomeration and put forward the theory of the optimal scale of industrial agglomeration. He believed that too many or too few enterprises agglomerated in a region could not achieve the best results.

Chinese scholars have also done a lot of research on industrial agglomeration, mainly focusing on the measurement of the level of industrial agglomeration, the relationship between industrial agglomeration and other factors, the status quo of industrial agglomeration in my country, and the causes of industrial agglomeration. Gai Wenqi and Zhu Huasheng (2001) believe that the spatial agglomeration of industries enables member enterprises in the region to obtain external economy, thereby reducing transaction costs, increasing regional innovation capabilities, and ultimately improving regional competitiveness. Fan Jianyong (2006) studied the relationship between industrial agglomeration and labor disparity rates between regions , and concluded that the driving force of industrial agglomeration was the increasing returns to scale of non-agricultural industries. Su Xuechuan (2004) believes that industrial clusters have scale effects and external effects, which are conducive to improving the specialization level of industries, further promoting the process of urbanization, and improving urban competitiveness.

Wang Zilong, Tan Qingmei, and Xu Xiaodi (2005) measured the agglomeration level of some manufacturing industries in China. Generally speaking, the agglomeration level of the manufacturing industry has shown a trend of continuous improvement. There is still a big gap with the eastern coastal areas. Pan Wenqing and Liu Qing (2012) used the HHI of China's regional industrial agglomeration index from 2001 to 2007 to analyze, and the results show that the regional manufacturing industry with strong economic development has a high degree of industrial agglomeration and a slowing growth rate, while the economy is relatively weak. The degree of manufacturing agglomeration in developed provinces is increasing. Xie Ziyuan and Zhang Haibo (2014) used relevant data from 1999 to 2011 to study the mediating effect of transaction cost, manufacturing cost, competition intensity and technological innovation between industrial agglomeration and the international competitive relationship of manufacturing industry. Agglomeration has a significant positive effect on the international competitiveness of manufacturing, but there are structural differences in this effect.

2.2. Regional Innovation Capability

Regional innovation capability refers to the ability of various innovation institutions to transform abstract new knowledge into concrete products, processes or services through

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interaction, which is manifested as a contribution to the regional social and economic system. Chinese scholars' research on regional innovation capability mainly focuses on the evaluation system, analytical framework and how to promote the improvement of regional innovation capability. Talking about regional innovation ability, the feeling on the face is empty, so it should be transformed into quantifiable indicators when evaluating regional innovation ability. How to select these indicators is very important to evaluate the regional innovation ability.

In the research on the evaluation system of regional innovation capability, Luo Shougui and Zhen Feng(2000) established a system including regional comprehensive strength, educational resources and potential, scientific and technological A quantifiable indicator system for resources and potential, enterprise innovation strength, information conditions, and regional policy and management level. The main contribution of Hu Zhijian and Liu Xielin (2002) is to clarify the definition and composition of regional innovation capabilities. They believe that knowledge creation, knowledge flow and other capabilities belong to regional innovation capabilities. In addition, they also believe that due to the different location conditions of each region and the influence of national policies, the distribution of regional innovation capabilities in various regions of China is uneven. Zhu Haijiu (2004) constructed a set of three-level index evaluation with network innovation ability, enterprise innovation ability and innovation output as the first-level indicators based on the evaluation objectives, methods and data availability and the robustness of indicators. system.

Wei Shouhua , Wu Guisheng, and Lv Xinlei (2010) used provincial panel data from 1998 to 2007 to test the determinants of regional innovation capability, and concluded that regional innovation capability is determined by the scale of innovation and innovation efficiency. At the same time, it is also concluded that the innovation scale and efficiency of the central and western regions lag significantly behind the eastern regions, resulting in a huge difference in innovation capabilities between the eastern and central and western regions. Gao Yuejiao and Wu Hecheng (2015) focused on analyzing the influence and degree of innovation subjects and the interaction between innovation subjects on regional innovation capability, and found that under the premise of measuring regional innovation capability by patent indicators, each innovation subject has significant influence on regional innovation capability. The positive role of regional innovation depends on the interaction and cooperation between the government and various innovation entities. Jin Qiaohua and Yan Taihua(2017)studied the relationship between international technology spillovers and regional innovation capabilities, and analyzed that the level of intellectual property protection showed significant threshold characteristics. When the level of regional intellectual property protection exceeded the threshold, foreign trade was significantly promoted. improved regional innovation capabilities. We can find that for regional innovation capability, the research perspective has shifted from the index evaluation system to the relationship between various economic factors and regional innovation capability .

2.3. Research on Manufacturing Agglomeration and Regional Innovation Capability

Most studies have found that manufacturing agglomeration has a significant promoting effect on the improvement of regional innovation capabilities, but some scholars have found that resource-dependent industrial agglomeration has an inhibitory effect on regional innovation. Liu Jun, Li Lianshui, Wang Zhong (2010) used provincial panel data from 1997 to 2007 to study the impact of industrial agglomeration on China's innovation capability. From the perspective of manufacturing subdivision, the impact of industrial agglomeration on regional innovation capacity varies among industries. Most high-tech industry agglomeration and traditional industry agglomeration promote regional innovation, while resource-dependent industrial agglomeration has an obvious inhibitory effect on regional innovation. . This inhibitory effect is mainly due to the excessive dependence on resources and the high investment in resource-

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based industries, which inhibit the investment in human capital and technological innovation to a certain extent. Zhang Cui (2012) analyzed the impact of China's manufacturing regional agglomeration on technological innovation by using a negative binomial regression model from a spatial perspective, and concluded that manufacturing agglomeration has a very significant role in promoting regional innovation capabilities through maximum likelihood estimation. .

The impact of manufacturing agglomeration on regional innovation capability also has obvious regional differences, market differences and distance differences. Du Shuang,Feng Jing,and Du Chuanzhong (2018) compared the manufacturing industries in the two economic circles of Beijing-Tianjin-Hebei and the Yangtze River Delta. However, there are significant differences in the path of action. Zhao Tingting and Xu Mengbo (2020) used provincial panel data from 2001 to 2016 as samples to test the impact of industrial agglomeration on regional innovation and its externality mechanism based on GMM empirical evidence, and believed that industrial agglomeration can significantly promote regional innovation. Innovation, but the improvement effect of industrial agglomeration on regional innovation in the eastern region is significantly higher than that in the central and western regions. The higher the degree of industrial agglomeration, the stronger the ability to improve innovation.

3. DEVELOPMENT STATUS OF CHINESE MANUFACTURING INDUSTRY

This section analyzes the status quo of manufacturing agglomeration from the perspective of location entropy. In terms of reflecting the degree of specialization of a department, location entropy has its advantages. It not only measures the distribution of a certain element in the regional space in the form of quantitative indicators, but also intuitively reveals the status of a region in a larger region. and influence. In empirical research, location entropy is used to analyze the situation of important professional departments in the region. In addition, from the index itself, the calculation method of location entropy is relatively simple, and the results are more intuitive and clear, so it is widely used. This paper measures the location entropy based on the number of manufacturing employment in each province and city.

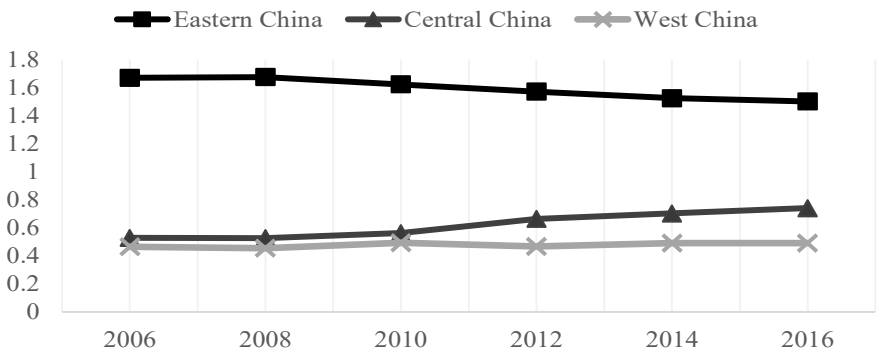

Figure 1. Manufacturing location entropy in various regions of China

From Figure 1 that the manufacturing agglomeration in the eastern and western regions decreases in the time dimension, while the manufacturing agglomeration in the central region increases in the time dimension. The manufacturing level in the eastern region is the highest, and the average location entropy from 2006 to 2016 is above 1.5 , but the downward trend shows that the manufacturing industry has shifted from the east to the central and western regions in China; the manufacturing industry in the central region is concentrated After 2010 , there was an upward trend. From 2006 to 2016 , the average location entropy was 0.62 ,

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indicating that there is still much room for improvement in the development of manufacturing in the central region; the manufacturing industry in the western region was concentrated in 2010 . After 2016, there was a slight downward trend. From 2006 to 2016 , the average location entropy was 0.48. The manufacturing layout of the western region needs to be further improved . All in all, the agglomeration level of my country's manufacturing industry presents a situation of eastern>central>western, which also shows the objective fact that the development of China's manufacturing industry is unbalanced.

The top five provinces in China's manufacturing agglomeration level are Jiangsu, Guangdong, Shanghai, Zhejiang, and Tianjin, all of which are from the eastern region of China. The bottom three provinces and cities in terms of manufacturing agglomeration are Hainan, Yunnan and Tibet. The tourism industry in Hainan is developed, and the manufacturing industry is less developed; Yunnan and Tibet are located in the western region of my country, and the development level of the manufacturing industry is relatively low. If the value of location entropy exceeds 1, it means that the manufacturing industry in this region is in a dominant position nationwide. There are eight provinces with a value of location entropy exceeding 1, namely Tianjin, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong and Guangdong, indicating that these regions have a relatively high level of manufacturing specialization. At the same time, these eight provinces are all located in the eastern region of my country. It can be said that China's manufacturing lifeline is firmly locked in the eastern region, which further illustrates the unbalanced development of the manufacturing industry in the eastern, central and western regions of my country.

4. ECONOMETRIC STRATEGY

The above theoretical analysis and data description show that there may be a certain positive promoting relationship between manufacturing agglomeration and regional innovation capability. In order to further verify the conclusion, this section will use the panel data of 30 provinces and cities and establish an econometric model for analysis.

4.1. Setting of the Model

Referring to the existing literature, this paper uses the production function of Cobb Douglas as the basic model, and its general form is as follows

$$Y = \lambda A K^{\alpha} L^{\beta} \tag{1}$$

Among them, Y represents output, K represents capital input, L represents labor input, A represents production technology factor, α represents the elasticity coefficient of capital input to output, β represents the elasticity coefficient of labor input to output, which λ is a constant.

This paper uses this kind of thinking, regards regional innovation ability as economic output, the agglomeration degree of manufacturing industry as regional input, and adds other relevant variables to establish an econometric model. In terms of removing the effect of heteroskedasticity, the variables will be logarithmic. The specific settings are as follows:

$$\ln inn_{it} = cons + b_1 \ln maggl_{it} + b_2 \ln pgdp_{it} + b_3 \ln gov_{it} + b_4 \ln urb_{it} + b_5 \ln open_{it} + u_i + \varepsilon_{it} \tag{2}$$

In formula (2), i represents the province or municipality, i= 1,2⋯30 ,t represents the year, t= 2005,2006 ⋯ 2016.Among them maggl is the agglomeration degree of manufacturing industry,pgdp is the per capita GDP of a certain region, gov is the degree of government

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intervention in the local market, urb is the level of urbanization, open is the degree of openness of the region, μ_i is the fixed effect of individuals, and ε_{it} is the disturbance term.

4.2. Description of Variables and Data Sources

4.2.1 Explained variable

Reviewing and referring to previous studies, we found that the indicator used by many scholars to measure regional innovation capability is mainly the number of patent applications granted. Patent-related data is relatively complete, highly available, and closely related to regional innovation capabilities, so this indicator is often used to measure regional innovation capabilities.

4.2.2 Core explanatory variables

At present, the main indicators used to measure industrial agglomeration include industry concentration, location entropy, spatial Gini coefficient, regional agglomeration index, Herfindahl- Hirschman index, etc. This article will use location entropy as an indicator to measure the manufacturing of a certain area. industry concentration. Based on the availability of data, we use the manufacturing population and total employment in each province to calculate the location entropy. The formula for location entropy is as follows:

$$maggl = (q_{im}/q_i)/(n_m/n) \tag{3}$$

Among them, it q_{im} represents the i number of employment in the province's manufacturing industry, which q_i represents the total number of employment in the region; it n_m represents the number of manufacturing employment in the country, which n represents the total number of employment in the country. If $maggl$ it is greater than 1, it means that $i$the manufacturing industry in the province has formed a certain concentration and has advantages nationwide; if $maggl$ it is less than 1, it means that i the level of specialization of the manufacturing industry in the province is not high, and it is not concentrated in the region and is no advantages in the country.

4.2.3. Control variables

In addition to the core variables, the regional economic development level, urbanization level, and government intervention will all have an impact on the regional innovation capability. Therefore, in order to ensure the perfection of the model, the above control variables are added to the measurement model.

For the level of regional economic development, this paper uses per capita GDP ($pgdp$) to represent. Urbanization refers to the process in which a large number of rural population turn to urban population and engage in non-agricultural production activities. Therefore, this paper selects the ratio of urban population to total population (urb) as a proxy variable for the level of regional urbanization. Both government behavior and the "invisible hand" of the market play a pivotal role in the process of economic development. This paper uses the ratio of fiscal expenditure to GDP to represent the degree of government intervention (gov), and the higher the ratio, the greater the degree of government intervention. In addition, the dependence on foreign trade will also have an impact on the regional innovation capacity, which is expressed in this paper as the proportion of the total import and export of domestic destinations and sources of goods to GDP.

2005 to 2016 of 30 provinces except Tibet for analysis. The data comes from the "China Statistical Yearbook", "China Labor Statistics Yearbook", "China Industrial Statistical Yearbook" and statistical yearbooks of various provinces. Partially missing data were filled by interpolation.

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Table 1. Descriptive statistics

variable	Observations	average	standard error	minimum	maximum value
pat	360	26,828	46,242	79	269,944
maggl	360	1.031	0.908	0.0642	4.795
pgdp	360	36,826	22,919	5,052	118,198
gov	360	0.214	0.0941	0.0798	0.627
urb	360	0.519	0.137	0.268	0.896
open	360	0.313	0.351	0.0142	1.58

5. RESULTS AND DISCUSSION

5.1. Overall Regression Results

According to the results of the Hausman test, fixed effects should be selected. Therefore, the parameter results of the fixed effect model are mainly analyzed here, and the regression results of the ordinary OLS model are used as a reference. The variables in Table 2 all represent logarithms $\ln maggl$ based on the original variables, such as maggl_1.

Table 2. Regression results of the impact of manufacturing agglomeration on regional innovation capabilities

variable name	(1) OLS	(2) OLS(FE)
maggl_1	0.352***	0.392***
	(5.70)	(22.91)
pgdp_1	2.314***	-0.286*
	(17.19)	(-1.81)
gov_1	-1.384***	-2.151***
	(-8.78)	(-35.93)
urb_1	-2.514***	0.491***
	(-7.53)	(4.32)
open_1	0.073	0.309***
	(0.90)	(9.80)
Constant	-18.536***	9.539***
	(-11.18)	(5.77)
Observations	360	360
R-squared	0.700	0.739
Number of year		12
r2_a		0.735
F		12487

OLS regression in parentheses ; *** means p<0.01, ** means p<0.05, * means p<0.1

In the two regression results, although the coefficients of manufacturing agglomeration are different, they are all significantly positive at the 1% significance level, indicating that the improvement of manufacturing agglomeration will promote the improvement of regional innovation capabilities. This is consistent with the theoretical analysis and data description we did earlier. In the fixed effect model , the elasticity coefficient of the number of patent applications granted to the manufacturing agglomeration is 0.392, and its economic significance is that if the manufacturing agglomeration increases by 1% , the number of granted patent applications will increase by 0.392% .

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The degree of government intervention is significantly negative in the two regression results, indicating that the higher the degree of government intervention, the more it will inhibit the improvement of regional innovation capabilities. The elasticity coefficient of government intervention to manufacturing agglomeration is -2.15, indicating that if the ratio of fiscal expenditure to GDP increases by 1%, the number of granted patent applications will decrease by 2.15% . For the openness of the region, it is significantly positive in the fixed effect model, indicating that the increase of the region's foreign trade dependence will promote the improvement of the regional innovation ability.

The coefficients of per capita GDP and urbanization have opposite signs in the two regression results. The coefficient of per capita GDP in the fixed effect model is significantly negative at the 1% level, which may indicate that the regional economic development level is hindered in the process of promoting technological progress. It may also be because the per capita GDP is affected by some factors, but not taken into account in this paper,which leads to the situation that the regression results are inconsistent with the expected results. The coefficient of urbanization level is significantly positive in the fixed effect model, indicating that the increase of urbanization level is beneficial to increase the number of regional patent grants.

5.2. Group Regression Results

Considering the differences in geographical environment and economic development level, this section will divide China's 30 provinces into eastern, central, and western parts, in order to study the key to the impact of manufacturing agglomeration on regional innovation capabilities through regional factors, of which the eastern part includes Beijing. , Tianjin, Hebei, Liaoning, Shanghai, Zhejiang, Jiangsu, Fujian, Shandong, Guangdong, Hainan and other provinces; the central part includes Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan and other provinces; the western part includes Guangxi, Chongqing , Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang and other provinces. According to the above groupings, regressions were performed respectively, and the measurement results shown in Table 3 were obtained.

Table 3. Grouped regression results

	(1)	(2)	(3)
variable name	east	central	west
maggl_1	0.623***	0.326***	-0.0412
	(0.0417)	(0.0817)	(0.0408)
pgdp_1	1.490***	-2.657***	-0.0369
	(0.251)	(0.165)	(0.206)
gov_1	-1.519***	-3.905***	-4.230***
	(0.337)	(0.230)	(0.145)
urb_1	-1.408**	2.857***	-2.106***
	(0.598)	(0.307)	(0.453)
open_1	0.631***	-0.0734	-0.224***
	(0.0803)	(0.149)	(0.0649)
Constant	-9.238***	31.57***	0.759
	(2.550)	(1.685)	(2.731)
Observations	132	108	120
R-squared	0.877	0.669	0.761
Number of year	12	12	12

OLS regression in parentheses ; *** means p<0.01, ** means p<0.05, * means p<0.1

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In the eastern region, the coefficient of manufacturing agglomeration is significantly positive at the 1% level, and the elastic coefficient value is greater than that in the overall regression. This means that the agglomeration of manufacturing in the eastern region promotes regional innovation capabilities more than the national level, and there is a positive interaction between manufacturing and regional innovation capabilities. Looking at the central region, the coefficient of manufacturing agglomeration is also significantly positive, but slightly lower than the national level. The internal differences between the eastern and central regions have affected the promotion of manufacturing agglomeration on regional innovation capabilities. At the same time, the coefficient of manufacturing agglomeration in the western region is not significant, and there is a trend of negative interaction with regional innovation capacity. Due to historical and geographical reasons, compared with the eastern and central regions, the western region has a lower level of economic development and weaker human capital accumulation.Therefore, the reason for this difference may be that the eastern and central regions have a high degree of economic activity, the manufacturing industry layout and industrial chain development are relatively complete, there are more exchanges and cooperation between enterprises, and industrial agglomeration has brought knowledge spillovers, further Feedback the development of regional economy and the output of innovative products. At the same time, the quality of human resources in the eastern and central regions is higher than that in the western region, and the agglomeration of talents caused by industrial agglomeration can improve the regional innovation capability even more.

In the regression by region, we can draw the following conclusions: the manufacturing agglomeration in the eastern and central regions has a significant impact on the improvement of regional innovation capabilities, and there is a positive correlation; the manufacturing agglomeration in the western region has no significant impact on regional innovation capabilities, and There is a trend of negative interaction with regional innovation capacity.

5.3. Conclusions and Recommendations

China's economic development has reached a new stage, and how to stimulate regional innovation, enterprise innovation, and mass innovation has become a hot topic of social discussion. Industrial agglomeration and the improvement of regional innovation capabilities are increasingly closely linked. The externalities generated by manufacturing agglomeration play an indelible role in regional innovation. Therefore, studying the relationship between manufacturing agglomeration and regional innovation capability has important practical and guiding significance for China's future industrial layout and economic development.

This paper firstly reviews and introduces related researches on industrial agglomeration, manufacturing agglomeration and regional innovation capability, then analyzes the current situation of China's manufacturing agglomeration based on the results of regional entropy measurement, and then uses China 's 2005 to 2006 The panel data of 30 provinces (excluding Tibet) in 2017, and regression analysis on manufacturing agglomeration and regional innovation capacity, in which regional innovation capacity is the explained variable, manufacturing agglomeration is the core explanatory variable, and economic development is added. The following conclusions are drawn:

Through the calculation of manufacturing location entropy, it is concluded that China's manufacturing agglomeration level presents the pattern of eastern > central > western. In the empirical research on regional innovation by manufacturing agglomeration, we find that manufacturing agglomeration has a positive effect on the improvement of regional innovation capability. In the sub-regional analysis, the manufacturing agglomeration in the eastern region has a significant positive correlation with the regional innovation capability; the manufacturing agglomeration in the central region has a positive effect on the improvement of the regional

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innovation capability; The effect of innovation ability is not significant, and there is a trend of negative interaction.

Based on the above analysis, this paper puts forward the following suggestions:

Cultivate industrial clusters according to local conditions. Industrial agglomeration is an effective way to speed up regional innovation, and how to improve the level of industrial agglomeration in various regions is a key issue. There are certain differences in resource endowment, human capital, industrial base and institutional environment in each region. If each region does not consider its own conditions and blindly develops towards the hottest industry, the final result will be vicious competition and industrial homogeneity in each region. emergence of structural phenomena. Local governments should, according to the actual situation, effectively strengthen the guidance of industrial development policies, cultivate and develop advantageous industrial clusters, and enhance the strength of local industries. Formulate scientific and sound industrial development plans, and rely on existing advantageous industries, integrate relevant resources, further optimize industrial allocation, and ultimately promote knowledge spillovers and enhance regional innovation capabilities.

Further promote the transfer of manufacturing in the eastern region to the central and western regions, and promote the balanced development of China's manufacturing industry. The target areas of industrial transfer should rely on new-generation information technologies such as big data, industrial Internet of Things, and artificial intelligence to promote the development of local manufacturing industries, and promote the establishment of new innovation organizations such as development innovation alliances and technology intermediaries. Faced with the lag in the transfer of industries, the central government can focus on introducing more talent policies to the central and western provinces, assist the localities to create a good talent environment, let more high-level human capital take root in the central and western regions, and promote industrial development. Regional technological innovation injects strong vitality.

Actively cultivate local talents and attach importance to the introduction of talents. Local governments strive to improve the level of urbanization in the region, promote local economic development, improve infrastructure construction, strengthen the development of medical education, and retain local talents. At the same time, the government should improve the talent introduction mechanism, provide talent protection, and provide legal protection and environmental protection for enterprises to introduce talents.

Reduce unnecessary government intervention and create a better environment for the market to promote the development of enterprises. The government should attach importance to the protection of intellectual property rights and improve relevant laws and regulations to strengthen the protection of intellectual property rights. Increase R&D investment, guide the more efficient flow of innovation elements, enhance the ability to monetize knowledge, and improve output efficiency.

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