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Analysis of the agglomeration of Chinese manufacturing industries and its effect on economic growth in different regions after entering the new normal

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Abstract

Entering the new normal of economy symbolises the innovation of growth mode and continuous optimisation and upgradation of economic structure. Using EG index, this paper measures the agglomeration degree of 31 provinces and cities and 31 manufacturing industries in China from 2012 to 2016; the results show that under the new normal, the degree of industrial agglomeration in China's manufacturing industry remains basically stable, but the overall situation is still in a state of moderate agglomeration, the regions with higher degree of concentration continue to present the pattern of 'one pole, two domains'. To further reveal the relationship between the concentration of Chinese manufacturing industry and regional economic growth, the GMM method of dynamic panel two-stage system was used, and the results showed that industrial agglomeration and economic growth do not have simple linear relationship, but inverted U-type relationship. There was a dynamic continuation effect of regional economic growth, and external factors such as fixed asset investment and government financial expenditure can promote regional industrial economic growth. Finally, the enlightenment of the complete article is given.

Keywords: manufacturing industry, industrial agglomeration, economic growth, EG index, GMM analysis

1 Introduction

Manufacturing industry is the basis of economic development, and the industrial agglomeration brought by its benefits is generally valued. After entering the new normal state of the economy, China's economy has changed from high-speed growth to medium-high-speed growth. What are the spatial differences in the concentration of manufacturing industries and whether they are in a downward trend, and whether there is a positive correlation between the economic growth effects that follow are the points to ponder, and the different answers will bring different policy implications, which obviously have very important practical significance.

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Industrial agglomeration based on the advantages of external economy, innovation benefits and competitive benefits can become a breakthrough point in economic development and structural adjustment. Industrial agglomeration and its effect on regional economic growth have also become one of the hotspots in academic research [1]. Due to the spatial distribution of the industry and its economic growth effects, the empirical research on industrial agglomeration has provided good practical guidance for scientific decision-making [2] and has attracted much attention from scholars.

Early related research started from abroad, and most of them indirectly explored the relationship between economic activity concentration and economic growth from some aspects such as labour productivity, urbanisation and market size. With the deepening of research, people have turned to the direct test of industrial agglomeration and economic growth. For example, Ciccone [3] researched the economic agglomeration of five European countries to regional economic growth and found that the two are mutually reinforcing. Geppert et al. [4] and other empirical tests on industrial agglomeration and economic growth in Germany from 1980 to 2000 showed a positive relationship between the two. In the above research, because the indicators for measuring industrial agglomeration are relatively simple, the endogenous nature of agglomeration is not considered, and the data used are mostly cross-sectional in nature; so the dynamic relationship between industrial agglomeration and economic growth cannot be examined. Since then, dynamic analysis based on panel data has gradually increased. For example, Bruhlhart and Sbergami [5] established a dynamic panel data model analysis of 105 countries during 1960–2000 and the European Union in 1975–2000 through a systematic GMM method by considering endogenous issues fully; the results show that the industrial agglomeration of these regions has promoted their economic growth.

Also, in China, there are many studies on industrial agglomeration and its relationship with economic growth. Most conclusions, such as Liu [6], show that there is a mechanism of interaction between industrial agglomeration and economic growth, which is a pair of endogenous processes. From the analysis of China's practical data, there is also a negative correlation [7], insignificant [8] or non-linear relationship [9, 10]. It can be said that different regions, industries, internal and external conditions, historical evolution, etc. will produce different economic agglomeration characteristics, and their corresponding effects on regional economic growth also have different correspondences.

In general, there are still some shortcomings in the current related research. The first is that most of the research is conducted in a static framework, and the research that reflects the dynamic characteristics of practical development has not yet become mainstream; the second is that some literature have simple setting indicators, which do not reflect the degree of industrial agglomeration well. In addition, in the empirical analysis of building data models, many literature do not pay enough attention to endogenous issues. Traditional panel data models cannot guarantee the unbiasedness of parameter estimates, which affects the acceptance of conclusions. Therefore, some literature have begun to use dynamic panel data model for analysis [11, 12].

China's economy has entered the new normal, which is consistent with the macro-economic development of other countries. And with the rise of Chinese manufacturing, the new normal has gradually changed in recent years. To reflect the situation of our country's industrial agglomeration after the economy enters the new normal state more accurately, this paper takes the 2012–2016 regional manufacturing data as the object and uses a two-stage system method to analyse the regional manufacturing industry agglomeration and its economic growth effects through the construction of EG indexes and dynamic panel data models. Because the GMM model can use the information of the difference and level equation variables to construct instrumental variables to control the endogenous problems of the explanatory variables, it can better reveal the hidden phenomena or problems in economic development.

2 Spatial pattern of manufacturing industry agglomeration in various regions of China after the new normal

EG indexes are more commonly used in research because they can more accurately measure and reflect the degree of industrial agglomeration. Under normal circumstances, $EG > 0.02$, it was low-level agglomeration; if $EG > 0.05$, the industry was highly agglomerated; when the index EG was between these two values, the industry was moderately agglomerated.

Drawing on the practice of Lu and Tao [13], the general calculation formula for EG index is:

$$EG_i = \frac{Gini - (1 - \sum_{j=1}^j X_j^2)H_i}{(1 - \sum_{j=1}^j X_j^2)(1 - H_i)} \quad (1)$$

In Eq. (1), X_j is the proportion of the total number of employees in the whole country to the total number of employees in the region j ; H_i is the Herfindal index, which reflects the distribution of industry competition or enterprise size. The calculation formula is:

$$H_i = \sum_f (E_i^f / E^i) \quad (2)$$

In Eq. (2), E_i^f is the f employees number of i industry enterprises, and $E^i = \sum_f E_i^f$ is the sum of all employees of industry enterprises. In addition, in Eq. (1), $Gini$ is the Kanny coefficient of industrial space, and its calculation formula is:

$$Gini = \sum_j (X_j - S_j^i)^2 \quad (3)$$

In Eq. (3), X_j is the same as above, $S_j^i = E_j^i / E^i$ is the ratio of the total number of employed persons in the regional j industry i to the total number of employed persons in the national industry.

This paper calculates the $Gini$ indicators and H indexes of the two-digit code C13-C43 in the National Economy Industry Classification and Code (GB/T 4754-2011). The EG index of each province and city is available in the data source 2012–2017 China Labour Statistics Yearbook. Due to space limitations, only the $Gini$ index and EG index are listed here, and the calculation results are shown in Table 1.

From Table 1, we can see that after the new normal economy, the agglomeration status of China's manufacturing industry has basically remained stable, and there has been no obvious downward trend, but it is still in a moderate agglomeration status as a whole. In the past five years, the degree of industrial agglomeration in China's manufacturing industry has increased. The average regional EG index has increased from 0.029 in 2012 to 0.034 in 2016, an increase of 17.24%. The concentration of manufacturing industry has significantly increased, but the manufacturing industry as a whole is in a moderately concentrated state.

In terms of index changes, most of the provinces with higher levels of industrial agglomeration have declined, while some provinces with a low degree of agglomeration have increased, and the differences in the degree of agglomeration of manufacturing between regions have slowed down, showing an overall favourable development trend.

In addition, the ranking of the degree of manufacturing agglomeration in each region has changed greatly, but the regions with a higher degree of agglomeration still continue to present a 'one pole, two domains' pattern, that is, a leading pattern with 'Guangdong as the pole and supported by the Pearl River Delta and the Yangtze River Delta'. In terms of ranking, the top six provinces have not changed, but the overall ranking has changed significantly. The largest increases were in Henan and Jiangxi, whereas the largest declines were in Heilongjiang, Tianjin and Shanxi. Among the declining provinces, one reason was the rational adjustment made due to the high degree of industrial agglomeration, such as in Fujian and Zhejiang; the other was that the old industrial base was affected by factors such as industrial structure transformation and upgrading, zombie corporate governance

Table 1 Industrial agglomeration status of 31 provinces and cities in China's manufacturing industry from 2012 to 2016

Area	<i>Gini</i> index				<i>EG</i> index				Rank	Rank increase or decrease
	2012	2016	Increase or decrease	Increase	2012	2016	Increase or decrease	Increase		
Beijing	0.013	0.016	0.002	18.92	0.013	0.016	0.002	19.08	13	0
Tianjing	0.011	0.005	−0.006	−58.1	0.011	0.005	−0.006	−58.1	24	−8
Hebei	0.014	0.018	0.004	26.74	0.014	0.018	0.004	27.09	11	1
Shanxi	0.017	0.008	−0.01	−56	0.017	0.008	−0.01	−56.1	16	−7
Neimenggu	0.004	0.006	0.002	59.59	0.004	0.006	0.002	59.77	20	5
North mean	0.012	0.01	−0.001	−12.6	0.012	0.01	−0.001	−12.6		
Liaoning	0.044	0.026	−0.018	−41.5	0.044	0.026	−0.018	−41.6	9	−2
Jilin	0.011	0.018	0.007	66.7	0.011	0.018	0.007	66.76	10	7
Heilongjiang	0.015	0.005	−0.01	−64.1	0.015	0.005	−0.01	−64.1	23	−12
Northeast mean	0.023	0.016	−0.007	−29.6	0.023	0.016	−0.007	−29.6		
Shanghai	0.026	0.028	0.002	9.247	0.026	0.028	0.002	9.628	7	1
Jiangsu	0.057	0.11	0.053	92.14	0.057	0.11	0.053	93.23	2	3
Zhejiang	0.140	0.081	−0.06	−42.5	0.141	0.081	−0.06	−42.6	3	0
Anhui	0.005	0.004	−0.002	−29.2	0.005	0.004	−0.002	−29.5	26	−3
Fujian	0.158	0.075	−0.082	−52.1	0.158	0.075	−0.083	−52.2	4	−2
Jiangxi	0.004	0.007	0.003	82.91	0.004	0.007	0.003	83.03	17	9
Shandu	0.066	0.054	−0.012	−17.9	0.066	0.054	−0.012	−18	5	−1
Eastern mean	0.065	0.051	−0.014	−21.2	0.065	0.051	−0.014	−21.3		
Henan	0.011	0.027	0.015	132.8	0.011	0.026	0.015	134.2	8	10
Hubei	0.013	0.012	−0.001	−9.58	0.013	0.012	−0.001	−9.67	15	−1
Hunan	0.012	0.007	−0.005	−39.5	0.012	0.007	−0.005	−39.5	18	−3
Guangdong	0.168	0.429	0.262	156.2	0.169	0.44	0.272	161.2	1	0
Guangxi	0.009	0.006	−0.002	−25.5	0.008	0.006	−0.002	−25.5	19	1
Hainan	0.000	0.000	0.000	−22.6	0.000	0.000	0.000	−22.6	30	−1
South Central mean	0.035	0.08	0.045	126.2	0.036	0.082	0.046	130.4		
Chongqing	0.008	0.006	−0.003	−31.9	0.008	0.005	−0.003	−32.1	22	−1
Sichuan	0.017	0.016	−0.001	−5.47	0.017	0.016	−0.001	−5.4	12	−2
Guizhou	0.007	0.004	−0.003	−47.8	0.007	0.004	−0.003	−47.8	27	−5
Yunnan	0.047	0.044	−0.002	−5.2	0.047	0.044	−0.002	−5.19	6	0
Xizang	0.000	0.000	0.000	2.598	0.000	0.000	0.000	2.594	31	−1
Southwest mean	0.016	0.014	−0.002	−11.9	0.016	0.014	−0.002	−11.9		0
Shanxi	0.009	0.012	0.003	33.94	0.009	0.012	0.003	34.07	14	5
Gansu	0.005	0.006	0.001	15.31	0.005	0.006	0.001	15.39	21	3
Qinghai	0.001	0.001	0.000	−31.4	0.001	0.001	0.000	−31.4	29	−1
Ningxia	0.000	0.001	0.000	42.15	0.000	0.001	0.000	42.2	28	3
Xinjiang	0.004	0.004	0.000	12.51	0.004	0.004	0.000	12.51	25	2
Northwest mean	0.004	0.005	0.001	22.15	0.004	0.005	0.001	22.23		
National average	0.029	0.033	0.004	15.45	0.029	0.034	0.005	16.49		

policies, and slow industrial transformation and upgrading. Third, the backward manufacturing areas are subject to a variety of internal and external factors, and the aggregation effect of resource elements is low. On the whole, the degree of industrial agglomeration in the Yangtze River Delta and the central and western regions has increased. This situation is basically consistent with the status of regional economic development.

To reveal the spatial changes of manufacturing agglomeration more intuitively, according to the changes of manufacturing industry index of 31 provinces and cities in 2016, a map of manufacturing agglomeration changes in each region was made. It can be seen that the region with a higher concentration of manufacturing industries

still presents a ‘one pole, two domains’ pattern; this situation of continuous leading has been in less change.

3 Analysis of the effect of regional economic growth on China’s manufacturing industry agglomeration after the new normal

To reflect the dynamic characteristics of practical development and the endogenous problems of data processing, this paper analyses through the construction of a dynamic panel data model and the application of a two-phase system GMM method.

3.1 Model construction

Regional economic growth is the result of the combination of multiple variables such as factor inputs, innovation clusters and natural conditions. Based on the Cobb-Douglas production function, this paper adds agglomeration variables that reflect spatial factors to reflect the basic conditions of regional economic growth from the perspective of time and space. The model is set as follows:

$$gdp_{it} = c_0 + c_1 EG_{it} + c_2 X_{it} + \varepsilon_{it} \quad (4)$$

Among them, the dependent variable gdp is industrial added value, which reflects the labour efficiency and economic growth of the regional manufacturing industry. EG represents the agglomeration status of the manufacturing industry. The value comes from the calculation results of the previous paragraph. i is a region and the year 2012–2016. X_{it} is a series of control variables and ε_{it} is a random error term.

To reduce the estimation bias caused by missing variables, the three corresponding control variables are added to the model. (1) Fixed assets investment (assets): It is an important input factor for manufacturing enterprises in production. Its size reflects the scale and strength of the industry. It is a necessary condition for production and can be used to measure the degree of input of internal factors in manufacturing. (2) Government expenditure (ge): On the one hand, the government directly supports the local manufacturing funds, and on the other hand, the government stimulates demand through expenditure, stimulates production, and promotes the development of manufacturing. The general budgetary expenditures of local governments are generally used to measure the degree of government expenditure and the degree of market pull. (3) Dummy variables: Add dummy variables for year and province to control fixed effects of time and region.

For model’s robustness and endogenous problems, to overcome the measurement errors caused by different units, initially, all the variables with economic units were used with their logarithmic values. In addition, to consider the inertia and path dependence of China’s economic growth, referring to the practice of Sun et al. [14], without using manual setting of instrumental variables, a systematic GMM method was selected to estimate the effects of economic growth and industrial agglomeration to control endogenous problems. Therefore, based on Eq. (4), the specific model of this study is set as:

$$\ln gdp_{it} = c_0 + c_1 \ln gdp_{i,t-1} + c_2 EG_{it} + c_3 \ln X_{it} + \varepsilon_{it} \quad (5)$$

In Eq. (5), in addition to using the lag period value of the explanatory variable, relevant dummy variables are added to control the fixed effects of time and region. At the same time, the dimensions of the independent and dependent variables are different, and natural logarithmic processing is performed on all continuous variables.

3.2 Empirical analysis of the growth effect of manufacturing industry agglomeration economy

To more clearly show the situation after the new normal of the economy, the data used in this article are from the China Statistical Yearbook 2012 and the China Industrial Economic Statistical Yearbook 2012–2017, and the samples were checked with the National Bureau of Statistics and other websites. Due to the lack of individual data in Tibet, the arithmetic mean of the previous and subsequent years was used in the study to complete the data to ensure the integrity of the data.

Table 2 Descriptive statistics of variables

Variable	Observations	Meaning	Unit	Mean	Standard deviation	Minimum value	Max	LLC inspection
<i>lngdp</i>	155	Industrial added value	100 million yuan	8.592	1.241	4.014	10.394	-12.186
<i>eg</i>	155	Index	-	0.033	0.075	0.000	0.474	-71.246
<i>eg2</i>	155	Exponent square	-	0.007	0.033	0.000	0.225	-53.053
<i>lnassets</i>	155	Manufacturing fixed asset investment (excluding farmers)	100 million yuan	7.947	1.364	3.362	10.060	-4.206
<i>lnge</i>	155	Fiscal General Budget Expenditure	100 million yuan	8.226	0.568	6.762	9.506	-19.127
<i>time</i>	155	Time-controlled variable	year	2014	1.419	2012	2016	-

To avoid the non-stationary pseudo-regression of the data variables, the LLC method is used for testing. Each variable passes the unit root test at the level of 1% (the last column of Table 2). The variables are $I(0)$ sequences, and panel data regression can be performed.

Simple descriptive statistics of each variable are shown in Table 2.

Examining the scatter point relationship between the main variables (see Figure 1), it is found that there is a nonlinear relationship between the industrial added value and the *EG* index, and a positive linear relationship with the investment in fixed assets.

Fig. 1 Scatter point relationship between main variables.

A. Industrial agglomeration and industrial added value B. Investment in fixed assets, government expenditure and industrial added value

Model regressions such as inter-group effects, random effects, and fixed effects were performed on *lngdp* and the variables *eg*, *lnassets* and *lnge*. The results of *be* model, *re* model and *fe* model are shown in Table 3. The Hausman test should use fixed effect model. From the three models, the explanatory variables *lnassets* and *lnge* are both significantly positive, whereas the *eg* index variables are not significant, indicating that both fixed asset

investment and government input on the market can promote the economic growth of China's manufacturing industry.

Further, to eliminate the possible explanatory variables of the dynamic panel model and its related endogenous problems with random error terms, especially the heteroscedasticity, autocorrelation and individual effects that may exist in the 'large N small T' panel model, based on the existing results achieved in the literature, this paper uses a two-stage system dynamic GMM method to estimate the model. The specific operation is realised by the STATA15.0 tool. On the one hand, difference equations are used to eliminate fixed effects; on the other hand, the lag term of the difference term is used as the instrumental variable of the horizontal term to increase the number of instrumental variables and solve the problem of weak instrumental variables of the horizontal lagging term. The estimation results are shown in the column 'A model' in Table 3.

In terms of robustness test, since the lag term of the difference variable is introduced as a new instrumental variable, in order to prevent transitional identification caused by improper selection of instrumental variables, a *Sargan* test is performed on the A model. The *Sargan* chi-square value is 10.591 and the *P* value is 0.158. Accept the null hypothesis that the model is effective for over-recognition restriction indicates that the model is effective and meets the relevant requirements of the dynamic model system GMM method. The *Hansen* test results show that the over-recognition restriction has legitimacy. In the *Abbond* test, the value of $AR(1)$ in the A model is 0.0483, accepting the null hypothesis, the estimated residual sequence has a first-order autocorrelation. The value of $AR(2)$ is 0.9076, rejecting the null hypothesis, indicating that there is no second-order autocorrelation in the residual sequence, which meets the consistency requirements of GMM estimation.

The B model introduces the squared value of the *EG* index as a new instrumental variable for verification again. The results show that the B model has passed the effective test in terms of instrumental variable selection and over-recognition constraints. The coefficient of the lagging period of the explanatory variable ($L1.lngdp$) is still significantly positive, indicating that the dynamic panel data model is reasonable. In addition, the relationship between the *EG* index, the fixed asset input, etc. in models A and B and the value added of the industry is consistent with the figures above.

4 Conclusion and inspiration

This paper uses the calculation of the *Gini* indicators, *H* indices and *EG* indices of the two-digit code C13-C43 in GB/T 4754-2011 to calculate the concentration of 31 provinces and cities and 31 manufacturing industries in China between 2012 and 2016 after the economy entered the new normal. They were measured separately. To further reveal the regional economic growth effect produced by the manufacturing industry agglomeration, this study used the dynamic panel two-stage system GMM method for estimation. The conclusions reached are as follows:

- (1) The degree of manufacturing agglomeration in various regions of China has changed greatly, but the overall situation has remained stable and is in a state of moderate agglomeration. The regions with higher levels of agglomeration still present a 'one pole, two domains' pattern.
- (2) After entering the new normal state of the economy, the economic growth effect brought by the agglomeration of manufacturing industries in various regions of China is not a simple linear relationship, and there is still a threshold effect.

It can be seen from Table 3 that after introducing the nonlinear explanatory variable *EG2* in the B model, the coefficient of the *EG* index is still positive and increases, and changes *EG2* from insignificant to significant, while the coefficient is significantly negative, indicating the industrial agglomeration and economic growth. It is not a simple linear relationship, but there is a threshold effect, that is, an 'inverted U-shaped' relationship, which once again validates the 'Williamson hypothesis' statement. This conclusion is in line with Zhou et al. [10] quantitative analysis of manufacturing, which is consistent with the conclusions of Huang et al. [15] on the high-tech industry.

- (3) There is a dynamic continuation effect of regional economic growth. It has a positive linear relationship with

Table 3 Estimated results of *EG* indices and economic growth

Explained variable	<i>lngdp</i>				
Explanatory variables	Fe model	Re model	Be model	A model	B model
<i>L1.lngdp</i>				0.83***	0.85***
				14.8	14.02
<i>EG</i>	−0.10	−0.04	0.97	1.07	2.86***
	−0.38	(−0.13)	−1.04	0.84	3.05
<i>EG2</i>					−5.2**
					−2.18
<i>lnge</i>	0.61***	1.01***	0.94***	0.16***	0.15***
	5.01	9.45	5.17	2.96	2.13
<i>lnassets</i>	0.21***	0.30***	0.54***	0.14***	0.13***
	6.00	8.53	8.03	3.25	3.26
<i>Constant</i>	106.66***	196.12***	−3.49***	47.44***	48.40***
	4.40	9.08	(−3.06)	6.17	5.27
<i>Time control</i>	−0.05***	−0.10***	(omitted)	−0.02***	−0.02***
	−4.17	(−8.90)		(−6.13)	(−5.20)
<i>Area control</i>				Yes	Yes
<i>Wald — chi²</i>				1326.05	1269.25
<i>Wald — Prob.</i>				0	0
<i>Sargan — chi²</i>				7.7003	9.0495
<i>Sargan — Prob.</i>				0.3598	0.2491
<i>Abond AR(1)</i>				0.0483	0.0494
<i>Abond AR(2)</i>				0.9076	0.8012

Note: (1) *t*-statistics in parentheses, ****P*<10%, ***P*<5%, **P*<1%;

(2) Autocorrelation test uses Arellano-Bond second-order autocorrelation test;

(3) The over-identification test uses the Sargan test. The null hypothesis is that all moment conditions in the model are valid.

fixed asset investment, etc., and the government fiscal expenditure pull is higher than the fixed asset investment pull.

Table 3 shows that the coefficient of *L1.lngdp* is significant and large, indicating that there is a dynamic continuation effect of regional economic growth, and it has an important impact on regional economic growth. The more developed the region, the faster the economic growth due to the dynamic continuation effect. Increases in fixed asset investment and government fiscal expenditure can significantly promote regional industrial economic growth. From the point of view of the coefficient, the government's fiscal expenditure is higher than the

investment in fixed assets in driving the industrial economic growth. The constant term is significantly positive, indicating that external factors such as technological innovation human resources, capital and so on have played a positive role in promoting regional manufacturing economic growth.

These conclusions can bring some important policy implications:

(1) After the economy enters the new normal, China's manufacturing industry agglomeration status has a large gap between regions, and regional changes are also rapid. This requires the overall control of the reasonable flow of industries between regions. The continuous flow and pooling of resources (such as capital, technology), especially high-quality resources, to developed and more developed regions will inevitably cause the industrial economy to intensify in terms of the degree of geographical agglomeration. Industry "manufacturing agglomeration. Under the influence of many factors such as declining demand in the foreign market, accelerating the adjustment and upgrading the domestic industrial structure and increasing environmental pollution, the problems of the decline in the concentration of manufacturing industries in the Northeast and the accumulation of industries in the backward areas in the West should be paid attention to.

(2) The threshold effect of economic growth brought by the agglomeration of manufacturing industries is worth vigilant. For economically underdeveloped regions, the effective allocation of various factors and resources is needed to drive the growth of industrial agglomeration, whereas for economically developed regions, more consideration must be given to the high-quality development of industries under the new economy.

(3) In the process of stimulating industrial economic growth, regional authorities should give full play to their own micro-policies, such as the government's active fiscal policy, the vigorous support of technological innovation and the establishment of a healthy economic environment. It can be said that China's economic growth has obvious path dependence, and it is necessary to dig out the ways and methods to solve the structural contradictions in restricting economic transformation and upgrading the problems of uneven and insufficient regional economic development.

At present, with the promotion of innovation-driven role and the rapid growth of new industries, new economies and new kinetic energy in economic growth, China's economy is expected to accelerate the development of high quality and continue to maintain its stable operation development trend, manufacturing under the new normal. Industry agglomeration will also exert its positive effects due to the continuous adjustment and upgrading of the industrial structure.

Data availability: The data used to support the findings of this study are included within the article.

Conflicts of interest: The authors declare that there are no conflicts of interest regarding the publication of this paper.

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