

# Research on mutual driving relationship between industrial agglomeration and talent gathering in Jiangsu

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## Abstract

How to drive and influence each other between industrial agglomeration and talent gathering is an important proposition that industrial economics and human capital theory are very concerned nowadays. In this paper, taking the high-tech industry agglomeration and high-tech talent gathering in Jiangsu Province as an example, we use factor analysis to measure the degree of aggregation of them, and use dynamic panel regression to analyze the mutual driving relationship between them. The results show that there is a mutual driving relationship between high - tech industry agglomeration and high - tech talent gathering in Jiangsu Province. The improvement of industrial agglomeration level can promote the development of talent gathering, and the enhancement of talent gathering level can also promote the strengthening of industrial agglomeration in the region.

**Key words:** *industrial agglomeration; talent gathering; mutual driving; high - tech industry*

## 1. Introduction

Industrial agglomeration and talent gathering are the two major elements of regional economic development, which is the object that the country has always been focusing on.<sup>1</sup>Talent gathering and industrial agglomeration as the two major characteristics of regional economic development, can greatly accelerate the regional economic development, improve the quality of regional social development. <sup>2</sup>In recent years, Jiangsu Province, industrial agglomeration and talent gathering are developing rapidly, especially high-tech industry gathering and the development of high-tech talent gathering. High-tech industry as the current new normal background to implement innovation-driven development strategy to promote the transformation and upgrading of the booster, to study its industrial agglomeration and talent gathering of the interaction is very important.<sup>3</sup>Therefore, this paper takes the development of high-tech industry agglomeration and talent gathering in Jiangsu Province as the research topic, uses the principal component analysis method to calculate the two metrics, and uses the dynamic panel data GMM regression to analyze the mutual driving relationship between them. According to the research results put forward the corresponding policy recommendations, in order to better promote the benign interaction between them, improve the level of regional economic development.

## 2. Experimental

### *2.1 Index system construction and measurement*

#### *2.1.1 Jiangsu Province high-tech industry agglomeration index system construction*

Based on the characteristics of high-tech industry agglomeration, this paper evaluates Jiangsu

Province from 2009 to 2015 with the following five evaluation indicators, taking into account the results of the "Jiangsu Province Science and Technology Progress Statistics Monitoring Results and Statistical Bulletin" from 2009 to 2015 (except in 2012) (Except 2012) 13 prefecture-level city high-tech industry Agglomeration degree (Table1) :

Table 1 High-tech industry agglomeration evaluation index system

Index system
High-tech industry sales revenue (100 million yuan)
Contribution rate of high-tech industry to industrial output growth (%)
High-tech industry exports accounted for the proportion of sales revenue (%)
High-tech industry output value of total industrial output value (%)
Percentage of R & D expenses (%)

### 2.1.2 Jiangsu Province high-tech industry agglomeration index measure

Table 2 Rotation Factor Load Matrix

Evaluation index	ingredient	
	1	2
Contribution rate of high-tech industry to industrial output growth (%)	0.92	0.186
High-tech industry output value of total industrial output value (%)	0.894	0.283
Percentage of R & D expenses (%)	0.789	0.244
High-tech industry sales revenue (100 million yuan)	0.288	0.954
High-tech industry exports accounted for the proportion of sales revenue (%)	0.234	0.968

Table 3 High-tech industry agglomeration comprehensive score in Jiangsu Province

	2009	2010	2011	2013	2014	2015	Average
Suzhou	1.01	1.07	0.98	1.23	1.21	1.31	1.14
Wuxi	0.93	0.78	0.69	1.16	1.02	1.18	0.96
Changzhou	0.3	0.15	0.54	0.25	0.33	0.44	0.34
Nanjing	0.24	0.36	0.39	0.24	0.2	0.32	0.29
Nantong	0.15	0.3	0.25	0.3	0.3	0.33	0.27
Zhenjiang	0.13	0.41	0.13	0.05	0.12	0.13	0.16
Yangzhou	0.2	0.24	0.28	-0.16	0.14	0.08	0.13
Taizhou	-0.04	-0.09	-0.11	-0.15	-0.21	-0.3	-0.15
Xuzhou	-0.45	-0.45	-0.28	-0.42	-0.41	-0.39	-0.4
Lianyungang	0.01	-0.18	-0.48	-0.52	-0.68	-0.66	-0.42
Yancheng	-0.83	-0.81	-0.57	-0.42	-0.39	-0.39	-0.57
Huai'an	-0.71	-0.73	-0.73	-0.59	-0.62	-1.01	-0.73
Suqian	-0.94	-1.05	-1.09	-0.96	-1	-1.04	-1.01

In this paper, the use of SPSS measurement software and use factor analysis method to analyze high-tech industry agglomeration degree of 13 prefecture-level city in Jiangsu

Province:

First, the KMO and Bartlett test, the test value of 0.827, is suitable for factor analysis; According to the total variance interpretation table analysis results, the two factors can explain the total variance of the original variable 88.568%, covering almost all the original variable information (Table 2). By the comprehensive factor scoring formula to calculate from 2009 to 2015 (except 2012) Jiangsu Province, 13 prefecture-level city high-tech industry agglomeration integrated score, according to the annual average score in descending order (Table 3).

### 2.1.3 Jiangsu Province high-tech talent gathering index system construction

In this paper, high-tech talent is different from ordinary talent, high-tech talent is a certain professional and technical, able to carry out research and development and innovation of the crowd, so the general evaluation of talent gathering indicators such as college education and other occupations are not suitable for evaluation of high - tech talent gathering.<sup>4</sup> This paper evaluates the degree of high-tech talent gathering by selecting the relevant indexes of the number of reactive talents and the quality of talents from the evaluation index of high-tech talents, as shown in Table 4:

Table 4 High-tech talent pool evaluation index system

Index system	
The number of talented people	Number of people in science and technology (per 10, 000 people)
Personnel quality	Number of R & D staff (per 10,000 practitioners)
	Invention patent license amount (per 10,000 people)

### 2.1.4 Measurement of High - tech Talents Agglomeration Index in Jiangsu Province

Table 5 High-tech talent gathering comprehensive score in Jiangsu Province

	2009	2010	2011	2013	2014	2015	Average
Suzhou	2.07	1.87	1.8	1.76	1.67	1.66	1.81
Wuxi	1.01	1.03	1.13	1.26	1.31	1.26	1.17
Changzhou	1.08	0.95	1.14	1.06	0.83	0.71	0.96
Nanjing	0.66	0.74	0.72	0.83	0.97	0.98	0.82
Nantong	0.29	0.69	0.68	0.53	0.77	1	0.66
Zhenjiang	-0.33	-0.25	-0.23	-0.16	-0.15	-0.15	-0.21
Yangzhou	-0.23	-0.15	-0.35	-0.27	-0.26	-0.26	-0.25
Taizhou	-0.56	-0.54	-0.6	-0.66	-0.6	-0.56	-0.59
Xuzhou	-0.67	-0.69	-0.66	-0.71	-0.75	-0.74	-0.7
Lianyungang	-0.71	-0.78	-0.76	-0.86	-0.9	-0.89	-0.82
Yancheng	-0.78	-0.87	-0.84	-0.81	-0.86	-0.89	-0.84
Huai'an	-0.82	-0.9	-0.9	-0.91	-0.95	-0.97	-0.91
Suqian	-1.01	-1.1	-1.12	-1.07	-1.09	-1.12	-1.09

This paper takes the degree of high-tech talent gathering in 13 prefecture-level cities in Jiangsu Province as an example to analyze the factors:

First, the KMO and Bartlett test, the test value of 0.786, more suitable for factor analysis; according to the total variance interpretation table analysis results, the factor can explain the total variance of the original variable 94.548%, so extract a factor to meet the study Request and calculate the final score. This method can be used to calculate the 2009 to 2015 (except 2012) Jiangsu Province, 13 prefecture-level city of high-tech talent pooled integrated score, according to the annual average score in descending order(Table 5).

## 2.2 high-tech industry cluster-driven talent pool analysis of empirical results

### 2.2.1 Measurement model setting

High-tech industry cluster-driven high-tech talent pooled the time span of 2009 to 2015 (except 2012 ), the time span is not large, the number of samples is 13, which are prefecture-level cities in Jiangsu Province, so we use dynamic panel data model. At the same time, in order to eliminate the possible problems of endogenous and individual effects between explanatory and explanatory variables, we use tool variables to control unobservable time and individual effect, and use the lagged one of explanatory variables as tool variables to eliminate endogenous problems. Which  $Y_{it}$  for the t-year i high-tech talent gathering degree,  $X_{it}$  for the t-year i high-tech industry agglomeration degree, for the residual items:

$$Y_{it} - Y_{it-1} = \alpha(Y_{it-1} - Y_{it-2}) + \beta(X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (1)$$

### 2.2.2 Analysis of regression results

In this paper, we use the comprehensive score of industrial agglomeration calculated in the previous section as the explanatory variable, and use the comprehensive score of talent pool as the explanatory variable, and use the two differential GMM estimation methods to estimate the model. Before the regression estimates, in order to ensure the stability of the data and the accuracy of the test results, this paper first test the variables and explanatory variables for unit root test and use the KAO-ADF test to test the cointegration relationship. Finally, two-step differential GMM regression is performed. The regression results are as follows(Table 6):

Table 6 Dynamic GMM regression results

Y(-1)	X	sargan	Prob(J-statistic)	AR(2)	Wald
0.413563*** (-13.82589)	0.150949*** (-5.448276)	12.75851	0.309401	0.1986	0.0000

Note: \*\*\*, \*\*, \* are indicated by 1%, 5%, 10% significance test.

From the above regression results, the sargan test p value greater than 0.1, through the excessive recognition test, can not refuse the validity of the tool variables hypothesis, the tool variable settings are valid. While AR (2) is greater than 0.1, so the equation does not exist sequence correlation, the model is set reasonable. Finally, the Wald test rejects the null hypothesis with a probability of 0.0000, indicating that the regression results are trustworthy. The regression coefficient of industrial agglomeration-driven talent pool is positive, and through 1% significance test, it shows that industrial agglomeration has a positive correlation with talent pool for a long time. The increase of industrial agglomeration can lead to the gathering of talents and drive the development of talent pool.

## 2.3 Analysis on the empirical results of high - tech industry agglomeration driving high - tech industry agglomeration

### 2.3.1 Measurement model setting

High-tech talent pooled high-tech industry cluster time span of 2009 to 2015 (except in 2012 default), the time is not large, the same dynamic data panel model. At the same time, in order to eliminate the endemic problems that can not be observed and the possible endogenous problems between variables, this paper uses the explanatory variables of the lag as a tool variable and performs the first order difference treatment on the model. Where  $g_{it}$  represents the high-tech industry agglomeration in the region  $i$ , where  $X_{it}$  represents the concentration of high-tech talent,

$$g_{it} - g_{it-1} = \partial(g_{it-1} - g_{it-2}) + \chi(X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (2)$$

### 2.3.2 Analysis of regression results

In this section, the comprehensive score of industrial agglomeration is used as the explanatory variable, and the comprehensive score of talent pooling is used as the explanatory variable, and the regression is adopted by two-step differential GMM estimation method. In order to ensure the stability of the variables and the accuracy of the test results, the explanatory variables and the explanatory variables were first tested and adjusted. At the same time, the KAO-ADF test showed that there was a cointegration relationship between the explanatory variables and the explanatory variables. The final two-step differential GMM regression, the regression results are as follows (Table 7):

Table 7 Dynamic GMM regression results

$g(-1)$	X	sargan	Prob(J-statistic)	AR(2)	Wald
-0.284909*** (-32.94757)	0.147361*** 2.709498	12.39679	0.334569	0.6861	0.0000

Note: \*\*\*, \*\*, \* are indicated by 1%, 5%, 10% significance test.

The regression results show that the equation is valid by the sargan over-identification test at 10% significance level, and the validity of the tool variable can not be rejected. At the same time AR (2) second order sequence correlation test is greater than 0.1, so the equation does not exist sequence correlation, the model set reasonable. Finally, the Wald test rejects the null hypothesis with a probability of 0.0000, indicating that the regression results are trustworthy. According to the regression results, it can be seen that the regression coefficient of the agglomeration-driven industrial agglomeration is positive and the 1% significance test is adopted. It shows that the talent pool has a long positive correlation with the industrial agglomeration, and the increase of the talent gathering degree can promote the production of industrial agglomeration and development.

## 3. Conclusions

The conclusion of this paper is that there is a significant mutual driving relationship between high-tech industry agglomeration and high-tech talent gathering in Jiangsu, but the driving force is low. In view of the research conclusion, the author puts forward the following policy suggestions:

Promote the transferring of industrial industries to north of Jiangsu, and strengthen the

cultivation of talent and technology to promote regional high-tech industries and the coordinated development of talent. To achieve the final goal, as scheduled to achieve a comprehensive well-off in the province, must coordinate the south, middle and east of Jiangsu to achieve coordinated development.<sup>5</sup>

Promote high-energy industry agglomeration, to attract talent to gather. In the context of the new normal economic development, the adjustment of industrial structure optimization is a necessary condition for the successful realization of economic growth shift.<sup>6</sup>

Strengthen the cultivation of high-quality professional personnel and provide a good talent growth environment, to gather talent to promote industrial agglomeration.<sup>7</sup> Jiangsu Province, a large province of talent, should actively respond to the "thirteen five plan" in the implementation of talent priority development strategy recommendations, the establishment of a large-scale talent team.

## References

1. *Zhang Zhenhua, Lu Zhengnan*. Construction of high-tech industry statistical index system, *J. Statistics and Decision*, **07**(2005)13-14.
2. *Chen Yingchun*. Industry cluster theory, *J. Guangdong Science and Technology*, **04**(2010)16-17.
3. *Zhao Zhicheng, Qu Yanfen*. Industry cluster theory research summary, *J. Modern Economic Information*, **06**(2008) 149-151 +125.
4. *Zhang Huixi*. Theoretical Analysis and Empirical Study on Talent Agglomeration in China, *D. Capital University of Economics and Business*, (2009).
5. *Yan Shengwen*. Industrial agglomeration talent pooling effect analysis, *J. Modern business*, **36**(2015)36-37.
6. *Yu Qiang, Han Qingpu*. Hebei Province, industrial clusters and talent gathering of the interactive development, *J. Management Manager*, **13**(2014)101-102.
7. *Sun Jian, You Wen*. Talent gathering and industrial agglomeration of the interactive relationship, *J. Management of the world*, **03**(2008)177-178.