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The coupling development of industrial cluster and city group

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ABSTRACT

Industry cluster and city group are two different sides of economic development, the development of industry cluster and city group constitutes an interactive coupling system. In this paper, it was proved that, the effect of factors of industrial agglomeration was greater than factors of population aggregation on the economic growth, and the coupling index had lag effect on the economic growth. This showed that discrete phenomena existed to a certain extent between city construction and the development of industrial parks in various regions, also known as the "two pieces of skins" phenomenon, which caused that coupling effect of city group and industrial cluster had not exerted effectively.

KEYWORDS

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INTRODUCTION

Since 1980s, spatial agglomeration of industries and cities gradually evolved into the development trend of regional economy. The study on the process of coupling development between industrial clusters and city group can help the regional body know the development law and the coupling mechanism of industrial cluster and city group, Thus draw up some policies to promote the coupling development of industrial cluster and city group.

The research (2001)of Van den Berg and van Winden showed that industrial cluster can play a decisive role on economic development of a city or smaller economic region. Promoting economic growth through industrial cluster has become a long-term development strategy in most major European cities[1]. Fan and Scott (2003)studied the relationship between industry cluster and economic growth in East Asia and China, they found there was very strong bidirectional promotion relationship between both sides; Singapore, Hongkong, Shanghai and Beijing were all attracting foreign direct investment to accelerate regional economic development[2] through using industrial cluster strategies. In Existing research in this area, Potter (2003) made the most comprehensive study on the relationship between cluster and regional economic development. He studied the role of clusters on American economic development during the period of 1990-2000, the results showed that the regional economic development was strongly influenced by trade clusters[3].

Su Xuechuan (2004) argued that industrial cluster is conducive to enhance the competitiveness of the city to promote the urbanization; The development of city group is the inevitable outcome of the urbanization. researched a certain stage. To accelerate the process of urbanization in our country, the role of city group and industrial cluster should be played[4]. Guo Fengcheng (2008) believed that there was a coupling relationship between city group and industrial cluster in a certain area; The degree of coupling and the Development in the area showed a significant positive correlation[5].

Li Dongguang and Guo Fengcheng (2008) pointed out that industrial cluster and city group presented significant positive correlation. The higher the degree of coordination between the two sides, the leading role on the regional economic development is greater. This is mainly manifested in the following aspects: to enhance the overall strength and competitiveness, improve the regional industrial development environment, optimize the industrial structure and promote the overall development of urban and rural[6]. On the basis of 14 city groups' panel data in China, Chen Yanyun and Qin Chuan (2012)demonstrated that the effect in promoting regional economic growth of coupling index of industry and city agglomeration is very small and has a lag; The industrial coordination and planning should be strengthened among cities, moreover, the industrial structure and spatial distribution should be adjusted and optimized on the whole[7].

THE MODEL

Assumption

(1)All industries are included in the industrial clusters in city group.

(2)Because current industrial clusters in China are mainly based on the second industry, the secondary industry is considered as a representative industry in industrial cluster analysis; That is, the second industry practitioners accounted for the proportion of employees is used to measure the degree of industrial agglomeration in cities, while the city population density is used to measure the degree of city agglomeration. Hence, the higher the ratio of the secondary industry practitioners or city population density, the higher the degree of industry or city agglomeration is.

The coupling system of industrial clusters and city group development includes employees of secondary industry, city population, GDP, fixed assets investment, local fiscal budget expenditure and actual use of foreign capital and other factors; So secondary industry practitioners accounted for the proportion of employees, city population density, GDP growth rate, total investment in fixed assets accounted for the proportion of GDP, local fiscal budget expenditure proportion of GDP, amount of actual utilized foreign investment accounted for the proportion of GDP are selected as indicator variables of the model.

In this paper, the growth rate of gross domestic product is on behalf of revenue growth advantage of a city group, it comes from three aspects: the advantage of industrial cluster, the advantage of city group, the coupling advantage of industrial cluster and city group. We focus on the effect of agglomeration economies for the city's GDP growth rate, then select the other control variables associated with the regional economic growth. The Regression model is as follows:

$$gdp\_gro_{it} = \alpha + \beta_1*gdp\_gro_{it-1} + \beta_2*sec\_job_{it} + \beta_3*pop\_dens +$$
$$\beta_4 pop\_sec_{it} + \beta_5*inve\_sh_{it} + \beta_6*fdi\_sh_{it} + \beta_7*gov\_sh_{it} + \varepsilon_{it}$$

(1)

Among them, gdp_gro is on behalf of the growth rate of GDP of city group; sec_job_{it} is on behalf of the agglomeration degree of industry cluster (the advantage of industrial cluster), which was measured by the proportion of secondary industry employees; pop_dens_{it} is on behalf of the agglomeration degree of city group (the advantage of city group), with city population density to measure; pop_sec_{it} is on behalf of the coupling advantage of industrial cluster and city group; $inve\_sh_{it}$ is the total investment in fixed assets accounted for the proportion of GDP, fdi_sh_{it} is the amount of actual utilized foreign investment accounted for the proportion of GDP, gov_sh_{it} is the local fiscal budget expenditure proportion of GDP, the three are the control variables of regional economic growth ; ε is the error term。 β_1、 β_2、 β_3 are marginal

coefficients for the advantage of industry cluster, the advantage of city group, the coupling advantage in each city group respectively.

It was analyzed by using Stata software in this study, three analysis methods were separately used: mixed OLS, fixed effect, random effect; Because the analysis on the effect of coupling factors was emphasized, the model also was divided into two types: with the variable *pop_sec* or not with this variable; So six kinds of regression model were presented.

EMPIRICAL RESULTS

TABLE 1 : Descriptive statistics of variables

variable	Observations' number	mean value	Standard deviation	minimum value	maximum value
gdp_gro	165	13.52	2.22	6.29	21.03
pop_dens	165	1067.485	448.43	507.2	2961.57
sec_job	165	50.82	5.91	32.93	65.59
inve_sh	165	50.67	15.87	15.87	100.14
fdi_sh	165	4.40	2.45	0.96	14.52
gov_sh	165	10.62	2.61	4.22	17.05
year	—	—	—	2001	2011

As shown in TABLE 1, "year" indicates particular year; The sample contains 15 city groups' data from 2001 to 2011. 15 city groups include: the Yangtze River Delta, Pearl River Delta, Beijing Tianjin Hebei, Shandong Peninsula, Liaodong Peninsula, the west side of the Straits, ChangZhuTan, Wuhan, Cheng Yu, Poyang Lake, Central Plain, HaDaChang, Jiang huai, Guan Zhong, Jin Zhong city group. Three kinds of effects analysis results are as follows:

TABLE 2 : Comprehensive regression analysis

	mixed OLS		fixed effect		random effect	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
pop_dens	0.0004	0.0108	0.00122	0.00821	0.0006	0.00976
	(1.28)	(2.52)	(1.2)	(1.5)	(1.42)	(2.44)
sec_job	0.00626	0.216	0.0954	0.247	0.0198	0.208
	(0.254)	(2.28)	(1.14)	(1.46)	(0.617)	(2.22)
inve_sh	0.0664	0.0733	0.105	0.106	0.0767	0.082
	(6.85)	(7.43)	(5.25)	(5.17)	(6.86)	(7.27)
fdi_sh	0.324	0.32	0.211	0.219	0.277	0.275
	(4.47)	(4.54)	(1.98)	(2.23)	(3.53)	(3.6)
gov_sh	-0.384	-0.446	-0.63	-0.654	-0.432	-0.483
	(-5.22)	(-5.53)	(-2.84)	(-2.83)	(-4.71)	(-4.92)
pop_sec		-0.00019		-0.00013		-0.00017
		(-2.44)		(-1.4)		(-2.3)
_cons	12.1	1.16	7.83	0.127	11.4	1.59
	(7.8)	(0.238)	(1.62)	(0.0141)	(5.77)	(0.331)
rmse	1.97	1.95	1.76	1.75	1.86	1.85
r2_a	0.218	0.233	0.191	0.195	—	—
obs	165	165	165	165	165	165

Note:The data is T Statistics in the"()" ; r2_a indicates adjusted multiple coefficient of determination ; obs is the number of observations。

In TABLE 2, three regression results of mixed OLS, fixed effect, random effect were basically consistent. So fixed effects regression was only selected to analyze in this paper. The results showed, during the factors of promoting economy growth, the regression coefficient of industrial agglomeration degree represented by *sec_job* was 0.247, which was greater than the coefficient of city population represented by *pop_dens* valued 0.008. It illustrated the effect of industrial agglomeration was greater than population aggregation on the economic growth. The T statistics of fixed asset investment represented by *inve_sh* showed that the effect of this variable was the most significant; It also reflected the economic development was mainly driven by investment, surplus labor had not been fully exploited. For the coupling factors we are concerned, the regression coefficient was negative, so its role in promoting economic growth did not appear.

In order to further explore the coupling factors' impact on the economy, we try to use one period lag approach to analyze the effect. The results showed that the regression coefficient of coupling index was positive and the coupling index had lag effect on the economic growth.

CONCLUSION

(1)The effect of industrial agglomeration was greater than the effect of population aggregation on the economic growth;

(2)The coupling index had lag effect on the economic growth.

This showed that there were a certain degree of discrete phenomena between city construction and the development of industrial parks in various regions,which also known as the "two pieces of skins" phenomenon, The phenomenon leaded to the coupling effect of city group and industrial cluster play not valid.

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