Research on the Economic Growth Factors and Spatial Spillover Effects in Ili Kazakh Autonomous Prefecture

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Abstract. Based on the Spatial Dubin Model (SDM), the spatial correlation of county economic growth in Ili Kazakh Autonomous Prefecture and the spatial spillover effect of factors affecting economic growth are discussed under the background of high-quality development. The empirical results show that there is an economic spatial correlation between the counties of Ili Kazakh Autonomous Prefecture, and the spatial flow of input factors has a role in promoting the overall development of Ili Kazakh Autonomous Prefecture. The effect of industrial structure on the economic growth of Ili counties is remarkable, and the total spatial spillover effect of the two elements of capital and education level is positive, but the effect on economic growth in Ili is limited. In addition, the lower level of medical care has a negative impact on the economic growth of Ili. To this end, the Ili government should enhance investment in education and medical care, improve utilization efficiency, and cultivate skilled talents as a new source of development. At the same time, the industrial structure should be adjusted, the urbanization process of each county should be accelerated, and the high-quality development of Ili Autonomous Prefecture should be realized.

Keywords: Spatial Dubin Model · Spatial Spillover Effects · Economic growth

1 Introduction

The "14th Five-Year Plan" period is the initial period for China's modernization to enter a new stage of development, and it is a key period for implementing the coordinated development strategy of the regional economy and expanding the new space for regional development. Ili Kazakh Autonomous Prefecture directly administers several counties and county-level cities, including Tacheng District and Altay area. There is only one autonomous prefecture that governs the two regions. Ili Kazakh Autonomous Prefecture is in a leading position in regional industrial development, but the county's economic development is weak, and there are imbalances in regional economic development. In addition, there are still deficiencies and problems in the Ili Kazakh Autonomous Prefecture in undertaking the function relief and industrial spillover of other cities. Therefore, when improving the overall economic strength of Ili, how to narrow the

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economic differences between districts (counties), improve the radiation and driving role of strong economic zones (counties), and promote the coordinated development of the regional economy is an important measure to ensure the coordinated and sustainable development of the county economy of Ili Kazakh Autonomous Prefecture. This paper explores the spillover effect of Ili Kazakh Autonomous Prefecture by establishing the spatial Dubin model, using capital investment, industrial structure, education level and basic medical level of the people in the region, guiding the positive spillover effect, and exploring the negative spillover effect in-depth and putting forward opinions.

2 Literature Review

Spatial econometrics is a term first publicly introduced by Paelinck at the annual meeting of the Dutch Statistical Association in Tilburg in 1974, and thus it began to develop with the emergence of the "prepare-take-off" to "Mature stage". As mentioned in Professor Jiang Lei's book, the most significant development of spatial econometrics at this stage is the development of spatial panel data model theory and a large number of empirical applications, and this field has attracted the attention of many outstanding scholars, such as Badi Baltagi, Paul Elhorst, Bernard Fingleton, Lungfei Lee, Jihai Yu et al. [1] Proposed by Anselin [2], where Spatial structure was added to the Seemingly Unrelated model, the Spatial Seemingly Unrelated Regression model (SSUR) suggested a new journey in Spatial panel research. Kelejian and Prucha (2004) studied the setting of the spatial fixed-effect model and the constraints of the spatial matrix [3]. Baltagi and Li studied the spatial random effect model [4]. Kapoor studied the spatial panel error model [5] and Elhorst et al. provide a comprehensive overview of the space panel [6].

Combining county economic growth indicators with graphical data has created a precedent for county economic research to study the development differences in county economies [7]. On this basis, from the perspective of spatial spillover [8], scholars have explored the impact of factors such as labor, public expenditure, investment activities, industrial structure upgrading and innovation activities on county economic development [9], and used traditional statistical methods combined with ESDA [10] and spatial econometric models to relate to county economies and mechanism of action for empirical analysis [11].

Through literature combing, few articles focus on the spatial spillover effects of inter-county economic growth and influencing factors in Ili Kazakh Autonomous Prefecture under the background of high-quality development, so this article will focus on this discussion.

3 Methodology

3.1 Spatial Weights Matrix Construction

According to the suggestion mentioned by Professor Jiang Lei, for the empirical evidence of the China problem, it is reasonable to use the binary proximity spatial weight matrix instead of the distance-based spatial weight matrix, especially in Xinjiang, and the reason for the in-depth investigation is that the spatial structure of the western prefecture-level

city and the county-level city is extremely different, so the 1st-order Sook spatial weight matrix is used, which is constructed as follows:

$$w = \begin{bmatrix} 0 \cdots 1 \\ \vdots \ddots \vdots \\ 1 \cdots 0 \end{bmatrix} \tag{1}$$

where the dummy variable for two regions with a common boundary is 1, otherwise a spatial matrix assignment of 0.

3.2 Construction of the Spatial Panel Data Model

3.2.1 Spatial Global Autocorrelation Index (Moran's I)

This paper uses Moran's I to measure spatial autocorrelation of county-level cities in Ili Kazakh Autonomous Prefecture. The formula is:

$$\text{Moran's I} = \frac{\mathrm{N}}{\sum_{\mathrm{i}=1}^{\mathrm{N}} \sum_{\mathrm{j}=1}^{\mathrm{N}} \mathrm{w_{ij}}} \frac{\sum_{\mathrm{i}=1}^{\mathrm{N}} \sum_{\mathrm{j}=1}^{\mathrm{N}} \mathrm{w_{ij}}(\mathrm{y_i} - \overline{\mathrm{y}})(\mathrm{y_j} - \overline{\mathrm{y}})}{\sum_{\mathrm{i}}^{\mathrm{N}} (\mathrm{y_i} - \overline{\mathrm{y}})} \tag{2}$$

In Eq. (1): N represents the number of spatial units, y_i represents the economic development level of the ith region, and the measurement index in this paper is the per capita GDP between counties and cities, W_{ij} which is the spatial weight matrix. The Moran's I statistic takes a range of values in which positive values indicate positive spatial correlation (or spatial agglomeration [−1, 1]) and negative values represent negative spatial correlation or spatial dispersion.

3.2.2 Spatial Metering Panel Model

In this paper, the spatial Dubin model is used to analyze the flow of factors between prefectures and prefectures in Xinjiang and their impact on economic growth. The formula for the spatial Dubin model is as follows:

$$Y_{it} = \rho W y_{it} + \beta X_{it} + W\theta X_{it} + \varepsilon_{it} \tag{3}$$

where: y is the explanatory variable (dependent variable), ρ is the spatial autoregressive coefficient, X is the explanatory variable (independent variable), θ represents the spatial influence coefficient of the explanatory variable on the explanatory variable, and W is the spatial weight matrix, which is a spatial weight matrix of 0 to 1.

3.3 The Selection of Variables

3.3.1 The Explanatory Variable (Dependent Variable)

This paper focuses on the spatial spillover effect of economic growth in various counties of Xinjiang Ili Kazakh Autonomous Prefecture, and the explanatory variables should exclude the factors affecting the population, measure the regional economic growth level of each prefecture by per capita GDP, and reduce the per capita GDP from the base period of 2005.

3.3.2 Explanatory Variables (Arguments)

Investment in Fixed Assets (I). It is measured by the proportion of total fixed-asset investment in the GDP of the current year, and the indicator is deflated.

Educational attainment (Ed). Considering the large difference in educational resources between different cities and counties, the number of primary and secondary school students per 10,000 people is selected to measure the educational level of the region.

Basic medical level (M). Beds in hospitals and health centers in different counties are used to measure the level of basic medical care in the region.

Industrial structure (D). According to the county economic development of Ili Kazakh Autonomous Prefecture, from the current stage, the added value of the secondary industry of each city (county) is used to represent the proportion of the regional GDP to represent the industrial structure of the district (county).

The data are derived from the statistical yearbook of Ili Kazakh Autonomous Prefecture, the statistical yearbook of counties and the reports of city (county) governments.

4 Empirical Analysis

4.1 Analysis of Global Spatial Autocorrelation

From Table 1, it can be found that the global Moran's I index value of county economic growth in Ili Kazakh Autonomous Prefecture from 2005 to 2018 is greater than 0 29, the global Moran's I index generally showed a trend of first fluctuating and then declining, but overall it was significantly positive, and the z-values converted to Moran's I were greater than 1.96, and the spatial autocorrelation test showed that at a confidence level of 5%, county economic growth in Ili Kazakh Autonomous Prefecture has a significant positive spatial correlation.

Table 1. List of global spatial autocorrelation indexes of real GDP per capita in Ili Kazakh Autonomous Prefecture

year	Moran's I	Z-scores	P-value	year	Moran's I	Z-scores	P-value
2005	0.385	2.854	0.004	2012	0.298	2.312	0.021
2006	0.347	2.582	0.010	2013	0.320	2.475	0.013
2007	0.322	2.428	0.015	2014	0.371	2.847	0.004
2008	0.295	2.257	0.024	2015	0.413	3.180	0.001
2009	0.301	2.289	0.022	2016	0.369	2.802	0.005
2010	0.324	2.451	0.014	2017	0.355	2.707	0.007
2011	0.334	2.562	0.010	2018	0.335	2.540	0.011

Table 2. Regression results of spatial Dubin model in Ili Kazakh Autonomous Prefecture

Individual variables		overall	
I	−0.0004*	W*I	−0.0041
Ed	0.7277**	W*Ed	−0.6817
M	0.0003**	W*M	−0.0014***
D	4.5719***	W*D	6.0908***
Inspection	Test results		
rho	0.310***		
R^2	0.4135		
LR-spatial lag	37.055***		
Robust LM lag	3.819**		
LR-spatial error	122.375***		
Robust LM error	89.138***		
Hausman	9.93***		
Wald	108.34***		
N	350		

4.2 Spatial Spillover Effect Analysis of Economic Growth in Ili Kazakh Autonomous Prefecture

4.2.1 Regression Results of the Population Spatial Durbin Model

The results of the regression of the spatial Dubin model in the county of Ili Kazakh Autonomous Prefecture are shown in Table 2, and the spatial model should first be tested before analyzing the regression results:

First, whether the spatial effect parameter indicates whether there is a spatial spillover effect on the economic growth of the regression result by significance, and the results show a significance level of 1%.

Second, the estimated result of LR-spatial lag reaches a significance level below 5%, and the estimated result of LR-spatial error reaches a significance level of less than 1%, and the robustness LM lag test and LM error are both The estimated results of the tests are all below 1% significance. The above test results prove that it is more appropriate to establish a spatial Dubin model.

Third, based on a Hausman test result of 9.93, the model used a fixed effect to better fit the model's estimated effect than a random effect through a 1% significance level test.

Fourth, the model results passed the post-test Wald, and the significance level reached less than 1%, and the model suitability results were better.

As can be seen from Table 2, the spatial autoregressive coefficient is 0.310, and the explanatory variable (GDP per capita) is significant at the level of 1%, which is positive, indicating there are obvious spatial correlations and spatial spillover effects in the economic growth of the county in Ili Kazakh Autonomous Prefecture.

Judging from the β value of the main statistics, the educational level and the basic medical level have reached the significance of 5%, and the industrial structure has reached the 1% level, of which the improvement of the industrial structure has a great positive impact on economic growth; while the impact of fixed asset investment on economic growth is not significant, and even has a negative impact. The reason for this may be that the government has not been able to adjust the proportion of fixed asset investment on time, resulting in structural contradictions and far fewer returns than inputs.

W*M W*D is significant at the 1% level, but the coefficients of the two are −0.0014 and 6.09, which can indicate that the industrial structure has a positive spatial spillover effect, and the surrounding area has a positive conduction effect on local economic growth. The negative industrial structure coefficient indicates that the surrounding areas have a certain negative conduction effect on local economic growth.

4.2.2 Decomposition of Factors on the Spillover Effect of Economic Growth

From Table 3, it can be seen that the direct connection, indirect and total effects of the industrial structure are significantly positive at the 1% confidence level, indicating that increasing the industrial structure can significantly promote the economic growth of the region and adjacent areas, reflecting the improvement of the optimization of the local industrial structure.

The mobility and rate of return of production factors between cities (counties), thus driving neighboring cities (counties). Economic growth. The indirect effect of education level is significantly negative, indicating that the education situation in the surrounding areas will hinder the economic growth of the region, the reason may be that the education level between regions is not the same due to various factors, the advantage of convenient transportation will be a one-way flow from a low education level area to a higher education level, and finally, the central regional city mainly relies on the accumulation of surrounding production factors in the growth period, and the surrounding towns or small and medium-sized towns gradually gather to the central city. Bringing a variety of high-quality resources to the regional center, will have a certain impact on the development of small and medium-sized cities in the region and produce a "siphon effect"; but its overall effect is significantly positive, indicating that it is supported by policies such as intellectual aid to Xinjiang, so that the gap between education levels is narrowed. The indirect and total effects of the basic medical level are negative, but they are not obvious, indicating that although there is a certain weak "siphon effect" between regions, the difference in the medical level is not enough, and the negative impact is small.

5 Suggestion

First, strengthen economic exchanges and cooperation at the county level. In the process of county economic development, apply the perspective of cooperation to examine the economic development trend, strengthen the economic ties between cities (counties), and promote economically strong cities and counties) to drive economically weak areas (counties) development to avoid unnecessary competition and waste of resources.

Table 3. Overview of direct, brief and total effect results of each variable

variable	Direct effects	Indirect effects	Total effect
I	−0.000591 (−0.09)	−0.00537 (−0.33)	−0.00596 (−0.29)
Ed	0.670 (1.90)	−0.562 (−0.61)	0.107 (0.10)
M	0.000204 (1.79)	−0.00172*** (−5.15)	−0.00152*** (−4.12)
D	5.416*** (10.42)	10.21*** (8.00)	15.63*** (10.36)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Second, attach importance to the intensity of investment in educational resources. All counties and counties of the Ili Kazakh Autonomous Prefecture should raise the level of basic education and pay attention to the cultivation of skilled personnel by raising the input of educational resources; at the same time, they should improve the level of treatment and introduce educational talents according to local needs.

Thirdly, it is recommended to pay attention to the improvement of medical standards. It is necessary to increase the frequency of talent exchanges between regions and explore the advantages and disadvantages of medical treatment between regions so that the differentiation of medical levels tends to be personalized.

Fourth, all counties should actively adjust the regional industrial structure (especially the industrial structure), combine their own comparative advantages to promote the diversified development of industry, support regional industrial transformation and upgrading, and avoid vicious competition caused by the singleness of Xinjiang's industries.

6 Conclusion

In summary, it can be seen that the input of factors will have a significant impact on regional economic growth, and the interaction between regional factor competition and the game will have a negative economic impact, and exacerbate the imbalance of regional development, such as the level of medical care will attract the one-way flow of factors; and the spatial spillover effect generated by factors will radiate the economic growth of underdeveloped areas, such as the spatial spillover of industrial structure and education level will increase regional economic growth and promote regional development coordination.

In addition, there are still certain deficiencies in the article, such as the selection of variables can be expanded to expand the scope, so that the policy analysis and suggestions of the county economy can be carried out in all aspects.

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