

# **Analysis on Theoretical System of Spatial Econometrics and Its Prospect**

**Xia Wuyang**

University of the Thai Chamber of Commerce

**Abstract:** Along with the rapid social-economic development in China, enterprises in the market economy grow and the spatial econometrics prospers due to a better corporate economic structure. Spatial econometrics is a form of economic theory and a branch of economics. In the early stage, spatial econometrics did not receive much attention. However, as the national market economy structure gets more complex and the economic forms are diversified, the theory of spatial econometrics has more advantages. This kind of economics is to compute through measurement model, applicable to complex economic structures. It can also quickly and efficiently reduce the modeled economic problems to ordinary economic problems, providing certain technical support for China's economic development. The paper studies the application principle of the spatial econometrics theory system and its future prospect.

**Keywords:** spatial econometrics, model analysis, development prospect

In recent years, the theory of spatial econometrics has been applied to various work related to economics. It is because the spatial econometrics has made various innovations and breakthroughs in the calculation method and measurement process. This kind of technical innovation supports the spatial econometrics to become a mainstay of the economic theory in the development of modern society. Since the theory system of spatial econometrics was put forward, it did not attract much public attention or have wide application till the defects of various economics theories appear in actual economy market. After that, the theory of spatial econometrics got officially promoted, with public attention.

## **1. The Theoretical System of Spatial Econometrics**

The theoretical system of spatial econometrics is to address spatial challenges by building a spatial econometric model. When adopting spatial econometric models, we should pay attention to the relation between models and practical issues, and the spatial econometric model is to solve the practical complex economic problems. During the modeling process, the relation between econometric models and practical problems needs to be guided and correlated through certain media, which is the exact purpose of spatial matrix. The spatial matrix establishes the relationship between the model and the practical problem in space. This is also the difference between spatial econometrics and traditional economics <sup>[1]</sup>.

1.1 Spatial correlation of spatial econometrics: Spatial econometrics is to solve problems through spatial models. Since there is a model, there must be several intersecting data points during problem solving. In other words, there is a correlation between variables, and when one data changes, the other related data will also change, and such correlation may affect the accuracy of the results during measurement. The main cause is that the corresponding relationship between the spatial metrological model and practical problems

was not fully considered when the spatial metrological model was created, making the model unable to fully and comprehensively express the practical problems. Therefore, there will be certain difference between them, and then there will be spatial correlation. The solution to the spatial correlation is to correctly judge the internal structure of the model and the corresponding relationship between the model and the practical problems when establishing the spatial measurement model, so as to achieve specific correspondence and perfect restoration [2].

1.2 Spatial heterogeneity of spatial econometrics: Due to differences in the establishment of the spatial econometric model, the spatial econometric model does not correspond to the actual problems, resulting in certain differences between various data, and this is called spatial heterogeneity. Spatial heterogeneity is very similar to spatial correlation in some cases, and they are easily mixed up with each other. Therefore, it is of much importance to have an in-depth understanding of the spatial econometric model, clarify the differences between the two kinds of problems, and have a clear understanding of the problems of different spatial models.

## 2. Design and Establishment of Spatial Measurement Model

2.1 Establishment of spatial lag model: the expression of spatial hysteresis measurement model is as follows:

$$y = \rho W_y + X\beta + \varepsilon$$

$y$  indicates the vector quantity of  $n \times 1$  order in the expression, as dependent variable, changing with the independent variable.  $X$  indicates the matrix of  $n \times k$  order in the expression, as an explaining variable. In the expression,  $k$  indicates the number of  $X$ ,  $\rho$  indicates the spatial lag vector coefficient,  $W_y$  indicates the variable matrix and  $\varepsilon$  indicates the error vector of the model [3].

2.2 Establishment of spatial error model

Spatial error model and spatial hysteresis model are two important parts of spatial cross-section data model, and the expression of the spatial error model is:

$$y = X\beta + \varepsilon \text{ and } \varepsilon = \lambda W_y + \mu$$

In the formula,  $\lambda$  indicates the spatial error correlation coefficient,  $y$  indicates the vector quantity of  $n \times 1$  order in the expression, as a dependent variable, changing with the independent variable.  $X$  indicates the matrix of  $n \times k$  order in the expression, as an explaining variable. In the expression,  $k$  indicates the number of  $X$ ,  $\rho$  indicates the spatial lag vector coefficient,  $W_y$  indicates the variable matrix and  $\varepsilon$  indicates the error vector of the model [4].

## 3. Development Trend of Spatial Econometrics

Compared with traditional economics, spatial econometrics can solve spatial problems better, with unique advantages in terms of space. Spatial econometrics can determine the solution to spatial problems more efficiently. Therefore, the spatial econometrics will develop more rapidly in the future economic field, with wider application.

3.1 Concretization of spatial econometrics: the spatial econometric model shall target at the practical problems, and each region of the model shall have the corresponding part to practical problems, by which, the problems can be solved accurately and efficiently, and the concretization of econometric model as well as the reliability and accuracy of the

model can be enhanced. The relationship between spatial econometric models and problems shall be strengthened, and it will be widely applied in various economic fields. Moreover, the spatial metrological model is a 3D model, and it's much more three-dimensional and harder to analyze than normal economic analysis. Therefore, it will make spatial econometric model more professional to certain degree by fully understanding the nature and modeling methods of the spatial metrological model, and it can also be promoted in a more powerful manner.

3.2 Development trend of spatial econometric model: Spatial econometrics has a broad development prospect, but first with the efforts to solve the existing problems in the current metrological model, improve the modeling process of the spatial metrological model, clarify the modeling basis, update the modeling basis based on the spatial matrix, and provide a fundamental basis for the development of the spatial metrological model [5]. In addition, more attention shall be paid to spatial correlation and spatial heterogeneity in the model, and they shall be solved through functions of the model itself.

#### **4. Conclusion**

In conclusion, although spatial econometrics has been promoted and developed to a certain extent, it still has a lot of room for improvement in the future. The measurement model of spatial econometrics mainly solves practical problems through a three-dimensional model, and the model needs to correspond to every aspect of the problem. Furthermore, it is the goal to overcome the loophole in the econometric model caused by spatial correlation and spatial heterogeneity. Meanwhile, to better apply the spatial econometric model, it is necessary to have a clear understanding of the expressions of each model and the meaning of each parameter, and master the application of model expressions. Spatial econometric model is applicable to complex problems and can be widely applied in modern social economy. It can also solve various economic problems in a comprehensive way and boost the development of China's economy and society to a certain extent.

#### **References**

- [1] Jun-Ping Qiu, Jia-Chen Shen, Yan-Hui Song, Research progress and trend of econometrics at home and abroad in recent ten years -- Based on visual contrast study of Citespace [J], *Modern Information*, 2019, 39(02):26-37.
- [2] Wei Cai, Gang Peng, Research on R&D spillover effect of China's industrial industry from the perspective of spatial econometrics [J], *Journal of East China University of Technology (Social Science)*, 2018, 37(04):323-327.
- [3] Mei-Wang Wang, Research on the influencing factors of regional haze in China based on spatial econometrics [D], Northwest University, 2018.
- [4] Yin Pan, Application prospect of spatial econometrics in urbanization research [A], Urban Planning Society of China, Dongguan People's Government, Rational planning for sustainable development -- Proceedings of 2017 China urban planning annual conference (04 history and theory of urban planning) [C], Urban Planning Society of China, Dongguan People's Government: Urban Planning Society of China, 2017:8.

[5] Jian Hu, Bing Jiao, Analysis on theoretical system of spatial econometrics and its prospect [J], Statistics & Information Forum, 2012,27(01):3-8.