Spatial Econometric Study on the Effect of REI on Economic Growth under the Background of Computer

Dongmei Cai¹,*

¹School of Accounting and Finance, Anhui Xinhua University, Hefei, Anhui, China, 230088

*Corresponding author e-mail: 381742499@qq.com

Abstract. Regional market integration is the process and state of integration of regional marketization. Since the 1980s, the process of REI in China has accelerated. By strengthening regional economic cooperation, major cities in China have promoted the process of REI (hereinafter referred to as REI), which has promoted the economic growth of cities in China. Economic growth is affected by many factors, such as human capital, social capital, export, government intervention, etc., which is also an important part of REI. Through better division of labor effect, scale economy, competition effect, technological innovation, regional market integration will promote regional economic growth. Under the background of computer software technology, this paper measures the spatial effect of economic growth in some cities of Yangtze River Delta Economic Zone, which can better reflect the spatial correlation of economic growth.

Keywords: REI, Economic Growth Effect, Spatial Measurement

1. Introduction

With the increasingly obvious economic globalization, REI has become the mainstream of economic development. With the strengthening of regional cooperation in China, REI strategy has become the key path of national rejuvenation, which has become an important way to reduce transaction costs [1].

Through the REI strategy, we can improve the overall competitiveness of the economic zone, which will promote the healthy and rapid development of the entire economic zone. China's regional economy is mainly divided into three economic zones, which has become the best region in the process of REI [2]. With the economic reform and opening up, the economic zone has become a huge super economy, which has led to the change of the overall pattern of regional economy in China. However, with the rapid realization of REI in China, the influence of traditional industrial factors has gradually declined, which requires us to realize the transition of regional economic development path as soon as possible [3].

2. Basic econometric analysis of REI
2.1. The basic concept of measurement of REI

REI measurement covers many disciplines, including regional science, urban economics, economic geography and development economics, which provides research ideas for the development direction of various industries. The traditional econometric model does not consider the spatial autocorrelation of regional economic relations, which will lead to the limitations of the research on the impact of REI on economic growth. Based on the traditional econometric analysis, this paper considers the spatial autocorrelation of variables, and obtains the following model follow-up model.

Among them, we need to know a few things. $\ln(int\ e)$ is total factor productivity, which is affected by domestic and external opening-up. $\ln(r/l)$ is human capital, which is mainly formed in education. Human capital will promote regional economic growth, which is generally expressed by the natural logarithm of the number of students in each region. $\ln(tz)$ is social capital, which is mainly the influence of social capital stock on regional economic growth. Social capital is generally expressed by the natural logarithm of the ratio of social fixed capital investment to per capita GDP. $\ln(open)$ is the impact of exports on economic growth, which is mainly expressed by the natural logarithm of the ratio of total imports and exports to per capita GDP. $\ln(zf)$ is the role of government coordination and intervention in economic development, which is mainly expressed by the natural logarithm of the ratio of government funds to GDP.

2.2. Spatial lag model (SLM)

The spatial lag model is suitable for studying the case that the economic behavior of an economic individual is affected by the spillover of its neighboring economic individuals. SLM model includes first-order spatial autocorrelation of dependent variable and exogenous independent variable. We know the explanatory variable $x$ and the spatial lag term $Wy$, and we can get formula 1.

$$
\ln(y) = \alpha + pW \ln(y) + \beta_1 \ln(int\ e) + \beta_2 \ln(zf) + \beta_3 \ln(tz) + \beta_4 \ln(open) + \beta_5 \ln(r/l) + \mu
$$

$$
\mu \approx N(0, \sigma^2 I)
$$

(1)

Among them, $Y$ is the vector of $(n \times 1)$ Order interpreted variable, $\mu$ is the error term vector of $(n \times 1)$ order normal distribution, $X$ is the vector of a series of interpreted variables, $\alpha$, $p$ and $\beta$ are unknown parameters to be estimated respectively [4].

2.3. Spatial error model (SEM)

The spatial error model can be applied to the case that the interaction between the study areas is different due to their different relative positions.

The spatial error autoregressive model is shown in formula 2.

$$
\ln(y) = \alpha + \beta_1 \ln(int\ e) + \beta_2 \ln(zf) + \beta_3 \ln(tz) + \beta_4 \ln(open) + \beta_5 \ln(r/l) + \varepsilon, \varepsilon = \lambda Wy + \mu
$$

$$
\mu \sim N(0, \sigma^2 I)
$$

(2)
Among them, $W_\varepsilon$ is the space interference term, $\lambda$ is a scalar parameter [5].

2.4. Geographic weighted regression (GWR)

The main differences between GWR and classical econometric regression methods are as follows. GWR method assumes that the relationship of economic variables of spatial samples will change with the change of spatial location. However, the classical measurement method will assume the spatial equilibrium of the relationship between economic variables. Therefore, we only get the overall relationship, which ignores the spatial imbalance of individual variable relationship caused by sample differences. The GWR is shown in equation 3.

$$\ln(y) = c_i + \alpha_i \ln(\text{int} e) + \beta_{i1} \ln(rl) + \beta_{i2} \ln(tz) + \beta_{i3} \ln(zf') + \beta_{i4} \ln(open) + \mu_i$$ (3)

Among them, $c_i$ is the individual effect with each sample point, and $\alpha_i$ is the variable coefficient [6].

3. Empirical analysis on economic growth of economic integration in the Yangtze River Delta

3.1. GWR empirical analysis

This paper mainly analyzes the GWR Model. Through the model parameters, this paper selects the indicators of some regions in the Yangtze River Delta in 2008-2017, as shown in Table 1. The data source is China Urban Statistical Yearbook from 2008 to 2017.

| Region   | ln(int e) | ln(tz)   | ln(zf')  | ln(open) | ln(rl)  |
|----------|-----------|----------|----------|----------|---------|
| Shanghai | 0.65044   | 0.40804  | -1.27967 | 0.39693  | 0.29795 |
| Nanjing  | 0.66155   | 0.25351  | -0.89385 | 0.04444  | 0.09898 |
| Suzhou   | 0.45248   | 0.66155  | -1.53318 | 0.37471  | 0.2424  |
| Wuxi     | 0.46359   | 0.30906  | -0.7171  | 0.30906  | 0.13231 |
| Hangzhou | 0.44137   | -0.50702 | 0.7171   | 0.07676  | 0.1212  |
| Ningbo   | 0.33128   | -0.19897 | -0.7171  | 0.40804  | 0.35249 |
| Jiaxing  | 0.28684   | 0.79386  | -0.86052 | 0.19897  | 0.50702 |
| Shaoxing | 0.44137   | -0.26462 | -0.41915 | 0.23129  | 0.2424  |
| Zhoushan | 0.16564   | 0.11009  | -0.65044 | 0.48581  | 0.46359 |

3.2. Impact analysis of each index
First, government intervention will promote economic growth. Through the coordination and intervention of the government, the economic zone can maintain the stability of economic development. Among them, the government generally regulates market investment through financial activities, which can promote the economic growth. Second, social capital can effectively promote the economic growth of the Yangtze River Delta. The economic zone is supported by state and social funds, which greatly promotes the economic development of the economic zone. Third, human capital promotes regional economic growth. Scientific research institutions and key universities provide a large number of talents for economic development, which is a strong driving force for economic development. Fourth, exports affect the economic development. To a certain extent, the economic development of the economic zone depends on the international market and overseas investment, which has a slightly smaller impact on economic development than other variables.

4. Policy suggestions on the effect of REI on economic growth

4.1. Actively participate in regional economic cooperation

China should comply with the development of the times and actively participate in regional economic cooperation. Through regional economic cooperation, we can obtain static effects such as trade creation, which will obtain a variety of dynamic effects, such as expanding market scale, improving economic competitiveness, attracting foreign investment, etc. By participating in regional economic cooperation, our products will enter the other side's market with preferential terms of trade, which not only widens the export channels but also disperses market risks. By actively participating in regional economic cooperation, we can promote the development of domestic economy. At the same time, China can open more fields, such as science and technology, financial services, tourism, human resources, etc., which will fully realize the optimal allocation of resources.

4.2. Improve trade and investment policies

China must improve its trade and investment policies, which will improve the trade and investment environment. According to the needs of REI, China should establish a variety of free trade areas, which will improve the cooperation mechanism and legal system. Through a perfect trade and investment system, China can maintain the stability, continuity, predictability and operability of trade and investment, which will create a unified, stable and transparent trade environment. By simplifying the examination and approval procedures for trade and investment, we can implement a standardized examination and approval system, which will create a good environment.

4.3. Actively promote and participate in REI

China should focus on Asia and actively promote the process of REI, which will improve the rapid development of China's economy. Asia is the economic entity with the most economic vitality in the 21st century, which has become one of the most important advantageous regions for China's foreign economic exchanges. Therefore, one belt, one road strategy, must be pursued in China to form regional or sub regional economic cooperation organizations with neighboring countries. By taking positive measures, China can promote the "10 + 1" free trade area and the "10 + 3" economic cooperation between China, Japan and South Korea. China should consider the overall situation of economic
development and build a global economic cooperation network through various international organizations and informal meetings.

5. Conclusion

In the 1980s, the process of REI accelerated, which promoted the economic growth of our country. By analyzing the spatial measurement of economic growth effect, China should strengthen regional economic cooperation, which will promote the process of REI and economic growth. Therefore, it is of practical significance to rescue the economic growth effect of REI, which will be a better new model and path of regional economic development.

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References

[1] Ren Xing, Guo Yi. Analysis on the regional economy and resources and environment: An Empirical Study Based on the PSR model [J]. Henan Social Sciences, 2016, 24 (8): 51-59

[2] Zhang Xinhui. Dual characteristics of China's current economic development strategy [J]. Henan Social Sciences, 2015, 23 (2): 6-10

[3] Xu Ling. Spatial econometric study on financial agglomeration and regional economic growth [D]. Economic Research, 2018, 21(10): 112-119.

[4] Guo Chunyan. Study on the comprehensive evaluation of regional soft power -- a comparative analysis of 15 sub provincial cities [J]. Henan Social Sciences, 2018, 23 (1): 97-101.

[5] Zhao Wu. The regional financial growth of regional soft power in China based on the Theil index [J]. Economic Geography, 2016, 26, 12-15.

[6] Zhou Yu. Quantitative research on China's marine fishing capacity and discussion of quantitative methods Yin [J]. Journal of Shanghai Fisheries University, 2013, 12, 9-11.