

Research on Regional Economic Development Model Based on Multivariate Spatial Economic Model

Chen Min

The College of Arts and Sciences Yunnan Normal University, Yunnan, China

Keywords: Regional economic; Multivariate spatial economic; Model

Abstract: Promoting the development of regional economic zones is a major national strategy. It is of great theoretical value and practical significance to explore and study the development of regional economic zones to promote high-quality economic development. Based on the development characteristics of regional economic zone, this paper establishes a revised multi-dimensional spatial economic model, and systematically analyses which mode of regional plate and regional economic integration is more suitable for the high-quality development of regional economic zone. The results show that for multi-dimensional spatial economies, regional economic integration development model is better than regional plate development model. Regional economic integration development model can improve the overall economic development efficiency and is conducive to high-quality economic growth than regional plate development model.

1. Introduction

In recent years, China's provinces and municipalities have witnessed remarkable economic growth, and people's living standards have improved qualitatively. At the same time, some new characteristics of domestic cities have gradually emerged, the plate development mode, for example, is one of them. Plate mode refers to the fact that, influenced by the development policies of local governments, there are great restrictions on the flow of economic factors among provinces and municipalities, leading to the existence of industrial development gradients in regional economic zones, and relatively few economic exchanges between them, showing different plate development modes. In contrast, the mode of regional economic integration is that local governments at all levels break the divide-and-conquer mode, carry out overall planning and design from a higher perspective, ensure that economic elements can relatively freely communicate between provinces and cities, and achieve coordinated development among regions. To clarify which mode of regional plate and regional economic integration is more suitable for the high-quality development of regional economic zones, the key lies in which mode of development can really promote the high-quality development of regional economic zones. If a model can improve the overall economic development efficiency, then it is the best choice for high-quality development of regional economic belt. Therefore, it is of great practical significance to study the location model of multi-spatial main body, to model the provinces and cities in the regional economic zone, and to systematically analyze which mode of regional plate and regional economic integration is more

suitable for the high-quality development of the regional economic zone.

2. Construction of multi-dimensional spatial economic model

2.1. Basic assumptions and framework of the model

Since the multivariate spatial economic model is based on the further revision of the traditional "center-periphery" model, the assumptions are given based on the traditional "center-periphery" model, as shown in Table 1 below.

Table1. Basic assumptions of the model

Hypothesis	Details of the hypothesis
Hypothesis 1	There are X urban groups in the whole space area. The scope of urban agglomeration is limited. There are costs for economic activities between any two cities.
Hypothesis 2	There are only two kinds of industries in the whole space area, one is manufacturing industry, which is concentrated in the urban area, the other is agriculture, which is distributed outside the urban agglomeration.
Hypothesis 3	In the whole space region, manufacturing industry is incomplete competition. It is assumed that there are a large number of manufactured products and that there is an increasing return to scale in production. Agriculture belongs to the nature of complete competition and produces homogeneous and single products.
Hypothesis 4	In the whole space area, urban residents are both consumers and producers of manufactured goods, and they have the same preference for the two products. Urban residents can freely communicate among the main bodies of cities. Their mobility will lead to the transfer of consumption and production activities. Local consumption has no cost, while cross-regional consumption has cost.

2.2. Introduction of trade interchange variables

After completing the construction of a single regional economic subject model, this paper then introduces trade interoperability variables to link the various regions of the X urban group, in order to build a multi-dimensional spatial economic model. There are economic activities within the spatial region of urban agglomerations. On the one hand, there is no cost in the whole range of economic activities involving agricultural products, on the other hand, there is no cost in the urban area for economic activities involving manufactured goods, and there is "iceberg cost" between cities. In the multivariate spatial economic model, the sales volume of manufactured goods of any regional economic entity depends on regional income, price index, ex-factory price and trade interchange conditions, and has nothing to do with the specific spatial distribution of each economic entity. Since then, the construction of the multivariate spatial economic model has been basically completed.

3. Comparison of development modes of regional economic belts

3.1. The influencing mechanism of trade interchange conditions on multi-dimensional spatial economy

In order to better discuss the operating mechanism of the multi-dimensional spatial economic model, set $X = 3$ and Y is the region's manufacturing share. Based on Krugman and other scholars and relevant statistical data, this paper defines the average distribution of agriculture in different

regions. Matlab simulation is used to analyze the mechanism of the impact of regional trade terms on the operation of the entire spatial economy. When the conditions of regional trade exchange are poor, regional plate development, for example, it is difficult for elements to circulate freely among economic entities. Through simulation analysis, it can be concluded that in the case of regional trade plate development, regional spatial economies achieve dynamic equilibrium at $Y = 0.3$, when the same manufacturing industry is evenly distributed among the three regions. Under the mode of regional economic integration, it is easier for elements to circulate freely among economic entities. Regional spatial economies will break the equalization of the same manufacturing industry under the impetus of market forces, and then form the agglomeration of the manufacturing industry spontaneously. Among them, the choice of manufacturing agglomeration to form economic main body depends on the comparative advantage of manufacturing industry among regions.

3.2. The influencing mechanism of trade exchange conditions on multi-dimensional spatial development

From the conclusion of Krugman's "center-periphery model", it can be seen that when the trade cost of the two regions is high, there will be a balanced development of regional economic equalization, and when the trade cost is low, there will be a balanced development of regional agglomeration. Therefore, further conclusions can be drawn as shown in Table 2.

Table2. Influencing mechanism of trade exchange condition

Conclusions	Details of the conclusions
Conclusion 1	In the case of regional plate development, multi-dimensional spatial economies will form an average equilibrium.
Conclusion 2	There are only two kinds of industries in the whole space area, one is In the context of regional economic integration, multi-dimensional spatial economies will form agglomeration equilibrium.

From the conclusion 1, it can see that if the multi-dimensional spatial economy adopts the regional plate development model, the administrative barriers between provinces and cities in the basin will have a very significant impact, resulting in greater difficulties in the flow of economic factors among the main bodies, and eventually the development of multi-dimensional spatial economy will be evenly balanced. Average equilibrium, that is, the share of manufacturing industries in various cities within a multi-dimensional spatial economy will converge, making the average distribution of manufacturing industries in the whole region balanced. This phenomenon is industrial isomorphism. Obviously, industrial isomorphism will make regional competition fierce, affect the efficiency of resource allocation, and severely restrict the development vitality of multi-dimensional spatial economies.

From conclusion 2, we can see that if the multi-dimensional spatial economy adopts the mode of regional economic integration, the influence of administrative barriers between provinces and cities will be weakened continuously, and the conditions of intra-regional trade exchange will be improved continuously, which will stimulate the flow rate of economic factors among the main bodies, and ultimately promote the multi-dimensional spatial economy to effectively change the mode of regional economic growth and form the equilibrium of agglomeration spontaneously. On the one hand, the formation of agglomeration equilibrium of multi-dimensional spatial economies will further trigger forward and backward correlation effects, expand the radiation scope of provincial and municipal agglomeration economies, thereby enhancing the overall economic development vitality; on the other hand, it will accelerate the spontaneous location flow of various elements and resources within the economic main body, optimize the allocation of related resources,

and significantly stimulate regional economy development.

4. Comparative analysis of regional economic zone development model

At present, the efficiency of urban economic development in the regional economic zone is generally not high. For a long time in the future, the provinces and cities in the regional economic zone still need to adhere to the path of ecological priority and green development, force the transformation and upgrading of regional industrial structure, and strive to promote the high-quality development of the economic zone. Based on the research results from the perspective of economic development efficiency of regional economic zones and the perspective of trade interchange conditions, the results show that for multi-dimensional spatial economies, regional economic integration development model is better than regional plate development model, and regional economic integration development model can improve the overall economic development efficiency more than regional plate development model, which is conducive to regional economy growth.

5. Conclusions

Through systematic analysis of regional plate model and regional economic integration model, the results show that the development model of regional plate will lead to greater difficulties in the flow of economic factors among the main bodies, resulting in an average distribution of manufacturing industry in the whole region. This phenomenon is industrial isomorphism, resulting in a large waste of resources, and restricting the economic vitality within the region. On the other hand, the mode of regional economic integration development can improve the conditions of intra-regional trade interchange, and then enhance the flow rate of economic factors among provinces and cities, and ultimately promote the effective transformation of regional economic growth mode, so as to enhance the overall economic development vitality. Besides, it will optimize the allocation of relevant resources, improve the industrial structure of internal main bodies, and stimulate regional innovation power, and improve the efficiency of the development of multi-dimensional spatial economies and promote the high-quality development of the regional economic zone at a qualitative level.

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