Empirical Study on Optimizing Regional Economic Structure Adjustment Strategies Using Statistical Models

Ziyu Ma

Minzu University of China, Beijing, 100081, China

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Abstract: Studying the economic benefits of Regional Industrial Structure (RIS) is of great practical significance for promoting RIS optimization and upgrading, and achieving sustainable and healthy socio-economic development. Reasonable IS can not only promote regional economic growth, but also enhance the level of social development, which is an important guarantee for achieving sustainable economic development. However, many regions still face many challenges in optimizing IS and promoting economic development. Based on this, this article adopts the shift-share method (SSM) method and takes a certain region as the research object to deeply analyze the spatiotemporal evolution characteristics of its IS economic benefits. The research results indicate that there are certain shortcomings in the process of IS adjustment in the region, such as a single IS and low resource allocation efficiency. In response to these issues, this article proposes corresponding optimization strategies and suggestions. By comparing the competitive advantages of regional industries, it puts forward countermeasures and suggestions such as developing regional industrial characteristics, reasonably laying out the entire industry, and stabilizing financial support for structural optimization.

1. Introduction

The outbreak of the 2008 global economic crisis had a profound impact on the global industrial landscape, not only exposing the fragility of traditional economic development models, but also prompting countries to re-examine the rationality and sustainability of IS [1]. In this context, China, as the world's second-largest economy, has undergone significant changes in industrial transfer and structural evolution in response to multiple challenges such as macroeconomic instability, accelerated marketization, and deepening economic globalization [2]. As the proportional relationship between the three major industries of agriculture, industry, and services in the national economy, IS is not only an important indicator for measuring the level of regional economic development, but also a key factor affecting the quality and efficiency of economic growth [3]. In recent years, with the continuous promotion of China's IS adjustment and transformation upgrading, the traditional industrial development path has gradually been broken, and the quality and efficiency of IS have also shown a trend of evolving towards deeper levels [4].

The practice of more than 40 years of reform and opening up has proved that the optimization and upgrading of IS is the only way to achieve rapid and healthy economic development [5]. Economic development is essentially a process of continuous adjustment and upgrading of economic structure. Although the balance, coordination, and sustainability of China's economic development have significantly improved in recent years, the problem of unbalanced and insufficient regional economic development remains prominent [6]. This imbalance is not only reflected between the eastern, central, and western regions, but also between urban and rural areas, as well as between different industries. To solve these problems, it is necessary to adjust IS, accelerate the industrial transformation of underdeveloped areas, promote innovative development of science and technology, cultivate economic growth poles in multiple regions, narrow the economic and social development gap between regions, improve the level of economic development and per capita income, and strengthen the construction of social security and public service systems, ultimately achieving sustainable socio-economic development [7]. Currently, the industrial development in China and even globally is undergoing a significant period of historical

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transformation.

The transfer of industrial gradients and structural adjustment have become important ways to promote regional industrial docking and cooperation, and to promote the cross integration and development of multiple industries [8]. For a long time, China's economic growth has been dominated by the secondary industry. This high input, high consumption, high pollution, and low efficiency IS model not only exacerbates the problem of resource scarcity, but also causes serious damage to the ecological environment, severely restricting the sustainable development of the social economy. Therefore, how to achieve the transformation of economic growth mode through IS adjustment has become an important task for the current and future periods. This article takes a certain region as the research object, adopts SSM, and deeply analyzes the spatiotemporal evolution characteristics of IS economic benefits in the region. The deviation share analysis method, as a classic regional economic analysis method, can effectively reveal the changing trend of RIS and its contribution to economic growth. By analyzing the spatiotemporal evolution pattern of the economic benefits of IS in the region, this article aims to reveal the advantages and disadvantages of its IS adjustment, and provide scientific basis for the sustainable development of the region.

2. SSM Model Construction

2.1. SSM Principle

SSM is a regional economic analysis method proposed by American economists Daniel et al. in the 1960s [9]. This method regards the development of regional economy as a dynamic process and takes the economic development of the region or country where it is located as a reference frame. By decomposing the changes in the total regional economy during a certain period, it reveals the inherent mechanism of regional economic growth [10]. Specifically, SSM decomposes the changes in regional economic aggregate into three components: share component (also known as regional growth component), structural deviation component, and competitiveness deviation component. The share component reflects the expected growth level of the research area under the background of economic growth in the reference region; The structural deviation component measures the impact of differences in regional industrial structure and reference regional industrial structure on economic growth; The deviation component of competitiveness reflects the relative advantages or disadvantages of regional industries in market competition. Through this decomposition, SSM can effectively identify the reasons for regional economic development or decline, evaluate the rationality and competitiveness of regional industrial structure, and then identify industrial sectors with competitive advantages.

Compared with other regional economic analysis methods, SSM has strong comprehensiveness and dynamism, which can not only reveal the internal driving forces of regional industrial structure changes, but also provide scientific basis for the dominant direction of future industrial development. In practical applications, SSM places the economic development of the research region in a broader regional or national economic context, and comprehensively evaluates the rationality and shortcomings of the regional industrial structure by quantitatively analyzing the share component, industrial structure deviation component, and competitiveness deviation component of regional economic growth. At the same time, this method can identify industrial sectors with competitive advantages in the region, providing important references for the formulation of regional economic development strategies and the optimization of industrial structures. For example, by analyzing the deviation of competitiveness, the competitive advantage of a region in a specific industry can be clarified, providing a basis for the formulation of regional economic policies; The analysis of structural deviation components can help identify problems in the regional industrial structure and provide direction for industrial transformation and upgrading.

2.2. Model Building

Starting from the dimensions of IS factors and location competitiveness factors, the differences in economic growth rates between different regions can be explained, and based on this, the

advantages and disadvantages of each region's economic structure and its own competitiveness can be evaluated. Through this analysis, we can identify industrial sectors with relative competitive advantages within the region, providing clear basis for the rational direction of regional economic development and the principles of IS adjustment in the future. Based on this, we believe that the total regional economic growth G is jointly influenced by three key factors: regional share factor N, IS deviation factor P, and location competitiveness deviation factor J. The specific calculation process of these three factors is as follows:

$$G = \sum_{i=1}^{n} G_i = \sum_{i=1}^{n} N_i + \sum_{i=1}^{n} P_i + \sum_{i=1}^{n} J_i \tag{1}$$

$$N = \sum_{i=1}^{n} N_i = \sum_{i=1}^{n} e_{i0} \times \left[E_t - E_0\right] / E_0 \tag{2}$$

$$P = \sum_{i=1}^{n} P_i = \sum_{i=1}^{n} e_{i0} \times \left[\left(E_{it} - E_{i0}\right) / E_{i0} - \left(E_t - E_0\right)\right] / E_0 \tag{3}$$

$$J = \sum_{i=1}^{n} J_i = \sum_{i=1}^{n} e_{i0} \times \left[\left(e_{it} - e_{i0}\right) / e_{i0} - \left(E_{it} - E_{i0}\right)\right] / E_{i0} \tag{4}$$

In the above expression, $i = 1,2,3$ represents the primary industry, secondary industry, and tertiary industry sectors, respectively. Among them, e_{i0}, e_{it} represents the added value of the i industry in the research area during the base period and the end period respectively; E_{i0}, E_{it} represents the added value of the i industry in the reference region (or national average level, etc.) during the same base period and end period, respectively. Meanwhile, E_0, E_t represents the gross domestic product of the reference region in both the base and end periods. These variables together constitute the fundamental data for analyzing changes in regional economic structure and its influencing factors.

3. Empirical Analysis and Optimization Strategies

3.1. Empirical Analysis

Figure 1 shows the changes in IS deviation share values in the region from 2018 to 2023. From the perspective of the trend of structural deviation components, the overall trend shows a relatively stable upward trend, with small differences between different years, especially during the period from 2019 to 2021, where the upward trend is particularly significant. This indicates that the region has achieved significant results in optimizing and upgrading IS, and the role of IS adjustment in promoting economic development has been continuously strengthened, thereby promoting the sustainable development of economic benefits. This trend reflects the gradual effectiveness of optimization measures in industrial layout and resource allocation in the region, laying the foundation for long-term stable growth of the regional economy. From the changes in the competitiveness component of IS, its trend fluctuations are quite obvious. In the middle and early stages of the study, the competitiveness component of most years was negative, indicating that the region's IS competitive advantage was relatively insufficient during this stage, and its economic potential was not fully realized. However, with the adjustment and optimization of IS, the competitiveness component gradually turned positive in the later stage and showed a positive growth trend. This transformation indicates that the region has gradually achieved the advantage

transformation of IS and significantly improved its competitiveness through policy guidance and industrial upgrading.

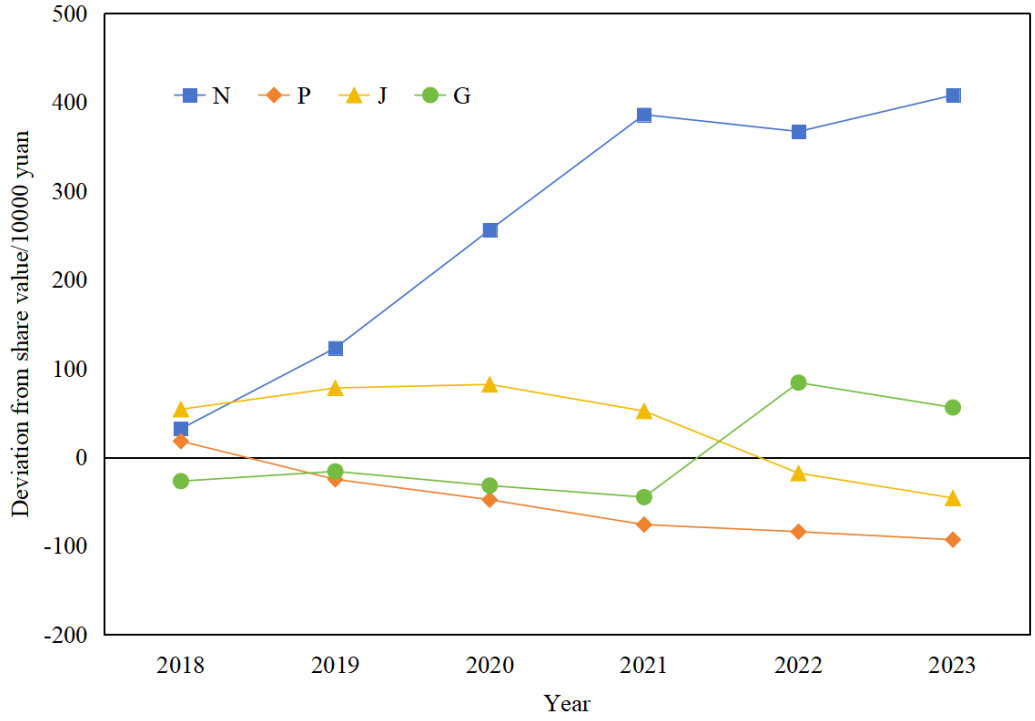

Figure 1 Change analysis

Further analysis revealed that the deviation component of the first IS in the region remained relatively stable, with negative values in all years except for 2018. This indicates that in the past few years, the primary industry in the region has been in a state of contraction, with unclear economic benefits and a lack of regional competitive advantages. The structural deviation component of the secondary industry was basically positive before 2021, and then turned negative, indicating that the contribution of the secondary industry to economic benefits gradually shifted from favorable to unfavorable. This change is closely related to the optimization and transformation of IS in the region, reflecting the transformation of the role of the secondary industry in the regional economy. The deviation component of IS in the tertiary industry was negative from 2018 to 2021, and positive at other times, indicating that the development speed of the tertiary industry was slower during this period, while it was faster in other time periods. However, the competitive deviation of the tertiary industry is mostly negative, indicating that although the scale of the tertiary industry has expanded, its development quality is not high and its competitiveness still needs to be further improved.

3.2. Optimization Strategies

Based on the analysis of IS in the region, the tertiary industry shows great potential for development and is expected to become the core driving force for future economic growth. The region should further increase support for the tertiary industry, improve its development quality and competitiveness, while consolidating the optimization achievements of the primary and secondary industries, and promote higher quality and more sustainable development of the regional economy. Figure 2 shows the coping strategies proposed in this article. The region should fully leverage its unique geographical advantages, focus on developing modern service industries, and enhance industrial competitiveness by improving service quality. Specifically, relying on the existing railway transportation network and port transportation conditions, as well as the advantage of being located in the transitional zone between provincial and dual core cities, we can vigorously develop the transportation service industry and strive to build the region into a city level passenger transportation hub and logistics freight center, further consolidating its important position in the regional transportation network.

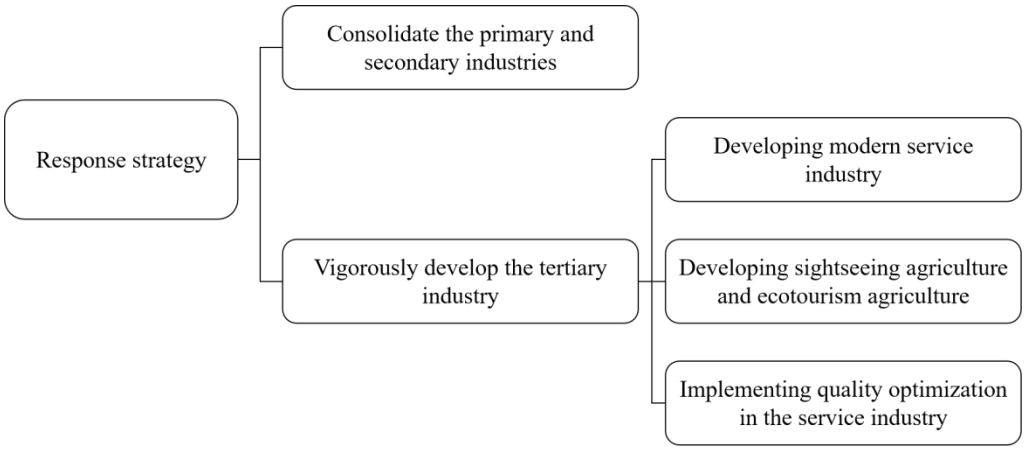

Figure 2 Response strategy

In addition, the region should fully utilize the existing competitive advantages of agricultural production, promote the deep integration of agriculture and service industry, develop sightseeing agriculture and eco-tourism agriculture, and create a high-quality modern service industry with regional characteristics. For example, by developing agricultural sightseeing parks, ecotourism projects, etc., more tourists can be attracted and the coordinated development of agriculture and tourism can be promoted. At the same time, the government and relevant departments should accelerate the implementation of policies to optimize and improve the quality of the service industry, strengthen the rectification of illegal and irregular industries, improve the market operating environment, regulate industry order, and provide strong guarantees for the healthy development of modern service industry.

4. Conclusions

This article uses SSM to conduct an in-depth analysis of the spatiotemporal evolution characteristics of the economic benefits of IS in a certain region. The research results indicate that the region has achieved certain results in the process of IS adjustment, but there are still some shortcomings, mainly manifested as a single IS and low resource allocation efficiency. In response to these issues, this article proposes corresponding optimization strategies and suggestions, including developing industries with regional characteristics by comparing the competitive advantages of regional industries; Reasonably layout the entire industry and optimize resource allocation; Stable financial support for IS optimization, etc. These suggestions aim to provide scientific basis and practical guidance for further optimization of IS in the region. From the research results, it can be seen that the economic benefits of IS in the region are relatively good, with the contribution of the secondary industry to economic growth being particularly significant. However, the development of the tertiary and primary industries is relatively insufficient, especially in terms of the quality and competitiveness of the tertiary industry. In the future, the region should further increase its support for the tertiary industry, enhance its competitiveness by improving service quality and innovation capabilities. At the same time, we should consolidate the optimization achievements of the primary and secondary industries, promote the modernization of agriculture and the high-end development of industry, and promote the coordinated development of the three major industries. Specifically, the region can rely on its geographical advantages and resource endowments to focus on developing modern service industries and promoting the transformation of the tertiary industry towards high-quality and high added value. In addition, we should strengthen technological innovation, promote industrial integration, and cultivate new economic growth points.

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