Study on the Current Status of Regional Economic Resilience

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Abstract: Against the backdrop of today's increasingly frequent financial crises and cyclical economic fluctuations, economic resilience has become a hot topic in the field of regional research. This article will conduct in-depth research on the current situation of regional economic resilience development in China. This study will start from the perspective of enhancing regional economic resilience. This article constructs a relatively comprehensive evaluation index system in the research. At the same time, the author uses the entropy weighted TOPSIS method to scientifically measure the level of regional economic resilience. Based on the measurement, the development status of each province from 2012 to 2012 is comprehensively evaluated. Finally, a comprehensive analysis is conducted on the spatiotemporal dynamics of the evolution of regional economic resilience. The results of the study found that the overall level of economic resilience in China is steadily increasing. Among them, most regions have enormous potential for improvement, and regional differences are gradually narrowing.

Keywords: Economic Resilience, Entropy Weight TOPSIS, Time and Space Dynamics

1. Introduction

Nowadays, China's comprehensive capabilities have significantly increased, and its international influence is expanding [1]. In this context, when faced with the repeated outbreaks of the new coronary pneumonia epidemic, the global economy is subjected to a strong external shock. China's economic system has shown a relatively strong ability to withstand external shocks. This economic phenomenon reflects the importance of strong economic resilience for the economy to achieve good and stable development. Since the twenty-first century, the country's urbanisation rate has increased from 36.22 percent in 2000 to 63.89 percent in 2020. Cities are now primarily responsible for the economic growth of an area [2]. The performance of different cities in response to external shocks varies, with the high economic resilience of the region achieved through technological innovation to achieve industrial structure upgrading, driving regional economic growth. Cities not only need to identify and resist crises before they occur but also need to reconstruct new development paths after the crisis has formed so that the economy can rebound quickly. Based on the background information provided above, this paper will measure the development index of regional economic resilience by creating a system of indicators for it, analyse the dynamic evolution of regional economic resilience over time and space from both a macro and micro perspective, and investigate patterns of change in

its evolution, which is unquestionably crucial for the areas to improve their capacity to handle the problem.

2. Literature Review

2.1. Evolution of Economic Resilience's Concept

The concept was first introduced by Reggiani et al. [3]. As a result, the study of it has gradually become an important research element in the field of economic geography. Prior to 2010, research on regional economic resilience was relatively scarce and consisted mainly of exploratory literature on how resilience theory could be applied to the fields of study of economics and geography, with its current conceptual definitions generally including engineering and ecological resilience from an equilibrium perspective, and adaptive resilience from an evolutionary perspective. In recent years, facing multiple challenges such as the new coronary pneumonia that ravaged the world, the response of regional economic systems to sudden external shocks has become a topic of increasing concern for researchers. Scholars in related fields of study define it as having four dimensions: anticipation, preparedness, response and recovery [4–5]. The academic community's understanding of the concept of economic resilience has gradually evolved. The content is also becoming increasingly rich. Specifically, at the beginning, it was decomposed into the dimensions of resisting shocks, responding to shocks, and adapting to shocks by creating new development paths. The subsequent evolution is to define it as the ability of a region to withstand shocks, restore economic growth, and restructure its recovery path in a competitive market environment. Ultimately, its concept is summarized as breaking the inherent economic model within the system and reshaping a new development path. The dynamic adjustment process is the ability to adjust, involving multiple stages, including resistance, resilience, and the ability to make adaptive adjustments after being hit by shocks [6–8]. The academic understanding of its connotation also extends from the resilience of a country's economic system after being hit by a shock to the ex-ante prevention of a crisis (designing vulnerability indicators to predict risks and avoid excessive accumulation of risks), the ex-ante stabilisation (coping with and overcoming shocks), and the ex-post recovery (recovering from a crisis as soon as possible).

2.2. Measurement of Economic Resilience

Measurement of economic resilience is one of the key elements essential to the empirical study of regional economic resilience, and existing measurement methods mainly include qualitative and quantitative approaches. Qualitative measurement is mainly in the form of case studies, comparing different regions horizontally or different time periods in the same region vertically, rather than calculating a specific value. Quantitative research mainly includes the resilience index system and simple economic indicators in two ways. So far, the two main measures of economic resilience include the following. The first is to measure regional economic toughness by using the method of analysing core variables that reflect higher sensitivity to economic shocks, such as changes in the employment rate, changes in the unemployment rate, and so on [9-11]. The second is the indicator system method. Pan Aimin and Wu Youlong constructed the first-level indicators as shock resilience and recovery and adjustment capacity and measured urban economic resilience with a system of 18 second-level indicators, such as local budgetary revenues and per capita gross domestic product [12].

The author summarizes the core essence of the concept of regional economic resilience and the core elements it involves. This summary is based on research in the relevant literature. First, the paper defines the core of the concept as the defense mechanisms of the regional economic sector stimulated by external shocks. At the same time, the concept also includes the core capacity of the region to support rapid economic development in the absence of external shocks. In addition, the core elements

of regional economic resilience should include resilience at the scale level, structural level, innovation level, openness level, institutional level and social level. This is the basis of the author's analysis.

3. Construction of the Indicator System

The following combination of data availability and other factors makes the scale of toughness, structural toughness, innovation toughness, openness toughness, institutional toughness, and social toughness of the six aspects of the construction of the economic toughness indicator system more comprehensive (Table 1). ①Scale resilience: from the economic scale and population size to measure the scale toughness; ②structural toughness. It mainly measures the region's urban and rural structure. ③innovation toughness. It measures innovation capacity in terms of both R&D input and R&D output. ④ Openness resilience. It measures the region's external dependence. ⑤ Institutional resilience. It measures institutional resilience in terms of ownership structure, distribution system and economic operation mechanism. ⑥ Social resilience. It measures the social resilience of the region in terms of public services and the ecological environment.

Table 1: System of indicators for evaluating economic resilience(a)

Tier 1	Tier 2	Tier 3	Tier 1	Tier 2	Tier 3
Structural resilience	Urban and Rural Structure	Ratio of income of urban and rural residents	Social resilience	Social public services	Social Security
		Ratio of Consumption Level of Urban and Rural Residents			Number of beds in medical institutions/number of resident population
Innovation Resilience	R&D Input	R&D Expenditure of Industrial Enterprises Above Scale			Total education expenditure Infrastructure construction
		Full-time equivalent of R&D personnel of industrial enterprises above designated size			
	R&D Output	Number of effective invention patents of industrial enterprises above designated size			Cultural construction
Openness Resilience	External Dependence	Total Import and Export/GDP			Resource Consumption
Institutional resilience	Ownership Structure	Development of non-state economy Tertiary		Ecological environment	Environmental management
					Labour productivity

Table 1: System of indicators for evaluating economic resilience(b)

Tier 1	Tier 2	Tier 3	Tier 1	Tier 2	Tier 3
Scale resilience	Economic scale	Gross Domestic Product	Institutional resilience	Distribution system	Labour productivity Capital productivity
		Fixed Asset Investment			
	Population size	Provincial resident population		Economic operation mechanism	Factor market allocation
	Market size	Total retail sales of consumer goods			Government consumption as a share of total consumption

4. Results and Analysis

The data comes from the China Statistical Yearbook [2]. According to the data availability 31 provinces of China were selected as the research object to scientifically measure the development level of China's regional economic resilience from 2012 to 2020. Firstly, to eliminate the differences in scale and order of magnitude between the indicators, the indicators are standardised. Secondly, considering that the contribution of each indicator to the level of regional economic resilience has certain differences. Therefore, the entropy weighting method is used to assign weights to each indicator, and then the TOPSIS method is used to calculate the D+ and D- of each evaluation object according to the weights of each indicator calculated by the entropy weighting method, which finally results in the evaluation index of the regional economic resilience level from 2012 to 2020

$$RER_{i,t} = \frac{D_i^-}{D_i^+ + D_i^-}.$$

Firstly, the author divided the 31 provinces analyzed into four regions: eastern, central, western, and northeastern. This division is based on traditional geographical locations. Subsequently, the author drew a line chart of regional economic resilience from 2012 to 2020 based on the measurement results (Figure 1) and conducted in-depth research on their development status. From the perspective of spatio-temporal dynamic evolution, Figure 1 can be found: 1. China's eastern region has the highest level of economic resilience and has always ranked first in the country, which is closely related to the fact that the eastern region has a more solid economic foundation, a more diversified industrial structure, and the economic system is more stable; 2. The economic resilience of China's central region has always been ranked at the second level in the country, and China's central region's economic resilience level has shown a significant trend of incremental increase, which indicates that the central region attaches great importance to the development of economic resilience. This indicates that the central region attaches great importance to the potential of improving economic resilience. 3. The level of the northeastern region is generally ranked third in the country, and there is a certain degree of fluctuation; 4. The level of the western region has almost always been located at the country's lowest level, which is closely related to the western region's backwardness in economic development but also reflects the economic resilience of China's western region, where there is still more room for growth.
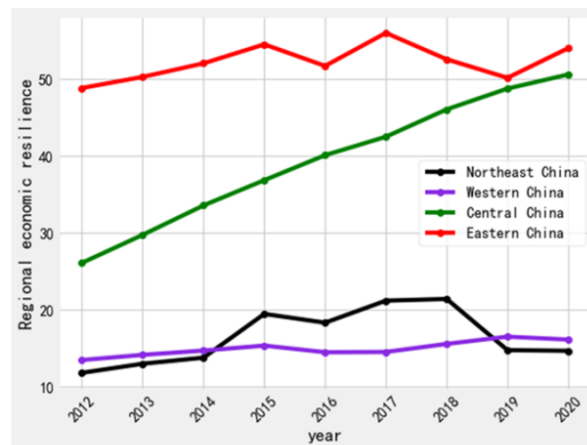
Figure 1: Evolution of spatial and temporal dynamic of regional economic
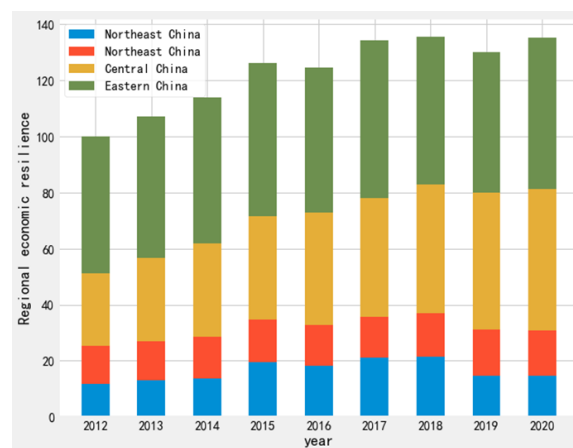

Figure 2: Histogram of regional economic resilience stacks

The following is an analysis of the current status of China's economic resilience development from a macro perspective. According to the data obtained from the previous measurements, a bar chart of regional economic resilience stacking from 2012 to 2020 is drawn (Figure 2). Observing Figure 2, it can be observed that from a macro perspective, the overall resilience of China's regional economy is showing an increasing trend. This result indicates that the overall economic development status of China is relatively stable.

5. Discussion

To sum up, this paper can initially conclude that the region with high economic speed and high quality development has a stronger ability to withstand economic risks, and will not experience too much turbulence in facing external shocks. The level in the central region of the country is in the middle of the national scale, and thus there is still some room for growth. The economic resilience of the western part of the country is at the lowest level nationally. However, the gradual implementation of policies such as the Western Development Programme and the "One Belt, One Road" can, to a certain extent, lead to the development of the western region. The development of the western region is also accelerating. This inherent ecological advantage provides natural wealth for economic operations. Therefore, it can be concluded that the economic resilience level of the cities in the western region has the potential to increase to a certain extent. The level of the eastern region of China is at the

highest level in the country, which is closely related to the geographical advantages and solid foundation of economic development. As the region with the best level of economic resilience development, the eastern region plays a crucial role in leading the nation's economic resilience, and actively drives other regions to move upward while developing itself.

Based on the above research results, the author will propose relevant policy recommendations. Firstly, the government should pay more attention to the issue of regional economic resilience. Secondly, the regions should be given a distinctive strategic deployment that suits the economic resilience of each region. For example, each region's own development strengths should be maximised and its weaknesses should be focused on. Finally, it should be emphasized that the key to improving regional economic resilience is to improve the level of economic development. So it is necessary to take all measures to ensure the high-quality development of the national economy.

6.   Conclusion

The primary findings of this study indicate that, when viewed from a micro viewpoint, the disparities in the degree of economic resilience development amongst provinces have progressively decreased, and there is a significant opportunity to improve regional economic resilience in China. Most regions have greater potential for strengthening their economic resilience. Macroeconomically speaking, China's regional economic resilience has generally been on the rise, and the country's regional economic resilience development is currently in a pretty steady state. Corresponding recommendations for effectively enhancing regional economic resilience are also provided. Ultimately, the primary flaw of this paper's research is that it only addresses the theoretical aspect of the subject of how to increase regional economic resilience. Research on methods to support the development of regional economic resilience is the focus of the follow-up improvement plan. This includes developing an economic model to do targeted quantitative analysis and choosing the main explanatory variables.

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