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Study on the Path of the Economic Resilience Measure and the Improvement of the Urban Agglomeration in Central Yunnan

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Abstract: The wave of globalization introduces the urban economy into a nonlinear network structure system, which makes the urban economic system change unpredictably. How to maintain the healthy and stable development of urban economic system and reduce the risk caused by unpredictable changes has aroused the attention of academia and industry. Accordingly, toughness, as a new research paradigm with overall dynamics and nonlinearity as its core, has been widely explored and analyzed by scholars. Based on the data of various indicators of prefecture-level cities in urban agglomerations in Central Yunnan from 2005 to 2020, this paper evaluates the scores of economic resilience of urban agglomerations in Central Yunnan over the years through entropy weight method. It is found that the economic resilience of urban agglomerations in Central Yunnan has shown an overall fluctuating trend in the past 16 years. Specifically, the economic resilience value declined in 2006, 2010 and 2017, and the economic resilience improved most significantly in 2009 and 2019. Finally, the paper gives some suggestions on how to improve the economic resilience of central Yunnan city cluster in the future.

Keywords: Central Yunnan City Cluster; Economic Resilience; Measure Analysis; Space-time Evolution.

1. Background

In the economic field, with the acceleration of globalization, national economies are often subjected to various shocks, such as economic cycle fluctuations, policy adjustments, financial crises and technological innovation, etc. Changes in the development environment make it difficult to predict changes in the urban economic system. What strategies should cities adopt to face the changing global market and maintain the healthy and stable development of the urban economic system? It is in the process of thinking and exploring this issue that urban economic resilience emerges at the historic moment and gradually becomes a hot issue that scholars at home and abroad pay attention to.

The central Yunnan City cluster consists of Kunming City, Qujing City, Yuxi City, Chuxiong Yi Autonomous Prefecture and Honghe Hani and Yi Autonomous Prefecture's northern Mengzi City, Gejiu City, Jianshui County, Kaiyuan City, Maitre City, Luxi County and Shiping County. It is the most economically developed region in Yunnan Province, the leader in promoting the economic and social development of the province and the main body of Yunnan Province participating in regional cooperation and competition at home and abroad. However, Central Yunnan city cluster is still in the stage of cultivation and development, and compared with the Yangtze River Delta city cluster or Chengdu-Chongqing urban economic circle, there are still many shortcomings in central Yunnan city cluster. First, the modern industrial system is not perfect, especially the export-oriented industry is insufficient and insufficient, and the homogeneity of industrial development is prominent. Second, the degree of opening up to the outside world is not very high. The level of external channel service is relatively low, and the transportation cost is relatively high and the unobstructed protection is insufficient. Third, infrastructure network support also needs to be improved, including transportation, communication, energy, information and other facilities, the level is very high in the province, but to participate in the "double cycle" is far from enough, and needs to be improved, especially the mechanism of regional coordinated development needs to be established and improved.

With the development of China's economy to a higher stage, urban agglomerations have obvious problems such as excessive dependence on natural resources, economic recession, and structural rigidity, resulting in greater impact on these regions in the face of external shocks (Li et al. 2019), which has greatly hindered the overall high-quality development of the Yellow River Basin. The word resilience comes from Latin and means "to jump or bounce back." Wink (2014) first introduced the concept of resilience into urban economics, arguing that resilience is the ability to avoid, resist, adapt to or cope with external shocks. Economic resilience refers to the ability of a region's economy to resist, recover, self-adjust and transform after unexpected shocks (MARTIN 2015). On the one hand, it emphasizes the ability of resistance aftershocks; on the other hand, it also emphasizes the ability of the regional economy as a whole to self-adjust and transform and achieve "path breakthrough" (Ding et al. 2020). Measuring the level of economic resilience of central Yunnan city clusters not only helps to have a better understanding of the resilience of different cities to external shocks, but also can scientifically evaluate the rationality of government policies and the effectiveness of investment behaviors of developers. So how to accurately measure the level of economic resilience of the central Yunnan city cluster? Sorting out this problem is of great significance for preventing various risks in the economic development of central Yunnan city cluster.

2. Empirical Measure of Economic Resilience Level of Central Yunnan City Agglomeration

2.1. Construction of the Index System

The degree of economic resilience of urban agglomeration is the comprehensive performance of all indicators in the index system, and each subsystem reflects the economic resilience of cities from different aspects. In this paper, a multi-dimensional measurement system is constructed by reference indicators of several scholars, and comprehensively considers the economic resilience of urban agglomeration through entropy method from three dimensions of resistance, resilience and renewal force (see Table 1).

Table 1. Comprehensive evaluation index system of economic resilience in central Yunnan urban agglomeration

	Primary index	Secondary indicators	Attributes of indicators
Central Yunnan city cluster Economic resilience	Resistant force	per capita GDP	+
		ratio of dependence on foreign trade	-
		Share of total imports and exports in GDP	-
	restoring force	General budget expenditure of local finance	+
		The proportion of total retail sales through social consumption in GDP	+
		gross fixed asset formation	+
	Update force	Patent acquisition	+
		per capita disposable income	+

2.2. Data Sources

All data used in this paper are from China Statistical Yearbook, China Urban Statistical Yearbook and Yunnan Provincial Statistical Yearbook.

2.3. Research Methods

Entropy method is a frequently used objective weighting method. Compared with subjective weighting, entropy method has the characteristics of high accuracy and strong objectivity, avoids the deviation of human factors scientifically, and can explain the evaluation results better.

If the entropy value of the J-th indicator is e_j, then the information entropy redundancy of this indicator is $d_j=1-e_j$, and the weight of each indicator is:

$$W_j = \frac{d_j}{\sum_{j=1}^{M} d_j}$$

Through the above formula, the comprehensive evaluation value of the economic resilience of the central Yunnan urban agglomeration in each year is calculated as follows:

$$Y_i = \sum_{j=1}^{M} w_j \times X_{ij}$$

3. Analysis of Economic Resilience Level Measurement Results of Central Yunnan Urban Agglomeration

Through the above steps, a line chart of the evolution trend of the economic resilience of the central Yunnan urban agglomeration from 2005 to 2020 was obtained (see Table 2). On the whole, during the 16 years from 2005 to 2020, the economic resilience of Central Yunnan urban agglomeration showed an overall upward trend, rising from 0.3357 to 0.5209, with an increase of 55.17%, indicating that the economic resilience index of Central Yunnan urban agglomeration had an obvious upward trend during the study period, but the overall resilience level was low. From the perspective of cities, the sustained growth of the economic resilience of the central Yunnan city cluster mainly depends on the following points, the first is the obvious location advantage. Located in southwest China, Central Yunnan is at the junction and junction of the three important regions of East Asia continent, South Asia subcontinent and Indo-China Peninsula. Seen from the map of Asia, the central Yunnan city cluster is precisely in the geographical center of East Asia, Southeast Asia and South Asia, with very unique geographical conditions and geographical advantages to participate in multilateral export-oriented regional cooperation. The second is superior natural resources. Central Yunnan city cluster is a relatively concentrated area of the dam area of the province. It not only has superior natural resources, superior climate, high environmental quality and rich mineral resources, but also has high economic value and a wide variety of biological resources. It is a region with superior comprehensive natural geographical conditions and resource endowment in Yunnan Province. The third aspect is that the economic foundation is good. The urban agglomeration in central Yunnan Province has complete industrial categories in Yunnan Province, and its economic aggregate accounts for more than 60% of the province. Especially in recent years, with the continuous optimization of the province's economic structure and industrial structure, the economic vitality of the central Yunnan city cluster has been growing, and the economic growth point has been formed with tobacco, non-ferrous metallurgy, equipment manufacturing and other key points, which has relatively strong regional competitiveness. The fourth aspect is that the urbanization of urban agglomerations in central Yunnan is advancing rapidly. Judging from the whole, the urban agglomeration in central Yunnan is in the stage of rapid urbanization development. Remarkable achievements have been made in infrastructure construction, and a modern comprehensive transportation network with Kunming as the center has basically taken shape. Expressways, high-speed railways, rural roads and even rural transportation have become very developed and convenient, and the face of industries, villages and towns has taken on a new look.

In addition, depending on the specific year, economic resilience was low from 2005 to 2012 and reached a high level in 2020. The results show that there are three big fluctuations in the middle, and the performance of economic resilience in

2006, 2010 and 2017 has declined. It can be seen that the economic development status and the ability to resist economic shocks are still low in central Yunnan city cluster, but the trend of gradually improving economic resilience remains unchanged. Specifically, the urbanization level and inter-urban development coordination ability of central Yunnan city cluster are at a low level as a whole, and the development gap between western city groups such as Chengdu-Chongqing and Guanzhong is still relatively obvious. With the construction of expressway network and railway network in Yunnan Province, the connection degree of urban agglomeration in central Yunnan has been greatly improved in recent years, and its vitality has been enhanced day by day. However, the economic and social dependence of the cities in central Yunnan on Kunming is still high, and the phenomenon of high industrial homogeneity and low coordination is still relatively serious. In the future, with the high-quality development of cities and the improvement of coordination policies between cities, the overall economic resilience of the Central Yunnan city cluster will continue to improve.

Table 2. Results of economic resilience measures of central Yunnan urban agglomeration

Year	Resi	Year	Resi
2005	0.3357	2013	0.4200
2006	0.3261	2014	0.4228
2007	0.3344	2015	0.4306
2008	0.3346	2016	0.4531
2009	0.3674	2017	0.4510
2010	0.3442	2018	0.4676
2011	0.3695	2019	0.5047
2012	0.3787	2020	0.5209

4. Conclusion

After analyzing the comprehensive evaluation of the economic resilience of the Central Yunnan urban agglomeration from 2005 to 2020, the work completed and the conclusions are as follows:

(1) Construct an index system for evaluating the economic resilience of resource-based cities. Read domestic and international literature on resilience and resilience of urban economies. The evaluation system of the economic resilience of urban agglomerations is further sorted out, and the urban economic resilience is carried out from three perspectives: resistance, recovery and renewal.

(2) On the whole, during the 16 years from 2005 to 2020, the economic resilience of Central Yunnan urban agglomeration shows an overall upward trend, increasing by 55.17% from 0.3357 to 0.5209, indicating that the economic resilience index of Central Yunnan urban agglomeration has a significant upward trend during the study period, but the overall resilience level is low.

(3) The performance of economic resilience decreased in the specific years of 2006, 2010 and 2017, indicating that the economic development status and the ability to resist economic shocks of the central Yunnan city cluster were still low, but the trend of gradually improving economic resilience remained unchanged.

5. Countermeasures and Suggestions for Improving Economic Resilience of Central Yunnan Urban Agglomeration

Based on the above conclusions, and combined with the main problems existing in Yunnan Province's self-positioning and development, the following suggestions are put forward in order to improve the economic resilience level of central Yunnan city clusters, better resist the next urban crisis, and recover from the urban crisis faster.

First, attach importance to the achievements of scientific research and innovation, reduce the burden of scientific research for research and development institutions, and increase funding. Actively introduce high-level talents, lay a talent foundation for scientific and technological innovation and development, establish a talent training mechanism, and build a talent transport chain. Attach importance to the cultivation of innovative talents, improve the reward and incentive system, attach importance to the protection of research results, and relevant departments improve the intellectual property system.

Second, promote the optimization and upgrading of industrial structure to provide a good foundation for the high-quality economic development of Yunnan Province. Urban economic diversity is one of the important factors affecting urban economic resilience. It is necessary to grasp the effective balance between correlation and diversity and optimize urban industrial structure.

Third, we need to meet people's high-level needs and raise people's happiness index. We will actively develop high-quality consumer services, increase employment, upgrade the structure of the service sector, and create a harmonious social atmosphere. We will do a good job in employment and social security work, unleash the multiplier effect of business start-ups on employment, reduce urban unemployment, and increase people's well-being.

Fourth, in the higher level of resource development, it is necessary to develop and utilize technologies for lower levels of resources. Exchange ideas in different regions and give play to each other's strengths. In addition, the negative effects brought about by the mutual migration of population between different regions should be effectively suppressed. To make full use of the radiation role of the advanced resource-based cities in the east, it can not only play a positive role in promoting the resource-based cities in the central and western regions, but also carry out self-renewal and self-repair, so as to achieve a reasonable distribution of residents' income. At the same time, in the context of regional environmental change, based on the principle of "people-oriented", through the analysis of the relationship between regional environmental quality and environmental quality, the impact of regional environmental quality on regional environmental quality is further reduced, and the relationship between regional environmental quality and ecological environmental quality is improved.

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