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Research on Evaluation of Thailand's Economic Resilience and Coupling Coordination

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Abstract: Based on World Bank data, this study builds a framework for evaluating economic resilience and evaluates Thailand's economic resilience index and coupling coordination from 1996 to 2021. The entropy method yields an average value of 0.4848 for total economic resilience. There is a significant economic resilience gap in each year, with just 11 years falling below the average. The value of a resilient economy is highest in 2018 and lowest in 1999. Scale resilience is the strongest of the four dimensions, whereas open resilience is the weakest. It is in the early stages, as shown by the average coordination value of 0.1642. Thailand of its economic resilience has room for improvement.

1. Introduction

Ecological science gave rise to resilience, which is now receiving more and more attention in economics. A region's ability to rebound economically from external shocks is a sign of its economic resilience. Three key competencies make up economic resilience: the capacity to bounce recover quickly, to tolerate shocks, and to prevent shocks [1]. Resilience was defined as the capacity to minimize losses to welfare and increase the likelihood of economic growth [2]. Resilience is a country's capacity to lessen vulnerability, withstand shocks, and recover quickly [3]. Therefore, nations with economies that are more robust can recover more rapidly and have continuous economic growth, whereas those with economies that are less resilient may not be able to fully recover or require a lengthy recovery period. Economic immunity and development potential together make up a nation's economic resilience. Major crises like the financial crisis and COVID-19 have shown the world the enormous obstacles that external shocks to economic development bring, and the powerful destructive force has become a century-long test of the economic and governance capabilities of all countries. As a result, the nation is economically resilient, and only the effects of the crisis will allow it to engage in economic activity, find a solution to its survival issue, and achieve sustainable development. An essential nation along the "Belt and Road" strategy's pathways is Thailand. The effective discussion of Thailand's economic resilience and the coordination of the economic resilience system within the development of these issues have some theoretical and practical value for the implementation of the "Belt and Road" strategy to improve Thailand's economic resilience.

2. Literature Review

The definition and measurement of economic resilience are seen differently by academics both at home and abroad. Economic resilience is the ability of an economy to continue growing at its pre-shock rate, entirely alter its structure, or at the very least return to the pre-shock rate of growth [4]. Resilience is the road toward development and growth that a regional economy takes after bearing the effects of the market, competition, and environment, changing its institutional, social, and institutional arrangements as needed to go back on the previous development and growth path [5]. Either macroeconomic stability, market efficiency, and social governance or economic stability [6], market efficiency, and development can be used to evaluate the degree of economic resilience [1]. A set of 13 indicators was developed based on the pressures of resistance and recovery, the status of adaptation and adjustment, and the transformation of governance [7]. In their evaluation of economic resilience, considered five factors, including industrial agglomeration, the wealth gap, and economic sensitivity were considered [8]. Economic resilience was evaluated according to three factors: risk resistance, innovation and transformation, and self-adaptation. Economic resilience was quantified based on three factors: risk resistance, innovation and transformation, and self-adaptation [9]. Additionally, some academics evaluate economic resilience in terms of market and governmental efficiency [10]. Based on the degree of risk absorption and the length of absorption, [11] examined economic resilience. Studies that just consider one indicator of economic resilience, such as shifts in economic growth or the unemployment rate, are also available. Industry diversity and innovation have a favorable effect on economic resilience in the study on the factors impacting economic resilience [12]. Economic agglomeration is transferred through specialization and diversity, and it is advantageous to the enhancement of economic resilience [13]. While other study found that the growth and entrepreneurial vigor of the manufacturing sector can help the urban economy's resilience [14]. The finance industry agglomeration and social capital are further driving elements [15-16]. In general, academics have studied economic resilience from a variety of angles and produced rich findings, concentrating on the assessment of urban economic resilience and the influence of business, finance, and capital on economic resilience, and sporadically talking about the coordination within the economic resilience system. Thailand is a developing nation with a middle-class income that follows a free economic policy and has an export-driven economy. Thailand has recently aggressively promoted infrastructure development and the growth of major businesses by introducing national-level plans like "Thailand 4.0" and the Eastern Economic Corridor [17]. Thailand's economic development is still sluggish, mostly as a result of the unjust export system, the unsteady global economy, and shifting energy prices [18]. The industrial structure has become more stable, making it challenging to increase Thailand's per capita national income. For over 40 years, Thailand has been stuck in the middle income stage, and as a result, it has come to be seen as an archetypal example of East Asian nations that are also caught in the "middle income trap" [19]. This study builds on earlier research techniques, thoroughly assesses the Thai economy's adaptability and coordination, and examines the aforementioned issues to lower the price of external shocks. This study is more useful as a guide since it has greater practical significance.

3. Research Design

3.1. Variable Selection and Data Processing

Regional growth is driven by economic resilience, and its thorough examination mostly uses the single-index method and the multi-index method. The scale resilience, structure resilience, innovation resilience, and openness resilience evaluation index systems for the Thai economy are

built in Table 1 [20]. This study uses per capita GDP growth rate, gross savings, fixed capital formation, and urbanization to illustrate the scale resilience of production capacity, financial reserve, market, and population space. The growth of the three primary sectors mostly reflects the robustness of structures. Specifically, the ratio of the added value of the three major industries and the structure of the entire industrial chain make it possible to combat external crises and ensure the stability of the industrial structure. The number of patents and R&D expenditures are indicators of competitiveness, and innovation resilience is essential to increasing it. The trait of openness resilience is a result of putting an emphasis on global collaboration and getting access to global resources (money, technology, skills) and market possibilities, particularly for the growth of international trade (import and export). The entropy method is used to normalize the weight and comprehensive index due to the various measurement units.

Table 1: Construction of Thailand's economic resilience index system

	Indicators	Max	Min	Mean	Std. Dev.
Scale	GDP per capita growth (annual %)	6.7940	-8.7651	2.1392	3.6995
	Gross fixed capital formation (% of GDP)	41.6549	20.4100	25.1025	4.2704
	Gross savings (% of GDP)	34.6035	27.2208	29.8769	1.8995
	Urban population (% of total population)	52.1630	30.4490	41.0824	7.3406
Structure	Agriculture, forestry, and fishing, value added (% of GDP)	11.5918	8.1259	9.3820	0.9794
	Industry, value added (% of GDP)	39.9217	33.2429	36.8869	1.7194
	Services, value added (% of GDP)	58.2860	49.5561	53.7311	2.3917
Innovation	Patent applications, residents	1572	203	851.5769	282.9912
	Research and development expenditure (% of GDP)	1.1400	0.1021	0.4385	0.3166
Openness	Imports of goods and services (% of GDP)	69.4511	42.3032	57.1026	7.8858
	Exports of goods and services (% of GDP)	71.4164	39.0184	62.9628	7.4083

3.2. Coupling Coordination Degree Model

The degree of interdependence and checks and balances between various systems is gauged using the coupling coordination degree model. The four aspects of economic resilience are analyzed in this study using the coupling coordination degree model within the 26-year data. When U_1, U_2, U_3, U_4 are the computed composite values for scale resilience, structure resilience, innovation resilience, and openness resilience. We see the formula,

$$C = \sqrt[4]{\frac{U_1 \times U_2 \times U_3 \times U_4}{(U_1 + U_2 + U_3 + U_4)^4}}, T = aU_1 + bU_2 + cU_3 + dU_4, D = \sqrt{C \times T} \quad (1)$$

T is the weighted comprehensive evaluation index of the four sections. C is the coupling degree, and the higher the value of C, the stronger the coupling relationship. D is the coordination degree, and the higher the value of D, the more harmonious the economic resilience is. Suppose that the four sections are of the same importance, and therefore we set up the weight like this, $a = b = c = d = \frac{1}{4}$. $D \in (0,0.1]$ shows miscoordination; $D \in (0.1,0.15]$ reflects barely coordination; $D \in (0.15,0.2]$ indicates primary coordination; $D \in (0.2,0.3]$ presents intermediate coordination.

4. Discussion

4.1. Thailand's Economic Resilience Assessment

Thailand's economy had an average resilience from 1996 to 2021 of 0.4848 (Figure 1), which generally indicated high volatility. Only the period from 1996 to 2005, accounting for 42.31%, fell below the average. The difference in the amount of economic resilience was considerable, with the greatest value being 0.6153 and the lowest being 0.3352. The economy was at its strongest in 1999 and its most resilient in 2018.

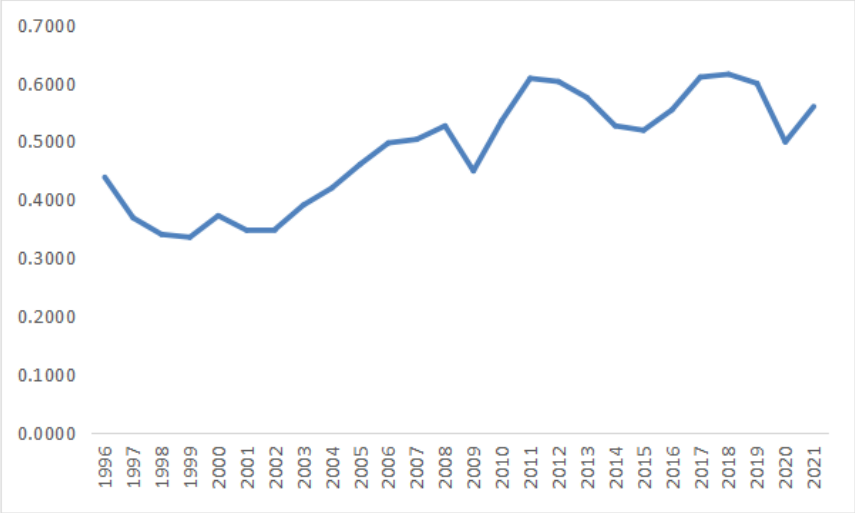

Figure 1: Overall value of Thailand's economic resilience

Thailand has the highest scale resilience and the lowest openness resilience when seen from the perspective of the four parts (Table 2), which demonstrates that Thailand has accelerated its economic expansion, urbanization process, and ongoing industrial structure optimization. The lack of scientific and technological innovation and Thailand's massive trade deficit have gradually reduced the quality of economic development, despite the fact that digital technology in the form of innovation has promoted industrial upgrading and integration and that digital industrialization and industrial digitization have emerged as the new economic growth engines in Thailand.

Table 2: The value of Thailand’s economic resilience from four parts

	1996	1997	1998	1999	2000	2001	2002	2003	2004
Scale	0.2657	0.1837	0.1113	0.1155	0.1275	0.1005	0.1093	0.1217	0.1336
Structure	0.1289	0.1290	0.1573	0.1249	0.1156	0.1175	0.1201	0.1378	0.1342
Innovation	0.0241	0.0232	0.0417	0.0612	0.0544	0.0546	0.0543	0.0630	0.0626
Openness	0.0196	0.0327	0.0298	0.0337	0.0747	0.0747	0.0649	0.0680	0.0893
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Scale	0.1530	0.1885	0.2154	0.1964	0.1642	0.1996	0.2218	0.2115	0.1744
Structure	0.1319	0.1367	0.1354	0.1526	0.1459	0.1632	0.1887	0.1867	0.1824
Innovation	0.0623	0.0695	0.0617	0.0626	0.0693	0.0849	0.0839	0.0928	0.1178
Openness	0.1133	0.1026	0.0909	0.1150	0.0699	0.0879	0.1139	0.1118	0.1008
	2014	2015	2016	2017	2018	2019	2020	2021	average
Scale	0.1752	0.1917	0.2211	0.2502	0.2496	0.2480	0.1846	0.2059	0.1815
Structure	0.1532	0.1245	0.1152	0.1135	0.1087	0.1070	0.1206	0.1165	0.1365
Innovation	0.1038	0.1235	0.1489	0.1762	0.1835	0.1921	0.1594	0.1637	0.0921
Openness	0.0945	0.0794	0.0688	0.0704	0.0735	0.0525	0.0344	0.0737	0.0745

4.2. Coupling Coordination Analysis of Thailand's Economic Resilience

Table 3: Coupling coordination degree

	1996	1997	1998	1999	2000	2001	2002	2003	2004
D-value	0.1259	0.1276	0.1307	0.1358	0.1483	0.1443	0.1436	0.1517	0.1581
	2005	2006	2007	2008	2009	2010	2011	2012	2013
D-value	0.1653	0.1706	0.1681	0.1741	0.1611	0.1767	0.1880	0.1886	0.1867
	2014	2015	2016	2017	2018	2019	2020	2021	average
D-value	0.1784	0.1758	0.1783	0.1851	0.1859	0.1788	0.1621	0.1806	0.1642

The average coordination of Thailand's economic resilience's four sections is 0.1642, which is at the primary coordination stage (Table 3). Ten years have yet to reach the average level, but the synergy has produced phased outcomes, with 2018 having the highest coordination. The effect of the pandemic will cause a considerable reduction in coordination across four sections in 2020, showing that there is much space for improvement in the coordination of Thailand's economic resilience. The majority of them are concentrated in the main area of coordination, suggesting that the overall capacity for coordinated development is inadequate. This is strongly tied to the strength of the economy as a whole, the lack of a mechanism for coordinated development.

5. Conclusion

Based on data about Thailand's progress from 1996 to 2021. First of all, a thorough index system for measuring economic resilience has been developed. The entropy approach was used to determine the comprehensive value. The amount of economic resilience varies greatly from year to year, with an average value of 0.4848 for the whole economy. The economic resilience gap hit 0.28 and shown instability. Second, Thailand's economic resilience coordination is weak and still has to be strengthened, as indicated by the average coordination of 0.1642, which is in the preliminary stages of coordination.

Policy implications: First, Thailand has to address its economic resilience, strengthen its economic resilience, and withstand external shocks. Coordination is required for economic resilience, and as such, it must be concerned with the advancement of scientific and technology innovation, opening up, industrial upgrading, and other factors. Particularly, there is a lack of general economic resilience cooperation among Asian nations. Second, Thailand has to keep accelerating its digital growth in order to strengthen its economy, eliminate resource mismatch, increase efficiency, and, to the greatest extent feasible, create a stable economic environment. Thailand should fully utilize the Internet, artificial intelligence, big data, and other technologies to strengthen information transmission and sharing, reduce search costs, seek in uncertainty as much as possible, make the economic situation clear, and enhance its defense capability in order to reduce risks. Thirdly, Thailand needs to enhance the necessary urbanization-related support infrastructure, boost research and development spending, and broaden the country's horizons. These actions will help Thailand's economy expand sustainably and of the highest caliber.

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References

[1] Briguglio L., Cordina G., Farrugia N., Vella S. (2009) Economic Vulnerability and Resilience: Concepts and

Measurements. Oxford Development Studies, 37(3), 229-247.
[2] Angeon V., Bates S. (2020) Reviewing Composite Vulnerability and Resilience Indexes: a Sustainable Approach and Application. World Development, 72, 140-162.
[3] Caldera Sanchez A., Serres A., Gori F., Hermansen M., and Röhn O. (2016) Strengthening Economic Resilience: Insights from the Post-1970 Record of Severe Recessions and Financial Crises. OECD Econ. Policy, 20, 1-30.
[4] Dropniak A. (2012) The Urban Resilience-economic Perspective. Journal of Economics and Management, 10, 5-20.
[5] Simmie J., Martin R.L. (2010) The Economic Resilience of Regions: Towards an Evolutionary Approach. Cambridge Journal of Regions. Economy and Society, 3, 27-43.
[6] Ibrahim N., Tii Njivukuh N. (2020) Economic Resilience in Sub-Saharan Africa: Evidence from Composite Indicators. Journal of the Knowledge Economy, 1.
[7] Sun H., Yuan W.P. (2020) A Study on the Relationship between Economic Resilience and High-Quality Economic Development in Western China.Regional Economic Review, 5, 23-35.
[8] Chen Y.W., Ding G. L. (2020) Measurement of Urban Economic Resilience of Prefecture-level Cities in China. Statistics & Decision, 36(21), 102-106.
[9] Qi X., Zhang J.S., Xu W. X. (2019) A Study on the Evaluation of the Development of County Economic Resilienc in Zhejiang Province. Zhejiang Social Sciences, 5, 40-46+156.
[10] Zhang P., Zhang Z.R., Yuan F. H. (2019) International Comparison and Institutional Arrangement of Jigh-quality Growth and Enhancing Economic Resilience.Social Science Front, 8, 77-85.
[11] Liu X.X., Zhang X., Li S.W. (2021) Measurement of China's Macroeconomic Resilience: A Systemic Risk Perspective. Social Sciences in China, 1, 12-32+204.
[12] Du Z.W., Jin L.X., Liu Q.H. (2019) Industrial Diversity, Innovation, and Economic Resilience:Empirical Analysis of the Pearl River Delta in the Post-financial Crisis Era. Tropical Geography, 39(2), 170-179.
[13] Zhao C.Y., Wang S.P. (2021) The Influence of Economic Agglomeration on City Economic Resilience.Journal of Zhongnan University of Economics, 1, 102-114.
[14] Su R.G., Zhao X.L. (2020) Manufacturing Development, Entrepreneurial Vigor and Urban Economic Resilience. Finance & Economics, 9, 79-92.
[15] Zhang Z., Zhao R.Y. (2021) Research on the Spatial Spillover Effect of Financial Industry Agglomeration on Regional Economic Resilience. Contemporary Economic Management, 43(3), 89-97.
[16] Ye T.Y., Li G.L., Liang X.R. (2021) Can Social Capital Enhance Regional Economic Resilience Effectively?—Empirical Analysis from the Three Major Urban Agglomerations in Eastern China. Inquiry into Economic Issues, 5, 84-94.
[17] Li Q. (2019) What kind of country is Thailand? Imp-Exp Executive, 548(5), 38-40.
[18] Ma J. (2019) Analysis of Thailand's Industrialization Development from the Perspective of Foreign Trade. Modern Economic Information, 11, 181.
[19] Luo Y.F. (2021) East Asian Industrial Chains Transformation and Leaping over "Middle-income Trap" -A Case Study of Thailand's Economic Development. Southeast Asian Studies, 1, 38-63.
[20] Han B.J. (2020) On China's Economic Resilience under the Impact of Epidemic Situation. Theoretical Exploration, 5, 116-121.