

# Multivariate Synergy Analysis of the Development Efficiency of Green Finance in China

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**Abstract:** Based on the diversity of green finance, this paper analyzes the development of green finance in the stage of rapid economic growth and the stage of economic new normal development. Research shows that the overall level of green finance development in the new normal development stage of the economy is generally higher than that in the high-speed growth stage of the economy, but the development speed is relatively slow, even stagnant. The difference is that the development speed of the central region has broken through the bottleneck and is in a leading position. The development of green finance has significant structural and regional heterogeneity in improving economic resilience, and regions with fast industrial upgrading, strong technological innovation, and large development scale have stronger upgrading effects. The development of green finance has a strong impact on the economic resilience of eastern provinces, followed by central and western provinces. Through further analysis of transmission channels, it is found that green finance can affect macroeconomic resilience through technological innovation and industrial structure upgrading, that is, technological innovation and industrial structure upgrading play a partial intermediary role between green finance and macroeconomic resilience.

**Keywords:** Multivariate Synergy , Development Efficiency, Green Finance

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## 1. INTRODUCTION

Over the past 40 years of reform and opening, China's economy has achieved rapid development and people's lives have improved. However, in recent years, the driving force of economic growth has become increasingly weak, resulting in a gradual decline in the growth rate, and the ecological environment has also been subjected to pollution that cannot be ignored. The continuous deterioration of the ecological environment has brought continuous adverse effects on the production and life of our people and left a heavy governance task for government agencies. At the same time, decades of high energy consumption and extensive development mode have led to excessive consumption of economic resources in China, and the development mode is in urgent need of transformation. At the beginning of the birth of green finance, it was precisely to solve environmental problems and promote the green transformation of economic development methods. Therefore, establishing a practical and feasible indicator system of green finance can help solve environmental problems and promote green development of the economy.

It is not difficult to find that the academic community mostly studies and evaluates the development level of green credit for financial institutions such as commercial banks, as a substitute for the development level of green finance. Even at the macro level, most discussions are conducted from the perspective of big finance. The evaluation content is relatively broad, and the evaluation indicators are mostly superficial. Few documents quantitatively evaluate the development level of green finance from the perspective of whether finance has a promoting effect on the economy, that is, financial function. Factors such as the degree of financialization, the level of economic development, and the level of living and education of residents are the main factors that affect the development of green finance.

Overall, the current development status of green finance efficiency in China is far from the national goal, and this issue needs to be addressed urgently. So how to improve the

efficiency of green finance in China? This article takes the green gold reform zone as a sample to study the development efficiency of green finance, clarify the factors that affect the efficiency of green finance in the green gold reform zone and their impact degree, to provide useful reference for comprehensively improving the development efficiency of green finance in China. Resilience refers to the process of maintaining the original state and being able to self-adjust and recover in a relatively short time under the influence of natural disasters or other factors. Yu et al. found that the economic resilience of most cities in China is relatively low, but it will gradually increase over time, and the economic resilience of different regions varies greatly.

In terms of influencing factors, Davies analyzed the impact of industrial organizations on the economic development of European countries from the perspective of industrial structure and found that regions dominated by the development of the financial industry have strong economic resilience, while regions dominated by manufacturing and construction industries have relatively weak economic resilience. Sun Jiuwen and Sun Xiangyu also confirmed that industrial structure, industrial policies, and cultural factors have an important impact on regional economic resilience by analyzing the reasons for the economic downturn in Northeast China. In terms of growth rate, until 2013, the growth rate on a month-on-month basis was in the eastern region (19.19), the western region (13.56), the national region (12.86), the northeast region (12.21), and the central region (9.79), which is related to the strategy of "taking the lead in developing the east, developing the west, rising the central region, and revitalizing the northeast".

## 2. THE PROPOSED METHODOLOGY

### 2.1 Measurement and Analysis of the Diversified Development Level of Green Finance

In the new normal development stage of the economy, the development trend of green finance is relatively flat. In terms of the development level of green finance, the average level of green finance in various regions and across the country from 2014 to 2016 was in the northeast (0.2491), the west (0.2073), the central (0.1997), the whole country (0.1895), and the east (0.1516), which is generally higher than the high-speed economic development stage, but the average growth rate is generally lower compared to the high-speed economic growth stage. The average growth rate in 2016 was in the middle (12.64), northeast (7.26), nationwide (-0.07), eastern (-2.05), and western (-5.71). The savings and investment conversion function refers to the financial system providing financing for fund demanders, mobilizing fund demanders to convert the obtained funds into effective green investment through means such as agreeing on the direction of loan investment and reducing transaction costs, providing capital elements for green production activities, and meeting the huge capital demand for activities such as energy conservation and emission reduction, resource conservation, and environmental protection.

To achieve lower transaction costs, the financial system can adopt differentiated credit policies, including differentiated interest rate floating levels, lower access thresholds, and appropriate capital investment preferences. Firstly, the average efficiency of green finance is ranked from high to low in Guangdong, Jiangxi, Zhejiang, Xinjiang, and Guizhou, with efficiency values of 1.08, 1.03, 1.02, 0.99, and 0.98. Further analysis shows that the number of effective units in Table 2 is greater than the number of ineffective units, and the effective units are Guangdong, Jiangxi, and Zhejiang, respectively. Moreover, there is no significant difference in the size of the average efficiency of the three provinces. The ineffective units are Xinjiang and Guizhou, with a difference of 0.1 between Guizhou, which has the lowest efficiency value, and Guangdong, which has the highest efficiency value. There is a significant gap between the development level of green finance in Guizhou and Xinjiang and the other three provinces and regions.

Currently, there are two main methods for measuring economic resilience in the literature: the first is to use the sensitivity index method to measure economic resilience, that is, the single index method; The second is to build a comprehensive indicator system to measure economic resilience. The single index method is more one-sided and cannot comprehensively reflect economic resilience. Economic resilience is not only reflected in the sensitivity to shocks, but also in the ability of the economic system to cope, adapt, and innovate after being hit. Therefore, this article intends to construct an economic resilience evaluation system from three perspectives: resilience to shocks, organizational coordination, and innovation and transformation capabilities, with reference to the method of Cui Genrui . Using the method of Zhu Jinhe and Sun Hongxue for reference, the entropy method is used to calculate economic resilience. However, the development speed of the central region has broken through the bottleneck. Therefore, to promote the development of green finance, China should appropriately extend the green finance development policies in the central region to other regions, in order to better promote the

development of green finance throughout the country. To this end, this article makes the following recommendations. Each indicator can achieve the best effect on the evaluation of green finance functions, and the degree of redundancy between them is minimized, without duplication, overlap, and conflict. The third is accessibility. Accessibility means that the required data must be easy to collect, and its source channel must be reliable and easy to obtain.

### 2.2 Policy Suggestions for the Diversified Development of Green Finance

Sustainability refers to the continuous and reliable collection of data involved. It shows that it is effective, and in the remaining years, it is less than 1, presenting an inefficient state. The main reason for this phenomenon is influenced by technological changes and changes in scale efficiency. From the mean value, the efficiency values of scale efficiency, pure technical efficiency, and technological efficiency changes are greater than 1, while only the efficiency value of technological change is less than 1, indicating that technological progress is an important factor impeding the improvement of green finance efficiency. The reasons for the above changes are on the one hand, with the strengthening of national support for the scale of green credit, the scale efficiency of each province has been improved; on the other hand, with the continuous strengthening of management, pure technical efficiency has been continuously improved, thereby improving technical efficiency.

First, green finance improves economic resilience by optimizing resource allocation. With global warming, the development of green finance has received widespread attention. Green finance promotes the implementation of energy conservation and emission reduction strategies by the country, inhibits the excessive expansion of energy intensive and high pollution industries through the development of financial tools, guides social funds to flow to the field of environmental protection, and provides financial support for green transformation. At the same time, the development of green finance can promote structural reform of the financial supply side, reduce capital costs, improve investment returns, and promote the establishment of a systematic risk prevention and early warning system, thereby effectively resolving risks, supporting economic recovery, and improving economic resilience. According to the principle of factor analysis and based on the principle that the cumulative variance contribution rate reaches 70% to 85% as the selection criteria, this paper extracts a total of three common factors, with a cumulative variance contribution rate of 84.59%. This indicates that the first three common factors provide sufficient information for the original data, which can well explain and explain the problem.

The proportion of the variance contribution rate of each factor to the total variance contribution rate of the three factors is used as a weight for weighted summary. Investment in environmental pollution control plays an important role in the development of green industry and economy. As countries and enterprises increase the amount of investment in environmental pollution control, the input cost in green financial efficiency increases, resulting in a decrease in green financial efficiency when the output remains unchanged. First, green finance promotes industrial upgrading and improves economic resilience. To comply with China's green development strategy, green finance uses credit policies and differential threshold constraints as means to provide funds for low-pollution and low-power consumption enterprises and projects, increase the financing costs of high-pollution and

high-energy consumption enterprises, reduce their financing levels, promote more capital investment in green industries, optimize the industrial structure, and enhance economic resilience.

In addition, the development of green finance will promote green enterprises to improve their management and promote industrial integration. At the same time, through the redistribution of production factors, the industrial structure is upgraded and optimized, improving the resilience of enterprises to shocks, and thus improving the resilience of the national economy. From a practical perspective, this is mainly caused by the difficulty of deleveraging and the short-term performance outlook of local governments. On the one hand, enterprises are caught in a dilemma of deleveraging: deleveraging means that enterprises need to shrink their business and reduce economic activity, which is undoubtedly "adding insult to injury" to already underperforming enterprises and accelerating the exposure of credit risks. However, if you do not actively deleverage, you will ultimately have to passively deleverage, often manifested as a crisis and deep recession, spreading credit risk. To slow down the process of credit risk exposure in the financial system, the exit process from polluting industries is also relatively slow.

### 3. CONCLUSION

Developing green finance is a necessary way to achieve coordinated economic, social, and environmental progress and achieve sustainable development. Therefore, exploring the efficiency changes and influencing factors of green finance in the green gold reform zone is of great significance for improving the efficiency of green finance and achieving sustainable economic development. Based on the construction of the green finance input-output index system, this article uses the super efficiency DEA and Malmquist index to analyze the green finance efficiency of the green gold reform zone from both static and dynamic aspects. It should focus on cultivating green finance talents, learning foreign leading technologies, and improving green finance innovation capabilities. At the same time, the government effectively solves the investment and financing problems of green enterprises and projects through guarantees for green enterprises, reduces the risks of financial institutions, promotes financial product innovation, promotes the development of green economy, and improves economic resilience.

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