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The Driving Effect of Carbon Financial Mechanism Innovation on the Optimization and Upgrading of Industrial Structure

--A Data Analysis Based on Provincial Panels

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ABSTRACT

The purpose of this research project is to deeply analyze how the innovation of carbon finance mechanism drives the optimization and upgrading of China's industrial structure to a more low-carbon, environmentally friendly and efficient mode at the provincial level. Under the new situation of global climate governance, carbon finance, as an innovative financial instrument and institutional arrangement, helps China's economy to develop in a green and sustainable way by guiding and allocating financial resources through the market mechanism. The project adopts provincial panel data analysis methods and double difference models to systematically examine the innovative practices of various carbon financial products (e.g., green credit, green bonds, carbon emissions trading, etc.) and their impacts on regional industrial structure. Specifically, we will explore how the carbon financial mechanism can effectively mobilize social capital to invest in the fields of clean energy, energy saving and consumption reduction, and circular economy, accelerating the development and growth of emerging industries; at the same time, we will analyze how it can act on the traditional high-carbon industries through price signals, motivate enterprises to increase technological research and development, reduce the intensity of carbon emissions, and promote the transformation and upgrading of traditional industries. In addition, the project will also assess the interaction between government carbon emission reduction policies and carbon financial mechanisms, as well as the differences and effectiveness of different provinces in using carbon financial tools to promote the optimization and upgrading of industrial structure, so as to provide strong data support and theoretical basis for the formulation of scientific and reasonable carbon financial policies and industrial restructuring strategies in various regions of China.

KEYWORDS

Carbon finance; Panel data; Empirical analysis

1. BACKGROUND OF THE STUDY

1.1. Background of the Study

With the increasing prominence of the global warming problem and the fulfillment of the international community's commitment to the Paris Agreement, the transformation of the low-carbon economy has become a core strategic choice for countries around the world. Against this background, carbon finance has emerged as an innovative financial mechanism, which realizes the organic combination of ecological environmental protection and economic growth through the quantification and pricing of greenhouse gas emission rights and the formation of corresponding financial products

and services, and strongly promotes the green transformation and development of the economy and society.

In China, as the construction of an ecological civilization has been incorporated into the national development strategy, the task of optimizing and upgrading the industrial structure, especially the transformation from high-carbon to low-carbon and from rough to intensive, is particularly urgent. As the world's largest carbon emitter, China must face the severe pressure of energy conservation and emission reduction while pursuing high-quality development, which requires us to give full play to the innovative and leading role of the carbon financial mechanism, and guide the flow of capital to the low-carbon and environmental protection industries through market-oriented means, so as to help the deep adjustment and upgrading of industrial structure.

At the recent Central Financial Work Conference, General Secretary Xi Jinping analyzed the situation facing high-quality financial development and deployed current and future financial work in an important speech. The conference proposed "doing a good job in five major articles on science and technology finance, green finance, inclusive finance, pension finance, and digital finance", which points out the direction for firmly grasping the theme of promoting the high-quality development of finance and doing a good job in related financial work.

1.2. Significance of the Study

1.2.1. Theoretical level of significance

a.Enrichment and development of carbon finance theory: This study helps to improve and expand the theoretical framework in the field of carbon finance through in-depth analysis of the impact of carbon finance mechanism innovation on the optimization and upgrading of industrial structure, especially in terms of how financial instruments specifically work on the structural adjustment of the real economy and how to solve the problem of environmental externality by means of market-oriented means, so as to fill in the gaps of existing theories and enrich the theoretical connotation of carbon finance.

b.Deepening the theory of industrial structure change: Combining the perspective of carbon finance to study the new power source of industrial structure optimization and upgrading can deepen the understanding of the theory of industrial structure change, especially how to pry the deep-seated change of industrial structure with the help of financial tools under the circumstance of aggravating resource constraints and increasing environmental pressure.

1.2.2. Implications at the practical level

a. Reference for policy formulation: The conclusions of this study based on the analysis of provincial panel data can provide important empirical evidence for the central and local governments to formulate targeted carbon financial policies, and to guide and incentivize the optimization and upgrading of industrial structure. Clarifying the key roles and transmission paths of carbon financial mechanism innovation in promoting industrial restructuring in different provinces will help policymakers to accurately implement policies and improve the effectiveness and relevance of policies.

b. Promoting green and low-carbon development: In the context of the global response to climate change, revealing the driving effect of carbon financial mechanism innovation on the optimization and upgrading of industrial structure will help accelerate China's and even the world's energy structural transformation and industrial upgrading, reduce carbon emissions, promote green and low-carbon economic development, and implement the United Nations sustainable development goals.

c. Enhancement of enterprise competitiveness: The results of the study can help enterprises understand and grasp the opportunities and challenges brought by the innovation of carbon financial mechanism, and guide them to adapt to the carbon pricing mechanism, proactively seek technological

innovation and management innovation, enhance their competitive advantages in the low-carbon industrial chain, and promote the green transformation and sustainable development of enterprises.

In conclusion, this study not only enriches the academic discussion on the interaction between carbon finance and industrial structure optimization and upgrading in theory, but also provides valuable reference and guidance for policy making and corporate behavior in practice, which is of great significance for promoting the low-carbon transformation and sustainable development of China and even the global economy and society.

1.3. Domestic and International Developments

1.3.1. Current status of domestic research

Domestic research on carbon finance started late. With regard to the definition of carbon finance, Wang Zi and Li Ji (2008) believe that the carbon finance market should include not only carbon-related financial activities, but also investment and financing for the development of low-carbon projects as well as the green credit business of banks; Zeng Gang et al. (2009) define carbon finance in terms of carbon trading activities, and believe that carbon finance encompasses a variety of financial systems and trading activities for the purpose of reducing greenhouse gas emissions [24]; while Qiao Haisu et al. (2011) believe that carbon finance should also include the provision of consulting services related to low-carbon projects and the guarantee of delivery of carbon emission rights. activities [24]; and Qiao Haisu et al. (2011) believe that carbon finance should also include the provision of consulting services related to low-carbon projects and intermediary services such as guaranteeing the delivery of carbon emission rights; for the study of the development of carbon finance in China, Lan Cao (2014) evaluates the efficiency of carbon finance transactions through various indicators, and analyzes from the aspects of savings mobilization capacity, capital allocation efficiency, and non-performing loan rate of green credit, and finds that from the viewpoint of various indicators, the carbon finance transaction efficiency of banks and green credit business is evaluated. analysis, and found that from the view of various indicators, China's carbon financial trading system still lacks macro efficiency; Yang Dian, Qian Chongbin, Zhang Rongguang (2017) took seven pilot regions as the main body of the study, and compared the operational efficiency of each market in terms of operational efficiency, economic, social and environmental benefits, as well as the control of energy consumption and emissions, and found that there are large differences in the overall efficiency of the pilots, and therefore the task of establishing a unified national market is still very arduous: Cheng Yongwei (2017) constructed a DEA evaluation model based on seven carbon emissions trading pilots by selecting indicators from several aspects of price, market, price, trading, and quota, and concluded that Shenzhen, Tianjin, and Hubei are DEA effective, while the efficiency values of Shanghai, Beijing, Guangdong, and Chongqing carbon trading markets are decreasing in order: Qi Huijuan (2018) studied China's carbon finance from the financial institutions to study the carbon finance The development of China's carbon finance, that at present there are problems such as backwardness in the construction of the institutional framework of financial institutions, lack of relevant experience in carbon finance business, and insufficient innovation of carbon financial products; Wu Yuying (2019) used the idea of dimensionality reduction, chose to cluster analysis, correlation analysis, and Gini coefficient to screen the 38 preliminary indicators, and analyzed the level of development of carbon finance of the provinces with the particle swarm projection tracing model, and analyzed the level of carbon finance development in each province, and analyzed from the industrial structure, Carbon financial products, high technology, talent training and other aspects of the relevant recommendations are put forward

1.3.2. Current status of overseas research

Foreign scholars for carbon finance research is much earlier than domestic scholars, the birth of the term "carbon finance" originated in the United Nations Framework Convention on Climate Change and the Kyoto Protocol. Foreign scholars first research on the relationship between carbon finance

and the environment, Franklin G Mixon (1993) carried out an empirical analysis of the factors affecting carbon emissions violations, the study showed that business groups can use their strong political influence to determine the environmental policy of the Environmental Protection Agency. environmental finance" concept, Jose believes that in the environmental industry and the financial industry, the definition of their system structure and realization methods and so on are different, he proposed that environmental finance is the mediator between the environmental industry and the financial industry, by analyzing the differences between the two, it is possible to protect the ecological environment and biodiversity through financial innovation. Sonia Labatt and Rodney (2002) conducted an in-depth study on the relationship between financial innovation and environmental protection, and they argued that financial innovation can improve environmental quality while transferring environmental risks.

In 2006, the World Bank first defined carbon finance, and more and more scholars have launched the study of carbon finance. Eichner (2010) found that the development of carbon finance not only has economic value, but also has social value, carbon finance innovatively combines the market economic system with carbon dioxide emissions, and plays the advantage of market economy. Dorsman (2011) found through the study of the EU carbon trading market that the development of carbon finance has played an indispensable role in the development of carbon emission reduction in the EU. DX (2013) believes that the essence of the financial market is still the market, so the scale of the development of the market and the diversification of the market is an important symbol of the evaluation of the development of the carbon finance market.

1.4. Status of Research

Both the carbon finance policy and China's industrial transformation have attracted great attention from academics. Lu Zhida (2020) examined the impact of the development of China's carbon financial market on the decarbonization of resource-based industries by analyzing China's 2006-2019 CDM data and the provincial panel data on the unit energy consumption of resource-based industries, and the empirical results show that the development of the carbon financial market has a significant positive impact on the decarbonization of resource-based industries, and the investment in research and development has a significant contributing role to the decarbonization of resource-based industries, while the impact of the proportion of state-owned property rights is significantly negative, and the regression results by region are in line with the overall regression results. The empirical results show that the development of carbon financial market has a significant positive effect on the decarbonization of resource-based industries, the investment in R&D expenditure has a significant promotion effect on the decarbonization of resource-based industries, and the effect of the proportion of state-owned property rights is significantly negative. Therefore, it is necessary to promote the decarbonization of China's resource-based industries by vigorously developing the carbon financial market, innovating carbon financial products and services, developing carbon financial intermediary organizations, and increasing technological innovation. Peng Yuwen et al. (2019) selected the sample area data from 2006-2016, measured the carbon financial development level of nine provinces and cities and three city clusters using factor analysis, and analyzed the impact of the carbon financial development level of the three city clusters on the change of the industrial structure through a panel data model. The empirical results show that the level of carbon finance development will play a positive role in upgrading the industrial structure of the region. At the same time, there are differences among different city clusters, which are mainly attributed to different levels of economic development, policy orientation and development stages. Finally, it is proposed that the government should increase the investment in energy conservation and emission reduction, strengthen industrial agglomeration and integration, and improve the efficiency of resource utilization; focus on the high-quality development of city clusters to promote the regional economic development; give full play to the diffusion effect of the region, and take advantage of the industrial strengths of the regions to promote the transformation and upgrading of the industrial structure.

1.5. Summary of Literature

To summarize, in previous studies, scholars at home and abroad have conducted in-depth research on carbon financial policy for industrial transformation, and have also put forward different views. However, in the previous research, there still exists the weak links such as the research area is more limited, the research method is more single, etc. Therefore, in this paper, China's carbon financial policy of each province as an example, respectively, to construct the carbon financial policy and industrial transformation and development of the comprehensive evaluation system, the provincial panel data as the basis, the use of gray correlation method, to explore the interrelationships between the two, and finally based on the empirical analysis, to draw a conclusion, and to provide a basis for the formulation of carbon financial policy for Anhui Province and even the whole country under the background of the double carbon. background, to provide a basis for the development of carbon financial policy in Anhui Province and even the whole country.

2. RESEARCH OBJECTIVES AND MAIN CONTENT

2.1. Objectives of the Study

This project firstly analyzes the current situation of carbon finance development and the development of related emerging and traditional industries in a provincial panel, and then uses the grey prediction model to obtain the development trend of the corresponding industries under the innovation of carbon finance mechanism, and establishes the relevant evaluation system accordingly, and then measures the coupling degree of the two, and then establishes the fixed effect model and the double difference model to explore the differences in the performance of the carbon finance policy on the development of industries in different time intervals and assess the policy effect of carbon finance on the optimization of industrial structure in each province. After that, by establishing fixed effect models and double difference models, we will explore the differences in the performance of carbon finance on industrial development in different time intervals in each province and assess the policy effect of carbon finance policy on industrial structure optimization. On this basis, we will analyze the degree of coordination between carbon financial mechanism innovation and related industrial structure optimization in the national carbon market, the degree of coordination between carbon financial mechanism innovation and related industrial structure optimization (from the provincial panel), and we will also analyze the internal mechanism of the policy effect of carbon financial policy on industrial structure optimization in a more in-depth manner; and then we will try to analyze the carbon financial mechanism innovation in terms of regulatory innovation, main body innovation, technological innovation and so on, After that, we will try to analyze how the innovation of carbon financial mechanism promotes the optimization and upgrading of industrial structure mainly for high-emission enterprises in terms of regulatory innovation, subject innovation, product innovation and technological innovation. After the aforementioned, we will be able to illustrate the driving effect of carbon financial mechanism innovation on the optimization and upgrading of industrial structure. After that, we will evaluate the carbon emission reduction policy and carbon financial mechanism, and the difference and effectiveness of the utilization of carbon financial instruments on industrial structure by provinces, and draw useful reference and effective lessons from them, so that we can make suggestions for the innovation of China's carbon financial mechanism, and propose a better model for the innovation and upgrading of industrial structure.

2.2. Content of the Study

This topic first provides a brief overview of the current situation of carbon finance development and the status of related emerging and traditional industries, thereafter establishes an evaluation system, calculates each comprehensive evaluation index, and then conducts an internal differentiation analysis to explore the degree of coupling coordination and the intrinsic driving mechanism of carbon

finance mechanism innovation on the optimization and upgrading of the industrial structure of related industries in certain provinces.

After that, we will pre-process the data and build a fixed-effects model to explore the differences in the performance of carbon financial policies on industrial structure adjustment in different provinces over different time intervals; and construct a double-difference model to assess the policy effects of carbon financial policies on industrial structure optimization.

Then, we will analyze the interaction between carbon emission reduction policies and carbon financial mechanisms and the differences and effectiveness of the use of carbon financial instruments in each province, and finally make suggestions for national policies and enterprise development. In the following, we will show several sides of the research content.

2.2.1. Summary of industrial structure and innovation in carbon finance mechanisms

Entering the new era, especially in the struggle for the second centennial goal, China is emphasizing more and more the importance of high-quality development, and is gradually sailing into the orbit of high-quality development; at the same time, the global climate problem is becoming more and more prominent, and the world is increasingly emphasizing low-carbon, environmental protection, and high-efficiency industrial model. Although China is already the world's second largest economy, it still has the problem of some backward production capacity, which requires a series of upgrading and optimization, and this problem is especially important to pay attention to in similar high-emission enterprises: for example, China's national installed power generation capacity at the end of 2023 was 291.965 million kilowatts, an increase of 13.9% over the end of the previous year, of which the installed capacity of thermal power generation was 1,390.32 million kilowatts, an increase of 4.1%; as of By 2022, China's total energy consumption will reach 541,000,000 tons of standard coal ..... This shows that China's carbon emissions market is vast and has unlimited potential. However, the planning of carbon finance system is only in the initial stage of establishment, and the implementation rules are still in the stage of improvement; the price of the national carbon market is stable and cyclical, which makes it difficult to play its current role; the market participates in a single body, which lacks of better vitality; and the national carbon market is in the stage of theoretical exploration. Carbon financial innovation tools are not able to play their role.

2.2.2. Construction of the indicator evaluation system

The evaluation system of carbon financial mechanism innovation on industrial structure optimization and upgrading is complex and diversified, and it is necessary to select the indicators from the perspectives of coordination, effectiveness and comprehensiveness in a scientific, coordinated and profound way. Referring to the existing literature, this topic divides industrial structure upgrading into four major levels, namely, energy utilization efficiency, environmental benefits, inter-industry carbon emission transfer efficiency, and related carbon technology innovation, and then expresses each level with different indicators.

2.2.3. Measurement of integrated evaluation indicators

Due to the large variation in units of different indicators, the indicators are dimensionless here using the initial value method:

$$X`_i = X_i / x_{i1} = (x`_{i1}, x`_{i2}, ..., x`_{in}),\ i = 1, 2, 3, ..., m$$

where X`i represents the dimensionless series of the ith indicator, Xi represents the value of the reference series for the ith year, xiL represents the value of the L indicator for the ith year, and x` in represents the value of the nth indicator for the nth indicator of the ith year.

The sequence of differences, maximum and minimum values are then solved for:

The difference sequence is:

$$\Delta_{oi}(k)=|x'_o(k)-x'_i(k)|,\ k=1,\ 2,\ 3,\ ...,\ n$$

The maximum difference is:

$$M=Max_iMax_k\Delta_i(k)$$

The minimum value is:

$$m=Min_iMin_k\Delta_i(k)$$

WhereΔ oi(k) represents the difference sequence, x'o(k) represents the kth value in the reference sequence, and x'i(k) represents the kth value of the ith indicator.

After that, we will calculate the correlation coefficient between the innovation of carbon financial mechanism and the development of industrial structure:

$$r(x_0(k),\ x_i(k))=(m+ɜM)/(\Delta_{oi}(k)+ɜM),\ ɜ\in(0,\ 1),\ k=0,\ 1,\ 2,\ ...,\ n,\ i=0,\ 1,\ 2,\ ...,\ m$$

Where ɜ is the resolution factor, often taken as ɜ = 0.5.

Finally, we will get the correlation between carbon financial mechanism innovation and industrial structure development:

$$r(x_0,\ x_i)=,\ i=0,\ 1,\ 2,\ 3,\ ...,\ m$$

2.2.4. Constructing double difference models

What we are discussing is the role of carbon financial mechanism innovation for industrial structure optimization and upgrading, then, as the regulator of the government, the relevant policies issued by them are particularly important, therefore, we can establish a double-difference model to assess its policy effect on industrial structure optimization and adjustment, thus proving the driving effect of carbon financial mechanism innovation on industrial structure optimization and upgrading from one side.

First, we construct a double-double-difference: province level and time level. Since it is combined with panel data, we use the standard double-difference model, which, in summary, can be shown as an econometric model below:

$$Y_{it}=\alpha+\delta D_i+\lambda T_t+\beta(D_i\times T_t)+X_{it}+\varepsilon_u$$

In the above equation,Y_{it} denotes the outcome variable; α is a constant term that does not vary over time;D_i is a binary quantity that denotes the control group when i=0 and the treatment group when i=1;T_t is the point in time at which the carbon finance policy comes into play, which is the undisturbed period when t=0 and the carbon finance policy disturbed period when t=1;X_{it} is a province-year-level e.g. monetary policy a set of control variables;ε_u is the error term.

In order to test the reasonable robustness of the above model, we will perform a robustness test on the model

$$Y_{it}=\alpha+\sum_{s=1}^{T_D-2}\beta_s^{pre}\left[D_i\times T_t^s\right]+\sum_{s=T_D}^{T}\beta_s^{post}\left[D_i\times T_t^s\right]+X_{it}+\mu_i+\gamma_i+\epsilon_{it}$$

β_s^{pre} is the difference between the pre-disturbance period s treatment and control groups relative to the previous period Y_{it}, T_t^s is a time dummy variable for period s, and β_s^{post} is the difference between the post-disturbance period s treatment and control groups relative to the previous period Y_{it}.

If the above test is passed, it means that the Yit of individuals in the treatment group has the same time-varying trend as that of individuals in the control group in the absence of the treatmentY_{it} Here, we indirectly test the parallel trend hypothesis by checking whether the observable ex ante trends of the treatment and control groups are the same. In addition to this, we will also conduct placebo tests etc. for the model.

Due to the limitations associated with standard double differencing, we will use the optimized double differencing model in subsequent studies for a more in-depth and detailed study.

2.4.1. Constructing a fixed-effects model

In order to explore the trend of carbon emissions and its influencing factors in each region of the country from 1990 to 2022, we can use the fixed effect model to analyze. The following is the formula for the construction of the model:

$$C_{it} = \beta_0 + \beta_1 * x_1(i,t) + \beta_2 * x_2(i,t) + \cdots + \beta_k * x_k(i,t) + u_i + \varepsilon(i,t)$$

Where C_{it} denotes the carbon emissions of region i in year t. It is the intercept term, and denotes all other fixed factors not included in the model that affect carbon emissions. is the intercept term, and β_0 denotes all other fixed factors affecting carbon emissions not included in the model. β_1, β_2 ... β_k are the coefficients of the respective variables, indicating the degree of influence of the corresponding independent variables on carbon emissions. $x_1(i,t)$, ... $x_2(i,t)$ $x_k(i,t)$ is the coefficient of the respective variable for region i in year t. These independent variables can include factors related to carbon emissions such as transportation and construction, industrial production, agriculture, forestry and land use, waste disposal, purchased electricity, heating and cooling, etc. The coefficient of the respective variable is the fixed effect of the region, which indicates the degree of influence of the corresponding independent variable on carbon emissions. u_i is the regional fixed effect, which indicates the fixed effect on carbon emissions due to regional differences, which does not change over time. $\varepsilon(i,t)$ is the random error term, which represents the effect of random factors on carbon emissions that are not explained by the model.

And then, we will estimate the fixed effects model using statistical software (STATA). The coefficient estimates of the respective variables are obtained by methods such as maximum likelihood estimation or least squares.

After model estimation is complete, a series of tests are required to ensure that the model is reasonable and valid. These include significance test, goodness of fit test, heteroscedasticity and serial correlation test. Significance test is to check whether the coefficients of the respective variables are significantly non-zero to determine whether they have a significant effect on carbon emissions. The goodness-of-fit test assesses how well the model fits the data, e.g. by calculating the R-squared or adjusted R-squared values. Heteroskedasticity and serial correlation tests are to check whether the model has heteroskedasticity and serial correlation problems to avoid inaccurate estimation results. If the model suffers from these problems, it needs to be corrected by appropriate methods, using weighted least squares to deal with heteroskedasticity, or using differencing to deal with serial correlation.

Finally, we will analyze the results. Based on the model estimation results, the extent and direction of the impact of the respective variables on carbon emissions will be analyzed. Specifically, the following points can be focused on:

a. Coefficient size and sign: the size of the coefficient reflects the degree of influence of the independent variable on carbon emissions, while the sign of the coefficient indicates the direction of the influence (positive or negative).

b. Significance levels: the significance levels of the coefficients of the respective variables are checked to determine whether their effects are reliable.

c. Area Fixed Effects: Analyze the magnitude and variance of area fixed effects to understand the fixed differences in carbon emissions across regions.

2.4.2. Differential analysis of coupling degree of different provinces in China

In China, the differentiated analysis of the driving effect of carbon finance policies on regional industrial optimization and upgrading in different provinces can be carried out in the following dimensions:

(1) Differences in policy responsiveness: The degree of responsiveness of different provinces to national-level carbon finance policies varies, depending on the strength of local policy implementation, the urgency of local industrial restructuring, and the importance that local governments attach to green development strategies. Some provinces may be quicker to formulate and implement local measures in line with the national carbon finance policy, which strongly promotes the transformation of high-energy-consuming and high-emission industries in the region to low-energy-consuming and low-carbon-emission industrial models.

(2) Differences in industrial structure: The industrial structure of Chinese provinces varies, with some focusing on heavy industry and others on light industry, services or modern agriculture. The effects of carbon finance policies vary in different industrial contexts. For example, in energy-intensive provinces, carbon finance can accelerate coal substitution, new energy development and technological transformation, while in manufacturing regions, it may focus more on improving energy efficiency, promoting cleaner production technologies and product life-cycle management.

(3) Degree of carbon market development: With the gradual establishment and improvement of China's carbon emissions trading market, the different degree of carbon market development in different regions directly affects the effect of carbon finance policies. Places such as Beijing, Shanghai and Guangdong have already established more mature carbon trading markets, which are richer in carbon financial instruments and have a more significant prying effect on industrial upgrading; in contrast, in other regions where the carbon market has not yet been established or is not yet active, the driving force of carbon financial policies may be relatively weak.

(4) Regional innovation capacity and investment in technological research and development: Carbon finance policies can promote industrial upgrading in the region by directing funds to low-carbon technological innovation and research and development. Provinces and regions with a concentration of high-tech industries and stronger scientific research strength are more likely to achieve industrial technological innovation when they are stimulated by carbon finance policies, thus rapidly achieving industrial optimization and upgrading.

(5) Regional natural conditions and carbon sink potential: Some provinces, because of their rich forest resources or other natural resources that can generate carbon sinks, can obtain additional financial support under the carbon finance policy through the development of carbon sink projects, which also provides a new path for their industrial restructuring.

In conclusion, the driving effect of carbon finance policies on the optimization and upgrading of industries in different provinces and regions of China is significantly differentiated, and there is a need to design and implement the policies in accordance with the actual situation of each region and to strengthen cross-regional coordination and cooperation, so as to ensure the coordinated development of the green and low-carbon industries on a national scale.

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