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Exploring the Influence Factors and Pathways of Green Finance on Carbon Emissions based on the Entropy Right Approach

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Abstract

In today's era, China has made significant progress in economic growth, industrialization and social development, but at the same time, serious environmental pollution problems have emerged. The goal of green finance is to pursue the harmonious development of financial activities, environmental protection and ecological balance, and with the increasing carbon emissions, it is urgent to achieve the goal of "double carbon". Therefore, in order to make better use of green finance to deal with the increasingly urgent ecological and environmental problems, especially carbon emissions, it is especially important to explore the impact and mechanism of green finance on carbon emissions.This study analyzed the impact of green finance on carbon emissions using 30 provincial panel data sets from 2006 to 2019. A green finance development index based on four indicators, namely, green credit, green securities, green insurance and green investment, was constructed to measure the level of green finance development using the entropy weight method. The carbon emission of each region was measured by using the calculation method of IPCC. After that, a statistical model was established and the following conclusions were obtained through the regression analysis of Moran index, spatial Durbin model and interaction term model: (1) green finance has a strong inhibitory effect on carbon emission; (2) green finance has a positive spatial spillover effect on carbon emission; (3) green technological innovation has a positive moderating effect on green finance affecting carbon emission.

Keywords

Green Finance; Carbon Emissions; Green Technology Innovation; Spatial Durbin Model; Interaction Item Model.

1. Introduction

1.1. Background and Significance of the Study

Since the reform and opening up in 1978, China has made significant progress in terms of economic growth, industrialization and social development, and with this has come the problem of excessive resource consumption and environmental pollution. At a time when China's CO2 emissions have increased from 1,455 million tons in 1978 to 9,839 million tons in 2017, according to data released by the Global Carbon Atlas [1], green finance is an obvious way forward for China.

Essentially, green finance aims to provide investment, financing and other financial services for environmental projects, with environmental protection as the main driver. Since the introduction of green finance policies by the Chinese government in 2015, China's green finance system has been continuously improved, and by the end of 2018, the total volume of transactions in the national carbon trading pilot primary and secondary spot markets was 2.82

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million tons, with a total transaction value of 6.2 billion yuan. In order to achieve the goal of green development, China needs to achieve innovation in various fields, including economic, financial, and technological, in order to achieve China's key strategic goal of sustainable development.

Meanwhile, the research on green finance and ecological environment in China is still in its initial stage. In order to better utilize green finance to address the increasingly pressing ecological and environmental issues, especially carbon emissions, it is particularly important to explore the impact and mechanisms of green finance on carbon emissions. For the weak role played by green finance in influencing carbon emissions, the importance of technological transformation in it has rarely been measured [2]. We believe that the development of green finance can effectively reduce carbon emissions, and the green technology innovation factor in green finance has a more significant and important impact on reducing carbon emissions.

1.2. Literature Review

Most of the existing studies have examined the impact of financial development on carbon emissions, but very little literature has examined the role of green finance in carbon emission reduction, and few have examined the impact of STI factors in green finance on carbon emissions [3]. However, green science and technology innovation is both one of the many factors that lead to green finance and one of the important parts that directly affect carbon emission indicators, so how does green finance affect carbon emission and how big is the role of science and technology innovation in the impact of green finance on carbon emission? Based on this, this paper, from the perspective of green finance, empirically investigates the carbon emission reduction effect of green finance based on dynamic panel data model, and with the help of data from 30 Chinese provinces (cities) from 2006-2019, studies the impact of green finance on carbon emissions and the importance of green technological innovation in the path of green finance affecting carbon emissions [4-5], enriches the relevant research results of green finance, and provides a new approach for the current stage of China's green This study will enrich the research results of green finance and provide new thinking for the introduction of new policies of green finance in China at this stage.

2. Green Finance Affects Carbon Emissions Impact Mechanism Analysis

2.1. The Role of Green Finance on Carbon Emissions

Theoretically, there are various ways for green finance to have a suppressive effect on carbon emissions. First, through financial guidance, green finance will promote the commercial market to shift to high-quality industrial projects with good development prospects, while policy-based financial institutions will focus on supporting low-carbon and environmentally friendly industries, and the distribution and transfer of funds between industries will jointly promote the optimization of industrial structure, reduce the supply of funds to high-pollution and high-emission enterprises, forcing them to This will reduce the supply of funds to high-polluting and high-emission enterprises, forcing them to carry out technological transformation and upgrade or reduce the scale of production, and also alleviate the financing constraints of low-carbon enterprises, providing more low-carbon products or services and reducing carbon emissions together. The second is the guidance of the consumer market. With the emergence of abundant green financial derivatives, this will help enhance consumers' awareness of low carbon and increase the demand for green products, and consumers will be willing to pay higher prices for low-carbon goods, which will attract the production of low-carbon products and promote the reduction of carbon emissions in the whole society. investors can form their own asset structures with their own risk preferences, broaden the financing channels of emerging industries and high value-added industries, and thus promote industrial structure upgrading.

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Hypothesis 1: Green finance has a dampening effect on carbon emissions.

2.2. Spatial Spillover Effects of Green Finance on Carbon Emissions

Due to the spatial effect, a positive spatial autocorrelation of the ecological environment after the impact of green finance on the ecological environment can show a cluster phenomenon geographic space, resulting in the ecological environment of the surrounding provinces will interact with each other and eventually reach a state of equilibrium. The development of green finance in the central city can solve the environmental pollution caused by the economic development of the region to a certain extent, which will reduce the environmental pressure in the surrounding areas. At the same time, the development of green finance in China has a strong regional policy, and the degree of autonomous and differentiated development is low, while the development of green finance is directly related to the regional resource input, the development of green finance in the central city will drive the development of green finance in the surrounding areas and produce a demonstration effect, thus affecting the carbon emission in the surrounding areas.

Hypothesis 2: There is a positive spatial spillover effect of green finance to the surrounding areas.

2.3. The Role of Green Technology Innovation in Green Finance Affecting Carbon Emissions

Green finance firstly, through the guidance of capital, low-carbon industries are given financial support to form the green capital needed for the development of green industries, so as to promote industrial adjustment and optimal allocation, realize green technology innovation and industrial transformation, reduce the negative externalities brought by the environment, and then suppress and feedback carbon emissions through the new energy-based green industries after transformation. Technological innovation is an important factor to improve the efficiency of green development, and higher technological innovation capability is an important guarantee for the rapid improvement of green development level. Technological progress improves the energy consumption structure through the development of new energy, the search for alternative energy sources, etc., and uses clean energy to replace fossil energy. Under the green financial reform, the use of financing mechanisms to use green funds for the scientific and technological innovation of enterprises promotes the investment of enterprises in the field of green technological innovation, and the diversified green financial model improves the level of technological research and development of green industries, which helps to improve the efficiency of energy use. The same level of output only needs to consume less energy, thus running green industries in ecological environmental protection and improving green development, which has a direct and major inhibiting and regulating effect on carbon emissions.

Hypothesis 3: Green technology innovation has a positive moderating effect on green finance influencing carbon emissions.

3. Green Finance Impact on Carbon Emissions Construction and Measurement

3.1. Construction of the Index System

3.1.1. Green Finance

This paper constructs an index system to measure the development level of regional green finance according to the development characteristics and data availability of green finance in China, which includes: green investment, green stocks, green credit and green bonds. Among them, this paper measures the scale of green credit in each region by the loan amount of green-related listed companies in the region. Companies with green-related concepts in the A-share

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market are screened in the Wind database as research samples, including energy conservation and environmental protection, wind power generation, ethanol gasoline, charging pile, photovoltaic, waste power generation, sewage treatment, waste gas treatment, beautiful China and other concepts. The data are aggregated by company affiliation into a regionally-driven panel. The People's Bank of China only started to formulate the issuance rules of green bonds in 2015, and the data cycle is short and relevant data are not available for some regions. Therefore, this paper adds up the labeled green bonds approved by NDRC or SEC in Wind database and the non-labeled green bonds filtered by keywords such as new energy, clean, and climate, and aggregates them by the affiliation of issuing entities to obtain them. Green stocks are measured using the ratio of market value of green-related listed companies to the total market value of A shares. This paper uses the ratio of investment in environmental pollution control to GDP to measure the level of green investment in a region. The data are obtained from the China Environment Statistical Yearbook and China Ecological Environment Statistical Annual Report of previous years.

3.1.2. Carbon Emissions

The measurement method proposed by IPCC to calculate the carbon emissions of each region, eight fossil energy sources such as kerosene, gasoline and natural gas are selected in this paper to measure the CO2 emissions. The data are obtained from the China Energy Statistical Yearbook of previous years.

3.1.3. Green Technology Innovation

Since patents are the most direct reflection of the level of technological innovation within a certain period of time, however, it takes a long time period from application to granting of patents, resulting in a certain time lag in the number of patents granted. Therefore, this paper adopts the number of green-related patent applications to reflect the level of green technology innovation in a certain period of time.

3.2. Measurement Process

3.2.1. Measurement of Green Finance

Entropy method is a scientific and effective weighting method to determine the weight of indicators by the information provided by the data itself. This paper adopts the entropy method to calculate the weight of each green financial development indicator, and then measure the level of regional green financial development. The concept of entropy originates from the classical thermodynamic theory, and it is an objective weighting method to reflect the dispersion degree of indicators. The higher the entropy value is, the greater the impact on the comprehensive evaluation will be. Therefore, the weights of indicators can be determined based on the entropy value of the information provided by the observations of each indicator. Suppose there are M programs to be evaluated, N evaluation indicators, and the original indicator data matrix is$X = (x_{ab})_{M\times N}$. For indicator xa, the greater the difference of indicator values xab, the greater the impact on the comprehensive evaluation. In the case that the values of an indicator are equal, the indicator has no influence on the comprehensive evaluation. The specific calculation process is as follows:

(1) To avoid logarithmic nonsense in the entropy value calculation, the data need to be shifted. For positive indicators (larger values are better):

$$X'_{ab} = \frac{x_{ab} - \min(x_{1b}, x_{2b}, \ldots, x_{Nb})}{\max(x_{1b}, x_{2b}, \ldots, x_{Nb}) - \min(x_{1b}, x_{2b}, \ldots, x_{Nb})} + 1, a = 1,2, \ldots N; b = 1,2, \ldots, M \quad (1)$$

For negative indicators (the smaller the value, the better):

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$$X'_{ab} = \frac{\max(x_{1b},x_{2b},\ldots,x_{Nb}) - X_{ab}}{\max(x_{1b},x_{2b},\ldots,x_{Nb}) - \min(x_{1b},x_{2b},\ldots,x_{Nb})} + 1, a = 1,2,\ldots N; b = 1,2,\ldots,M \quad (2)$$

(2) Calculate the ratio of the bth indicator in the ath scenario to the sum of all indicators.

$$P_{ab} = \frac{X_{ab}}{\sum_{i=1}^{N} X_{ab}} \ (b = 1,2,\ldots,N) \quad (3)$$

(3) Calculate the entropy value of the bth indicator:

$$E_b = -k\sum_{i=1}^{N} p_{ab} \ln(p_{ab}), \text{where } k > 0, k = \frac{1}{\ln(N)}, E_b \geq 0 \quad (4)$$

(4) calculates the coefficient of variation of the bth indicator. The coefficient of variation is defined as:

$$G_b = \frac{1-E_b}{M-E'_e}, \ln E_e = \sum_{b=1}^{M} E_b, 0 \leq G_b \leq 1, \sum_{b=1}^{M} G_b = 1 \quad (5)$$

(5) Determine the weights of each coefficient of variation.

$$W_b = \frac{G_b}{\sum_{b=1}^{M} G_b} \ (1 \leq b \leq M) \quad (6)$$

(6) Calculate the level of green finance development in each region.

$$S_a = \sum_{b=1}^{M} W_b \times p_{ab} \quad (7)$$

3.2.2. Calculation of Carbon Emissions

Currently, there is no official data on carbon emissions published in China, nor is there a uniform measurement standard. Among them, studies that determine emission factors based on data published by the United Nations Intergovernmental Panel on Climate Change (IPCC) and the National Development and Reform Commission (NDRC) of China dominate. In this paper, we refer to most of the literature and calculate the carbon emissions of each region according to the measurement method proposed by IPCC (2006 version). IPCC considers that since human burning fossil fuels in production and life produces various polluting gases that damage the environment, the emissions of CO2 can be measured by the amount of fuel burned and other factors, such as carbon emission factor and carbon oxidation factor. The calculation formula is as follows:

$$CE = \sum_{i=1}^{8} (CO_2)_i = \sum_{i=1}^{8} EC_i \times ALCV_i \times COF_i \times \frac{44}{12} \quad (8)$$

Where CE denotes CO2 emission, i represents the type of fossil energy, ECi is the energy consumption, ALCVi is the calorific value (average low level heat generation) of our country, COFi is the carbon oxidation factor (set to 1), and 44/12 is the molecular weight ratio of CO2 to C (molecular weight of C is 22 and molecular weight of O is 12). Carbon emissions and CO2 emissions are two different concepts, for example, 1 ton of carbon emissions is equivalent to 44/12 ton of CO2 emissions.

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3.2.3. Measurement of Green Technology Innovation

According to the classification of international patents such as WIPO, and drawing on the classification of China Green Patent Statistical Report, the patent applications in the fields of environmental control and management, environmental materials, alternative energy, energy conservation and emission reduction, green agriculture/forestry, recycling technology, new energy vehicles, green buildings, green management, etc. were searched in the State Intellectual Property Office, and the green applications in 30 provinces, cities and autonomous regions were obtained by summarizing according to their places of belonging. The number of patent applications.

4. Empirical Analysis of the Impact of Green Finance on Carbon Emissions

4.1. Statistical Model Construction

4.1.1. Global Moran Index

This paper uses the global Moran's index (Moran'I) to test whether there is spatial autocorrelation, i.e., whether there is spatial agglomeration, between regions in terms of green financial development and carbon emissions. Moran'I is used to test whether the study object has spatial agglomeration characteristics, and it reflects the spatially adjacent or spatially neighboring regional units The correlation degree of attribute values. The calculation formula is as follows:

$$\text{Moran's I} = \frac{\sum_{i=1}^{n}\sum_{i\neq i}^{n} W_{ij}(x_i-\bar{x})-(x_j-\bar{x})}{S^2\sum_{i=1}^{n}\sum_{j\neq i}^{n} W_{ij}} \tag{9}$$

$S^2 = \sum_{i=1}^{n}(x_i-\bar{x})^2$, $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$, xi, xj are the attribute values of regions i and j, respectively.$\bar{x}$ If Moran's I is less than 0, it is spatially negatively correlated, indicating that different attribute values tend to converge within a region. If Moran's I is greater than 0, it is spatially positively correlated, indicating that similar attribute values tend to accumulate within a region. When Moran's I = 0, it indicates that it is uncorrelated.

4.1.2. Spatial Durbin Model

Spatial economic units interact spatially with neighboring economic units through various linkages and are expressed through geographical spatial heterogeneity and dependence. Based on the theoretical analysis in the previous paper, there may be spatial spillover effects on neighboring regions in the process of green finance's impact on carbon emissions. Therefore, the spatial econometric model is used in the validation of this paper, and the spatial Durbin model in the spatial econometric model can consider the spatial effects of both the explanatory and explanatory variables when used. The spatial Durbin model for constructing this paper is shown as follows:

$$CO_{2it} = \alpha + \rho WCO_{2it} + \beta X_{it} + \theta WX_{it} + \mu_i + \varepsilon_{it} \tag{10}$$

where i, t denote region and year, respectively; CO2it is the explanatory variable, Xit is the explanatory variable, mainly including green finance as the core explanatory variable and energy structure, industrial structure and science and education expenditure as the control variables; ρ is the spatial lagged regression coefficient of the explanatory variable,β is the regression coefficient vector of the explanatory variable,θ is the regression coefficient vector of the spatial lagged term of the explanatory variable;α is the constant,μ i is the individual fixed

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effect of region i,ε it is the random disturbance term; W is the i× i-order spatial weight matrix. In this paper, the adjacency matrix (0-1 matrix) is chosen as the spatial weight matrix.

4.1.3. Interaction Term Model

In this paper, the interaction term is used to verify the moderating effect of green technology innovation. Regression variables are introduced and represented by the interaction between green finance and the moderating variable green technology innovation. If the interaction term is significant, it proves the existence of moderating effect. To ensure that the interaction term does not represent green finance and green technology innovation, green finance and green technology innovation variables are introduced into the model separately. The interaction term model is constructed as follows:

$$CO_{2_{it}} = \alpha + \beta GF_{it} + \gamma GTI_{it} + \theta(GF_{it} \times GTI_{it}) + \varphi X_{it} + \varepsilon_{it} \quad (11)$$

Where GFit is the main variable, GTIit is the moderating variable, GFit× GTIit is the interaction term; β ,γ ,θ are the coefficients of the corresponding variables. Xit continues as a control variable, as before.

4.2. Selection of Variables and Data Sources

4.2.1. Core Variables:

Green finance, carbon emissions, and green technology innovation are as described in the previous section.

4.2.2. Control Variables

(1) Energy structure : China, as a major energy consuming country, has the highest residential and industrial energy consumption in the world. China's main energy consumption is dominated by fossil energy, which releases a large amount of carbon dioxide after burning; therefore, the use and burning of fossil coal directly leads to changes in carbon emissions in a region. In this paper, the energy structure is measured by the percentage of fossil energy consumption.

(2) Industrial structure : China's economic growth has gradually shifted from industry-driven to service-driven. The development of service industry mostly does not need to sacrifice the environment, so the change of industrial structure with tertiary industry as the center of development will have an important positive impact on ecological environment. In this paper, we use the tertiary industry share of different urban areas established by the National Bureau of Statistics to measure the industrial structure.

(3) Expenditure on science and education : In this day and age, science and education has been given national importance as a basic national policy, and when the state increases its expenditure on science and education in a region, that region increases its potential for future technological innovation and later promotes green technological innovation, thus affecting carbon emissions. In this paper, we use the amount of actual non-productive social consumption expenditure on scientific research and education in each region in that year to measure the expenditure on science and education.

4.2.3. Data Sources:

The original data of the above variables were taken from the China Statistical Yearbook and China Energy Statistical Yearbook of the relevant years, etc. Under ensuring the completeness of sample data and consistency of statistical caliber, this paper utilizes the statistical yearbooks from 2006-2019 in order to obtain the original observed data in 30 cities.

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4.3. Measurement Process and Results

4.3.1. Spatial Visualization Analysis of Green Finance

In order to more visually analyze the changes in the level of green finance development between regions, the green finance variables are visualized using GeoDa software, and Figure 5 shows the quadratic plots for 2007 and 2020. From an overall perspective, the national level of green finance development has improved significantly during 2007-2020. By region, the spatial pattern in 2020 is basically the same as that in 2007, i.e., the level of green finance development decreases gradually from the eastern coast to the west, with the eastern region being higher and the western region being the lowest. Analyzed from a spatial perspective, the level of green development among regions shows a certain aggregation.

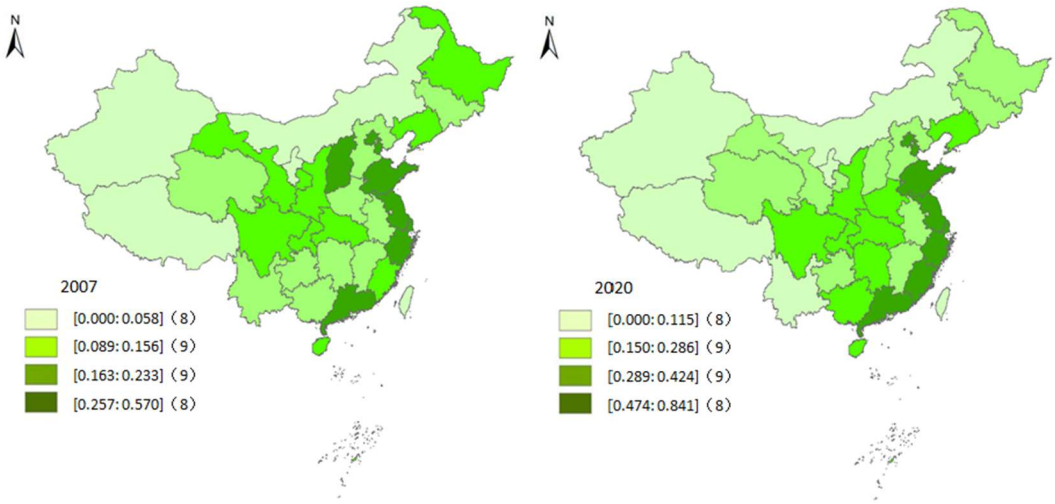

Figure 1. Green finance development level quadrant in 2007 and 2020

4.3.2. Local Autocorrelation Analysis

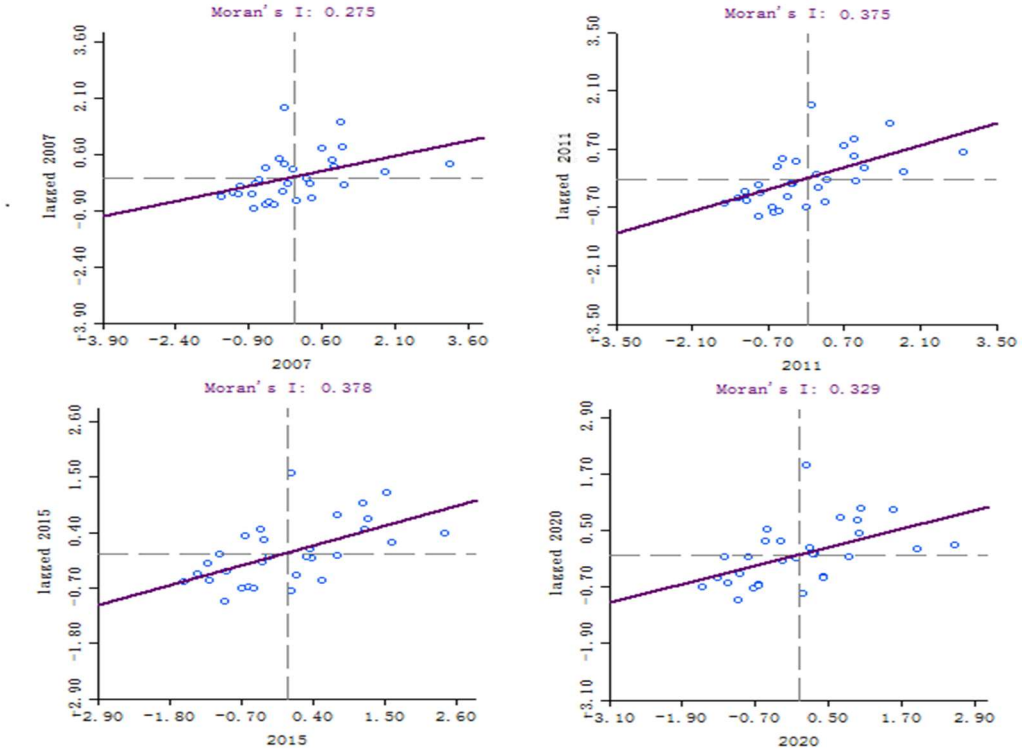

Figure 2. Moran scatter plot of green finance in 2007, 2011, 2015, 2020

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Local spatial autocorrelation analysis using Moran scatterplots. The Moran scatter plot is divided into four quadrants. The first quadrant is the high-high clustering area, i.e., high observations are surrounded by other high observations; the second quadrant is the low-high clustering area, i.e., low observations surround high observations; the third quadrant is the low-low clustering area, i.e., low observations are surrounded by other low observations; and the fourth quadrant is the high-low clustering area, i.e., high observations are surrounded by low observations.

As can be seen from Figure 6, most of the scatter points are distributed in the first and third quadrants, once again verifying the results of the global Moran index analysis that green finance has a positive spatial autocorrelation.

4.3.3. Spatial Durbin Model Regression Results Analysis

We build the model with green finance as the independent variable, carbon emission as the dependent variable, and energy structure (percentage of fossil fuel consumption), industrial structure (percentage of tertiary industry), and expenditure on science and education as the control variables. Through the model, we get that the coefficient of green finance is negative, which indicates that in general, green finance and carbon emissions are negatively correlated, and green finance can reduce regional carbon emissions substantially by optimizing the allocation of financial resources, the progressive effect of technological progress and the signaling effect, and carbon emissions will decrease when the degree of green finance increases.

We also concluded that the coefficient of energy structure (fossil energy consumption ratio) is positive, indicating that fossil energy consumption is positively correlated with carbon emissions, and the burning of fossil energy, as the main factor of carbon emissions at present, has a direct impact on carbon emissions, and an increase in the proportion of fossil energy consumption will naturally lead to a substantial increase in carbon emissions; for the proportion of tertiary industry, the coefficient of industrial structure is calculated to be negative, indicating that The coefficient of industrial structure is calculated to be negative, indicating that industrial structure is negatively related to carbon emissions, and as the tertiary industry that adapts to high pollution enterprises, the increase of industrial share will lead to the transformation of enterprises in the market, and by improving the industrial structure of green industries, the market will be promoted to green emission reduction and reduce carbon emissions; while the coefficient of expenditure on science and education is negative and small, indicating that expenditure on science and education is negatively but not significantly related to carbon emissions, and government expenditure on research and education determines the region's Government spending on research and education determines the potential for future technological innovation in the region, but this is a long-term adjustment process, so the increase in spending on science and education does not have a significant inhibitory effect on carbon emissions.

We observe that W × green finance is negative, indicating that green finance has a spatial spillover effect, which not only reduces local carbon emissions, but also has an effect on suppressing carbon emissions in neighboring regions. The spatial autocorrelation coefficient ρ is positive, indicating that the carbon emission indicators among regions show positive spatial autocorrelation and have some spatial agglomeration.

5. Conclusions and Policy Recommendations

5.1. Conclusion

Using panel data from 30 provinces and cities from 2006-2019, this paper analyzes the importance of STI factors in the process of green finance affecting carbon emissions from the perspective of green finance. The main findings include: first, green finance has a strong

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inhibitory effect on carbon emissions. Green credit, green venture capital, green stocks and green bonds as the core explanatory variables of green finance, both of which can suppress carbon emissions, and the increase of green finance indicators measured by the combination of the two will even significantly promote the reduction of carbon emission indicators. Second, the impact of green finance on carbon emissions has a significant positive spatial spillover effect on surrounding areas, i.e., green finance in provinces (cities and districts) can improve the ecological environment of surrounding areas. Different levels of green finance have different effects on carbon emissions, and cities with higher levels of green finance will play a great role in suppressing carbon emissions in the neighboring areas due to the demonstration effect and the treatment of environmental pollutants in the area. Thirdly, green technology innovation has a moderating effect on the impact of green finance on carbon emissions. There is a long-term equilibrium relationship among carbon emission index, green finance and green technology innovation, and green technology innovation, as an extremely important factor in green finance, will greatly increase the inhibiting effect of green finance on carbon emission.

5.2. Policy Recommendations

(1) The government should actively promote the development of green finance in the country. From a microscopic point of view, the deterioration of ecological environment provides unprecedented development prospects and business space for green environmental protection enterprises. The government should promote the guidance of green finance for capital when formulating policies, so that capital can be shifted to environmentally friendly green enterprises with the support of green finance and increase the ratio of green capital, thus promoting the optimization of industrial structure and alleviating the financing constraints of low-carbon enterprises, and in the increase of the ratio of green enterprises achieve a significant reduction of carbon emissions. The government should also strengthen the guidance of green finance for the consumer market, and promote the emergence of green financial derivatives in the enhancement of green finance, so that consumers will increase their demand for low-carbon products and promote the reduction of social carbon emissions. By actively promoting the development of green finance, the government will not only develop the green economy but also improve the ecological environment, achieving a win-win situation.

(2) The government's investment in green financial elements should take regional factors into consideration and be carried out in stages. The government should take regional factors into consideration when formulating the development planning of green finance. The positive spatial spillover effect of green finance leads to a significant suppression of carbon emissions in the surrounding areas, so when the government invests green resources in the planning of green finance development, it should comprehensively take into consideration the positive spillover of green finance and avoid wasting resources with the help of regional linkage. The degree of green finance in the central city will affect the level of carbon emission in the surrounding areas, and will also play a role in promoting the degree of green finance in the surrounding areas. Green finance is slow to start and needs a certain amount of time for technology research and development to buffer, so the government should invest green finance resources in stages, firstly focusing on the central area, and through the improvement of the degree of green finance in the central city, it will trigger Therefore, the government should focus on the central area first, so that the green financial resources in the peripheral areas can be triggered to start the green financialization through the enhancement of the green financial degree in the central city, thus reducing the consumption of the buffer time in the early stage of green financialization in the peripheral areas; after that, when launching the green financial resources, the green financial resources should be put into the central city which has the market foundation and development conditions, but also into the peripheral areas which have a smaller degree of green financial. Through regional linkage to expand the radiation area of green

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finance, the spatial spillover effect of green finance on ecological environment will be given full play to maximize the impact.

(3) The government should strengthen the guiding role of green technology innovation in the inhibiting effect of green finance on carbon emissions. As a highly oriented factor in the process of green finance affecting carbon emissions, science and technology innovation should be strengthened. In the development of green finance, the government should focus on the development of new energy, plan the promotion of new energy projects, and maintain subsidies for new energy enterprises. Under the incentive policy, it should encourage the transformation and upgrading of industry greening and change the existing fossil energy-based energy structure of China. The government should also increase the investment in green technology research and development, and improve the technology research and development of green industries with a diversified green finance model, so that only less energy is needed for the same output, improving the level of green development, which has a direct and major inhibiting and regulating effect on carbon emissions.

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