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The Impact of Green Technology Innovation and Environmental Regulation on High-Quality Economic Growth

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Abstract

Under the background of the new economic normal, high-quality development and low-carbon green transformation will be the main theme of China's economic construction in the future, and the emphasis on the ecological environment is also increasing. From the perspective of green technology innovation and environmental regulation, this paper takes 11 provinces and cities in the Yangtze River Economic Belt as samples to investigate the impact of factors such as green technology innovation efficiency, environmental regulation intensity, and carbon dioxide emissions on high-quality economic growth. The research results show that, in general, the improvement of green technology innovation efficiency and the increase of environmental regulation intensity have a significant positive impact on high-quality economic growth, while the increase in carbon dioxide emissions will have a significant negative impact. For different regions, there are differences in the level of high-quality economic growth and the impact of various factors on high-quality economic growth. The research conclusions of this paper can provide more concrete evidence for the formulation of relevant environmental policies in the provinces and cities of the Yangtze River Economic Belt, and have certain practical significance.

Keywords

High-quality Economic Growth; Green Technology Innovation; Environmental Regulation; Carbon Emissions; Double Fixed Effects.

1. Introduction

China's economic growth has achieved rapid growth under the extensive growth model, but the resulting ecological environment damage problem is also very serious, and the growth efficiency is low. The Fourth Session of the Thirteenth National People's Congress pointed out that high-quality development is not only a long-term requirement that must be implemented in the development of various regions, but also the main theme of China's economic and social development during the "14th Five-Year Plan" and beyond.

Therefore, China must take a low-carbon and green transformation road, and cannot continue to promote economic growth at the expense of destroying the ecological environment. Green technology innovation and carbon emission reduction are measures that are in line with green development. Green innovation can use less resources to promote the production process in an environmentally friendly way and generate economic benefits. The development of green technology innovation and the implementation of environmental regulation policies are of great significance for both environmental improvement and economic growth. General Secretary Xi Jinping emphasized at the ninth meeting of the Central Finance and Economics Committee that carbon peaking and carbon neutrality should be incorporated into the layout of ecological civilization construction, and strive to achieve the previously set goals of carbon

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peaking by 2030 and carbon neutrality by 2060 as scheduled. Target. Controlling carbon emissions is a crucial step in realizing a green and low-carbon transition.

In order to win the battle against pollution, achieve carbon peaking and carbon neutrality, and promote a comprehensive green transformation of economic and social development under the new economic normal, it is necessary to innovate green technologies, implement environmental regulation policies, and control carbon emissions. This paper selects the provinces and cities in the Yangtze River Economic Belt as the research object, and divides them into different regions. It intends to study the impact of green technology innovation, environmental regulation, carbon dioxide emissions, etc. on high-quality economic growth during the sample period. The research results can be used for the Yangtze River Economic Belt. It is of great practical significance to provide reference for solving ecological and environmental problems in different regions, thereby promoting high-quality economic growth.

2. Literature Review

At present, many literatures on green technology innovation are related to environmental regulation. Yan Qing and Yin Baoqing (2020) heterogeneous environmental regulation has a positive impact on green technology progress through different indirect channels[1]. Tao Feng et al. (2021) studied the impact of the environmental protection target responsibility system on green technology innovation activities from the perspective of quantity and quality. The implementation of the environmental protection target responsibility system promoted the quantity of green innovation activities, but reduced its quality, while the substantive review system can Improve the number of granted patents[2].

Foreign scholars have also conducted corresponding research on the impact of environmental regulations on green technology innovation. Jaluza & Lara Bartocci (2019) studied how the strictness of environmental regulations and the international competitiveness of countries affect the green innovation capabilities of industrial enterprises. The results show that The impact of environmental regulation on corporate green innovation can be either positive or negative, and can be modified by external factors such as company size and operating conditions[3]. Zeeshan Raza (2020) studied the environmental and economic performance of regulation-driven green technology innovation on short-haul shipping, and found that regulation-driven green technology innovation improved the environmental and economic performance of European short-haul shipping companies, resulting in a win-win situation for all parties involved situation[4].

Regarding the relationship between technological innovation and carbon dioxide, She Shuo et al. (2020) analyzed the impact of low-carbon city pilot approval on green total factor productivity, and examined the indirect effect of technological innovation and industrial structure through the mediation effect model. The results show that Approved low-carbon pilot cities can not only directly promote total factor productivity, but also indirectly increase total factor productivity by improving innovation levels and promoting industrial structure upgrading [5]. Xu Jia et al. (2020) studied the influence mechanism of low-carbon pilot city policies on green technology innovation from the enterprise level. It is the main way through which this policy works[6].

Regarding the relationship between carbon emissions and economic growth, Mo Jianlei et al. (2018) measured my country's energy and climate goals based on the Paris Agreement, and studied the future realization of carbon emissions from the perspectives of carbon emissions, energy consumption and economic output. The contribution to the peak target, the non-fossil energy ratio target and the carbon intensity target, the study found that the realization of each target requires the cooperation of different policies and the full use of the advantages of policy combination[7]. Lu Wanbo et al. (2013) divided the selected period into five stages of economic

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growth based on changes in energy intensity and total output value. From the perspective of industrial structure, I explored the contribution of six major industrial sectors to carbon emissions. The results showed that the contribution of each industry varies greatly. Relatively speaking, the industrial sector has the largest impact, followed by the transportation and postal industry, and other industrial sectors have less impact[8]. There are also many scholars who have studied the relationship between carbon emissions and economic growth based on the decoupling model. Yang Xiaohua et al. (2021) studied the decoupling relationship between manufacturing carbon emissions and economic development from the perspective of quantity and speed. The study found that in recent years, my country's manufacturing industry In a state of weak decoupling, and the manufacturing economy and carbon emissions have an inverted "N" relationship, the manufacturing industry is currently in a dilemma between the economy and the environment[9]. Gao Peng et al. (2021) constructed a decoupling elasticity model between foreign trade growth and carbon emissions. The results show that the upstream, midstream and downstream of the Yangtze River Economic Belt have an ideal weak decoupling relationship between foreign trade growth and carbon emissions. From a provincial perspective, Shanghai, Chongqing and other provinces have an ideal strong decoupling relationship between foreign trade growth and carbon emissions[10].

Based on the research results at home and abroad, it is found that scholars have achieved very rich results in the study of the relationship between green technology innovation and economic growth, the relationship between carbon emissions and green technology innovation, and the relationship between carbon emissions and economic growth. There are few studies that simultaneously incorporate innovation and carbon emissions into the high-quality economic growth impact framework. Therefore, on the basis of absorbing and learning from previous research results, this paper attempts to expand in the following aspects: (1) Incorporate green technology innovation, environmental regulation, carbon emissions and high-quality economic growth into a unified research framework, and discuss the relationship between them. influence relationship; (2) a two-way fixed-effect model was selected in the model estimation, which not only controlled the heterogeneity of time, but also controlled the heterogeneity of the region; (3) divided the Yangtze River Economic Belt into different regions, Research is more representative. The research results of this paper can provide more targeted suggestions for formulating relevant environmental protection policies in various regions of the Yangtze River Economic Belt to promote high-quality economic growth, so as to effectively promote high-quality economic growth in various regions.

3. Research Methods and Models

3.1. Entropy Method

The entropy method is a relatively objective weighting method, which determines the weight of the indicators through the information provided by the observed values of various indicators, judges the degree of influence of the indicators on the comprehensive evaluation, and has high reliability and accuracy of the calculation results. The higher the score, the better the performance of the measurement indicator.

3.2. DEA-SBM Model of Undesired Output

Traditional DEA models are based on the concepts of radial and angular and do not consider slack variables. Therefore, Tone Kaoru proposed a non-radial SBM model to solve the slack variable problem. Since environmental factors will have a great impact on the efficiency of green technology innovation, referring to the method of Zeng Jufen (2019)[11], this paper constructs a non-radial SBM model of undesired output to measure the efficiency of green technology innovation. The specific model is as follows:

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$$\min \rho = \frac{1 - \frac{1}{m}\sum_{i=1}^{m}\frac{s_i^-}{x_{ik}}}{1 + \frac{1}{q}\sum_{r=1}^{q}\frac{s_r^+}{y_{rk}}}$$

$$\text{S.t. } X\omega + s^- = x_k$$

$$Y\omega - s^+ = y_k$$

$$B\omega + s^b = b_k$$

$$\omega, s^-, s^+ >> 0$$

Among them, ρ represents the efficiency value, and the value range is 0 to 1. When ρ is 1, it means that the decision-making unit is strong and effective; when its value is less than 1, it means that the decision-making unit needs improvement in input and output, and has not reached the ideal state. ω represents the decision-making unit; s^- represents the slack variable of the input variable; s^+ represents the expected output; s^b represents the undesired output.

3.3. Model Construction

This paper studies the impact of green technology innovation and carbon dioxide emissions on high-quality economic growth. Therefore, high-quality economic growth is selected as the explanatory variables, green technology innovation and carbon dioxide emissions as explanatory variables, and the following measurement model is constructed:

$$HQEG_{it} = \beta_0 + \beta_1 GTIE_{it} + \beta_2 ER_{it} + \beta_3 X_{it} + \varepsilon_{it}$$

Among them, i is the province and city, and t is the year; HQEG is the level of high-quality economic growth; GTIE is the efficiency of green technology innovation; X is the control variable, including carbon dioxide emissions, total population, and total investment; ε is the random disturbance term.

4. Indicator Selection and Data Sources

Based on the panel data of 11 provinces and cities in the Yangtze River Economic Belt, combined with data availability and comparability, this paper sets the sample interval from 2009 to 2019. Relevant data come from "China Energy Statistical Yearbook", "China Environmental Statistical Yearbook", "China Statistical Yearbook", etc., and the corresponding price index is used to deflate relevant indicators to eliminate the impact of price fluctuations. For a few missing data, use linear imputation or mean to fill.

4.1. Calculation of High-quality Economic Growth

High-quality economic development not only considers economic growth, but also takes into account the quality of economic growth, taking into account the balance of development and the ecological environment, in order to achieve economical, efficient and comprehensive development. Therefore, this paper combines the "five development concepts", selects five first-level indicators of innovation, coordination, green, openness and sharing, and sets up 14 second-level indicators to measure the high-quality economic development by using the entropy method.

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4.2. Calculation of Green Technology Innovation Efficiency

According to the SBM-DEA model, the indicator system of green technology innovation is constructed according to input, expected output and undesired output. Reference is made to the literature of most scholars. The indicators selected in this paper are shown in Table 1.

Table 1. Input-output indicators of green technology innovation

Level 1 Index	Level 2 Index	Level 3 Index	Unit
input indicator	labor input	Full-time equivalent of R&D personnel	person year
	capital investment	Internal expenditure of R&D funds	million
	technical investment	Number of R&D projects	item
Expected output indicator	Innovative project results	number of patent applications	piece
	Innovative Economic Outcomes	New product sales revenue	million
Unexpected Output Indicators	Environmental Output Indicators	Wastewater discharge	tons
		Exhaust emissions	billion cubic meters

4.2.1. Input Indicators

The input indicators mainly consider three aspects of labor, capital and technology. Therefore, the full-time equivalent of R&D personnel is selected to represent the labor input level of innovation, the internal expenditure of R&D funds represents the level of capital investment in innovation, and the number of R&D projects represents the technical level of innovation.

4.2.2. Expected Output Indicators

Expected output refers to the desired output in innovation. The number of patent applications and new product sales revenue are selected from the project results and economic results of innovation.

4.2.3. Unexpected Output Indicators

From the perspective of green innovation, the problem of environmental pollution in the production process is an undesired output, so this paper selects the amount of wastewater discharge and exhaust gas discharge to represent the environmental benefit indicators. Due to the large number of missing data on solid waste and the relatively good effect of solid pollutant control in China in recent years, this paper excludes the solid waste indicator.

4.3. Calculation of Environmental Regulation

The intensity of environmental regulation will have a great impact on high-quality economic growth. Therefore, three indicators are selected, including the total amount of sulfur dioxide emissions, the centralized treatment rate of sewage plants, and the proportion of environmental pollution control investment in GDP, and the entropy method is used to calculate the environmental regulation intensity score.

4.4. Selection and Processing of Control Variables

4.4.1. Carbon Dioxide Emissions

Since China's energy activities are the main source of carbon dioxide emissions in China, this paper mainly calculates carbon dioxide emissions based on energy consumption. The carbon dioxide emissions are calculated according to the amount of fuel burned and the default emission factor recommended by IPCC. The calculation formula is as follows:

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$$CO_2 = \sum_{i=1}^{n} E_i \times NCV_i \times CEF_i \times COF_i \times (44/12)$$

Among them, CO_2 represents carbon dioxide emissions; i represents the type of energy. Considering the availability of data and the accuracy of calculation, this paper selects seven raw materials of kerosene, coke, gasoline, fuel oil, diesel, natural gas and raw coal for calculation; E_i Represents the consumption of energy i (physical quantity); NCV_i represents the average low-level calorific value of energy i; CEF_i represents the carbon content per unit calorific value of energy i; COF_i represents the carbon oxidation factor of energy i; $44/12$ is the carbon dioxide gasification coefficient , where 44 is the molecular weight of carbon dioxide and 12 is the molecular weight of carbon.

The average low-level calorific value of various energy sources is taken from the General Principles of Comprehensive Energy Consumption Calculation (GB/T2589-2020), and the carbon content and carbon oxidation factor per unit calorific value are from the 2006 IPCC National Greenhouse Gas Inventory Guidelines Catalogue.

4.4.2. Total Population

Population increases will put more pressure on the environment, This will have a certain impact on the high-quality economic development, so the total population is selected as the control variable.

4.4.3. Total Foreign Investment

Foreign investment may have two impacts on high-quality economic growth. On the one hand, foreign capital inflow may aggravate environmental pollution, because developed countries are more inclined to transfer high-polluting and energy-intensive industries to developing countries to reduce their own environmental pollution. On the other hand, foreign capital may also bring more advanced technology, which can effectively control pollution emissions, reduce environmental pressure, and promote high-quality economic growth.

5. Empirical Analysis

According to the selected research methods and models, this paper calculates variables such as high-quality economic growth, green technology innovation efficiency, environmental regulation, and carbon dioxide emissions in the provinces and cities in the Yangtze River Economic Belt from 2009 to 2019, and then analyzes the provinces and cities during this period. The direction and extent of the impact of green technology innovation and environmental regulation on high-quality economic growth.

5.1. High-quality Economic Growth

The specific value of the high-quality economic growth of the provinces and cities in the Yangtze River Economic Belt is calculated by the entropy method, and a line graph is drawn as shown in Figure 1. It can be seen that with the growth of the year, the degree of high-quality economic growth is also increasing. The high-quality economic growth of Jiangsu, Shanghai, Zhejiang and other places is significantly higher than that of other regions, and the growth rate is relatively larger. Quality development is good. Sichuan has grown rapidly from a lower growth level to a higher growth level, which may be due to the fact that Sichuan has paid more attention to the quality of economic development in recent years.

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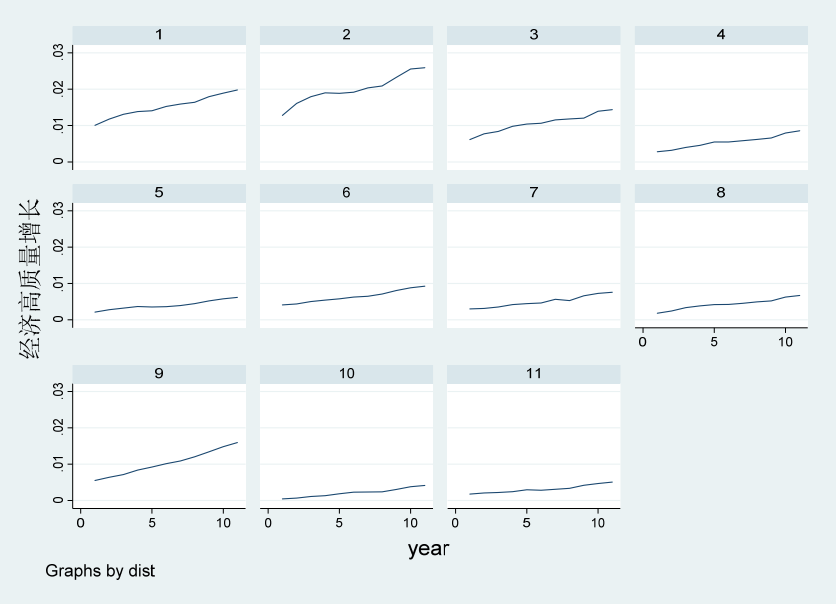

Figure 1. High-quality economic growth levels of 11 provinces and cities

5.2. Green Technology Innovation Efficiency

Taking 11 provinces and cities in the Yangtze River Economic Belt as the research object, the input indicators, unexpected output indicators and expected output indicators are brought into the DEA-SBM model to calculate the specific value of green technology innovation efficiency.

The Yangtze River Economic Belt is divided into upstream, midstream and downstream. The upstream includes Chongqing, Sichuan, Guizhou and Yunnan, the middle includes Hubei, Hunan and Jiangxi, and the downstream includes Anhui, Jiangsu, Zhejiang and Shanghai. According to the division of the upper, middle and lower reaches of the Yangtze River Economic Belt, Chongqing, Sichuan and Yunnan in the upper reaches, Hubei in the middle reaches, and Shanghai and Anhui in the lower reaches are respectively selected to draw a histogram of the efficiency of green technology innovation in each year as shown in Figure 2.

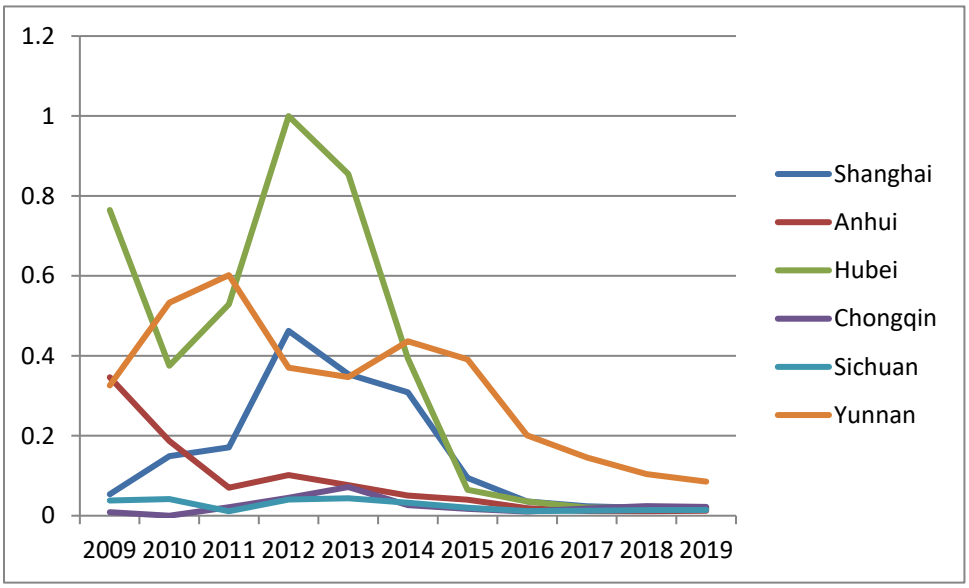

Figure 2. The changing trend of green technology innovation efficiency in some regions of the Yangtze River Economic Belt

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It can be clearly seen that the green technology innovation efficiency value of the middle and lower reaches of the Yangtze River Economic Belt is slightly higher than that of the upper reaches of the Yangtze River Economic Belt. The efficiency value has been at a high level after rising continuously in recent years. This shows that there are certain differences in the efficiency of green technology innovation between different regions, which is related to the difference in the degree of development between different regions.

5.3. Analysis of the Influencing Factors of High-quality Economic Growth

5.3.1. Descriptive Statistical Analysis

Descriptive statistical analysis was performed on each variable, and the results are shown in Table 2. It can be seen that the mean of high-quality economic growth is 0.008, and the standard deviation is 0.006, indicating that there are certain differences in the level of high-quality economic growth between provinces and cities. The mean value of green technology innovation level is 0.783, the standard deviation is 0.147, and the mean value of environmental regulation intensity is 0.008, and the standard deviation is 0.003, indicating that green technology innovation efficiency and environmental regulation intensity also have certain differences among provinces and cities. The standard deviation of carbon dioxide emissions is 5294.228, reflecting that the carbon dioxide emissions of different provinces and cities are quite different and have strong regional characteristics.

Table 2. Descriptive statistical analysis results of variables

Variable	Observation	Mean	Standard Deviation	Min	Max
HQEG	121	0.008	0.006	0.000	0.026
GTIE	121	0.783	0.147	0.457	1
CO2	121	14904.150	5294.228	6446.337	28228.530
ER	121	0.008	0.003	0.001	0.018
TP	121	5322.268	1827.386	2210	8375
TI	121	12906.090	17327.210	243.554	80954.900
Dist	121	within	0	6	6
Year	121	within	0	6	6

5.3.2. Model Regression Analysis

Table 3. Model regression results

variable	(1)	(2)	(3)	(4)
lnGTIE	0.001*	0.002*	-0.001**	-0.00056
lnCO2	-0.003***	-0.008***	-0.001***	0.0065***
ER	0.094**	0.14**	0.064***	0.1996
lnTP	-0.014	-0.055***	-0.004	-0.002*
lnTI	-0.001***	-0.001*	0.001***	0.005***
cons	0.166**	0.54***	0.043	0.0086***
Region	fixed	fixed	fixed	/
Year	fixed	fixed	fixed	/

Note: *, **,*** indicate significant at the 10%, 5%, and 1% levels, respectively.

First, take the logarithm of green technology innovation efficiency, carbon emissions, total population and total foreign investment to reduce heteroscedasticity. Then, each variable is tested for unit root to judge whether the data is stationary, and the test result shows that the data is a stationary sequence. Then, a hausman test was performed to determine whether to

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use a fixed-effects model or a random-effects model. The results showed that the p-value of 0.0000 was significantly less than 0.05, so the fixed-effects model was chosen in this paper.

Finally, the fixed-effect empirical test is carried out on the model constructed above, and the upper, middle and lower reaches of the Yangtze River Economic Belt are empirically tested according to regions. The results are shown in Table 3. This paper focuses on the impact of green technology innovation and environmental regulation on high-quality economic growth, and adds carbon emissions, total population, and foreign investment into the model.

Table 3 presents the regression results. Column (1) shows the regression results for the entire Yangtze River Economic Belt under the control of the fixed effects of region and year. The estimated coefficient of green technology innovation is significantly positive, indicating that the efficiency of green technology innovation increases by 1 percentage point, and the level of high-quality economic growth will increase by 0.001, that is, green technology innovation will have a positive impact on high-quality economic growth. Environmental regulation will have a significant positive impact. If the level of environmental regulation increases by 1 percentage point, the level of high-quality economic growth will increase by 0.094.

In terms of control variables, carbon dioxide emissions will have a significant negative impact on high-quality economic growth. When carbon dioxide emissions increase, the level of high-quality economic growth will decrease accordingly. The total population has a significant negative impact on the level of high-quality economic growth, indicating that the increase in population is unfavorable to the quality of economic development. The estimated coefficient of total foreign investment is also significantly negative, indicating that in the process of foreign investment introduction, the environmental problems caused by the introduction of foreign highly polluting industries are greater than the positive effects brought by advanced technology. Therefore, when the total amount of foreign investment increases, the level of high-quality economic growth declines.

Columns (2) and (3) are the regression results of the upper and middle reaches of the Yangtze River Economic Belt under the control of region and year fixed effects, respectively; Column (4) is the regression results of the random effect model in the lower reaches of the Yangtze River Economic Belt. It can be seen that the regression results of the upstream region are basically consistent with the regression results of the whole region, while the regression results of the midstream and downstream regions are different from those of the whole region.

For the green technology innovation variable, it is significantly positive in the whole region and upstream, has a significant negative impact in the midstream region, and has no significant impact in the downstream region, which indicates that the level of high-quality economic growth in the midstream and downstream regions may be affected by other factors greater impact. The impact of environmental regulation on high-quality economic growth in the whole region, upstream and midstream regions is significantly positive, and the impact in the downstream is positive but not significant. The carbon dioxide emission variable is significantly negative in the whole region, upstream and midstream, and significantly positive in the downstream, indicating that in the downstream region, with the increase in carbon dioxide emissions, the governance and effectiveness will be greater, so that the level of high-quality economic growth will not decline.

6. Conclusions and Implications

Based on the data of provinces and cities in the Yangtze River Economic Belt from 2009 to 2019, this paper calculates the specific values of high-quality economic growth, green technology innovation and carbon dioxide emissions, and examines the impact of green technology innovation and carbon dioxide emissions on high-quality economic growth , so as to provide

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some empirical evidence for the high-quality economic growth and ecological protection of the Yangtze River Economic Belt.

The main research conclusions include: (1) During the inspection period, the overall high-quality economic growth level of the provinces and cities in the Yangtze River Economic Belt has been continuously improving, and the initial value and degree of high-quality economic growth in Jiangsu, Shanghai, Zhejiang and other places Significantly higher than other regions, Sichuan has rapidly grown from a lower level to a higher level. (2) There are large differences in the efficiency of green technology innovation among regions. The green technology innovation efficiency value of the midstream region and the upstream region is significantly higher than the average value of the downstream region and the overall region. (3) From the perspective of the impact of green technology innovation on high-quality economic growth, it is significantly positive in the whole region and upstream regions, indicating that an appropriate increase in the level of green technology innovation is beneficial to high-quality economic growth; It is said that green technology innovation has a significant negative impact on high-quality economic growth, indicating that local green technology innovation will have a hindering effect on high-quality economic growth; for downstream regions, green technology innovation has no significant impact on high-quality economic growth. It is possible that the level of high-quality economic growth in downstream regions may be more affected by other factors. (4) From the perspective of the impact of environmental regulation on high-quality economic growth, it is significantly positive in the whole region, upstream region and mid-stream region, which is conducive to promoting high-quality economic growth, while environmental regulation in downstream regions promotes high-quality economic growth. The effect is more limited. (5) From the perspective of the impact of carbon dioxide on high-quality economic growth, it is significantly negative in the whole region, upstream regions and mid-stream regions, indicating that the increase in carbon dioxide emissions will reduce the level of high-quality economic growth; in the downstream regions, carbon dioxide emissions are significantly negative. It has a significant positive impact on high-quality economic growth, which may be due to the fact that carbon dioxide emissions in downstream areas are relatively large, but when carbon dioxide emissions increase, their governance and effectiveness will also be greater, resulting in high-quality economic growth. The level of growth does not decrease as emissions increase. (6) Regarding other control indicators that have an impact on high-quality economic development selected in this paper, from the perspective of the whole region, environmental regulation will significantly promote high-quality economic growth. It will have a significant inhibitory effect on the high-quality economic growth level.

The research conclusions of this paper have strong policy significance. Protecting the ecological environment and carrying out green technology innovation provide guidance and paths for China's high-quality economic growth, and meet the possibility of sustainable development on the road of China's socialist modernization. The research conclusions of this paper put forward corresponding suggestions for improving the quality of economic growth from the perspective of factors such as green technology innovation and carbon dioxide emissions.

First of all, from a regional perspective, factors such as green technology innovation and carbon dioxide emissions have different impacts on high-quality economic growth. Therefore, when formulating environmental policies, the same policy should not be applied to all regions, but different region to develop appropriate policies. Secondly, for upstream areas, green technology innovation will have a positive impact on high-quality economic growth, so policies should be formulated to encourage local companies to increase their willingness to innovate and improve the level of green technology innovation; for downstream areas, green Technological innovation has no significant impact on high-quality economic growth. The local government should find out the reasons, find other factors that have an impact on high-quality economic development, and take corresponding policy measures. Next, from the perspective of

the impact of carbon dioxide on high-quality economic growth, in the upstream and midstream regions, the increase in carbon dioxide emissions will reduce the level of high-quality economic growth. Therefore, local carbon dioxide emissions should be appropriately limited to reduce pollution, thereby improving The quality of local economic development; in downstream areas, the increase in carbon dioxide emissions will increase the level of high-quality economic growth. The local government cannot increase carbon dioxide emissions without limit in order to improve the quality of economic development, but should find the deep-seated reasons for this phenomenon. And solve this problem, because the increase in the level of high-quality economic growth brought about by unrestricted carbon dioxide emissions should only be short-term, and will cause irreversible environmental pollution problems in the long run. Then, provinces and cities should also pay attention to the significant positive effect of environmental regulation on high-quality economic growth, and formulate reasonable policies to improve the level of environmental regulation, thereby improving the quality of local economic growth. Finally, all localities must control the total population and total foreign investment. Excessive increase in population will exert greater pressure on the environment, affect the ecological balance, and thus adversely affect the quality of economic development; High energy consumption and high pollution industries are transferred to other countries. The degree of environmental pollution brought by these industries is greater than the degree of economic growth brought about by them, so it will have a serious adverse impact on the quality of economic growth and hinder the improvement of high-quality economic growth.

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