

# The Impact of Green Finance on Inclusive Economic Growth

## —Empirical Analysis Based on Spatial Panel

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### Abstract

Green finance plays a significant role in promoting inclusive economic growth. Based on this, this paper selects panel data from 31 provinces in China from 2005 to 2019 and USES spatial econometric model to explore the impact of green finance on inclusive economic growth. The research results show that green finance has different effects on inclusive economic growth in different regions, and the influence of green finance on inclusive economic growth in central and western regions is more significant than that in eastern regions. At the national level, green finance promotes inclusive economic growth. The implication is that appropriately strengthening green finance is an important way to effectively enhance inclusive economic growth.

### Keywords

Green Finance, Inclusive Economic Growth, Space Panel

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## 1. The Introduction

Since the reform and opening up of China's economy in the past decades of rapid development, China has increasingly moved to the center of the world stage, playing an increasingly important role in the international arena, and its international status and influence have been greatly improved. However, behind the rapid development of the traditional extensive economic power is the excessive consumption of resources in China, and the serious contradiction between environmental pollution and resources and environment, which has brought great challenges to the economy. As China's economy gradually towards the new normal and to be near green financial development direction, traditionally rely

on resources, such as energy development mode has not been able to drive the high quality of economic development, it also needs to continue to improve the economic growth mode, transformation of high energy consumption, high pollution, low efficiency, such as development pattern, improve the environment pollution, green finance, and the relationship between economic growth and lead China's 31 provinces in the direction of the high quality and sustainable development.

## 2. Literature Review

From the perspective of foreign scholars, in the early stage, many foreign scholars proposed similar concepts such as "green finance" and studied this phenomenon in depth. Tek Jung Maha (2019) argued that poor areas such as social and economic development, the imperfect infrastructure constrains region between the economic development, and also think for some development capacity lack region should intensify policy attention to the environment, in particular to develop some green finance project, in order to pursue the high quality of economic growth. The panel data from 1971-2013 were used to discuss the impact of economic growth, people's wealth gap and per capita energy consumption on environmental carbon emissions, and the study believed that green finance could promote inclusive economic growth (Hemachandra et al., 2019). In addition, in the research process, it is believed that the scale of public expenditure has a negative relationship with environmental quality, but it has a positive relationship with environmental expenditure. Therefore, in the aspect of green financial development, the role of government in inclusive economic growth should be emphasized (Aykut & Umut, 2019).

Domestically, Chao & Ren (2011) pointed out that the quality of economic growth, such as quantitative process is to solve the quality problem of the economic growth from the qualitative to the quantitative change of the premise and foundation, from the perspective of green investment study found that the green investment plays an important role in high quality and economic development (Wang, 2013), at the same time also think increasingly advanced science and technology level and work efficiency can inhibit the development of the urban land to enhance economic growth quality (Zhao et al., 2014), the study found that science and technology have a significant difference to the quality of economic growth (Hao Ying, 2014). Cheng & Li (2014) comprehensive major academic articles found that quality of economic growth theory ignored the important role of trace products, Wang & Ren (2015) from four angles such as economic efficiency, economic stability, economic structure, economic sustainability probes into the quality of economic growth, using principal component analysis (pca) the results show that if you want to achieve economic growth quality and the relationship between the economic growth requires comprehensive reasonably to perfect the structure between the various levels. Zhang (2015) believes that green finance can promote the quality of economic growth. He used the in-

ter-provincial panel data from 2004 to 2011 to study and found that green finance in different regions has different development effects on the quality of economic growth (Yu et al., 2016). According to Qi et al. (2019), the green financial system needs to be improved, and the development plan of China's green finance needs to innovate from the aspects of science and technology, policies, financial organizations and products (Cao, 2019). Zhang (2017), the prospects of green finance, think important measures to implement green financial environmental governance has a financial fiscal incentives, incentive policies to promote environmental improvement, and drive economic growth lies in the quality of development and progress, the People's Bank of China in Dazhou Center Branch Team, 2017, from the region and the national analysis attach great importance to the role of green finance to improve the quality of China's economic growth has an important role (Sun & Lin, 2018).

From the perspective of the effect mechanism of green finance on inclusive economic growth, You (2018) believes that China's economic development mode has changed and green finance is the mainstream of industrial development. Starting from the panel data of China's prefecture-level cities from 2004 to 2014, Chen et al. (2018) found that government intervention could affect green finance and thus promote the rapid development of China's economy. Peng (2019) divided green finance into four functions and believed that financing development was an important tool to improve the development of green finance. Green finance mainly refers to the sustainable and healthy development of commerce, and the main key factor of green development is to vigorously develop green financial projects, so as to realize the sustainable and healthy development among green enterprises (Xu & Yang, 2019). Liu (2019) used analytic hierarchy process to analyze the development status of green finance among different cities in Shandong, and the research results showed that there were differences among different cities, and the economic development levels with different characteristics were also inconsistent.

### 3. Data Processing

#### 3.1. Data Sources

This paper mainly takes the panel data of 31 provinces of China from 2005 to 2019 as the research object, based on the availability and authenticity of data samples. The research sample data in this paper are mainly obtained from the National Bureau of Statistics, China National Knowledge Network Statistical Yearbook, Gutai'an database and Wind database, etc. The interpolation method is used to supplement and perfect the missing data.

#### 3.2. Weight Determination Method

In order to explore the relationship between green finance and inclusive economic growth, this paper mainly adopts three methods to measure, analyze and

explore. First, the dimensionless tempering method is used to process the data so as to ensure the stability of the data. Second, the coefficient of variation method determines the weight of green finance and inclusive economic growth indicator system. Third, the entropy weight method is used to evaluate the comprehensive green finance and inclusive economic growth index.

First of all, the original data is tempered.

$$X_{i,t} = \frac{x_{i,t} - \text{Min}_{i,t}}{\text{Max}_{i,t} - \text{Min}_{i,t}} \quad (1)$$

$$X_{i,t} = \frac{\text{Max}_{i,t} - x_{i,t}}{\text{Max}_{i,t} - \text{Min}_{i,t}} \quad (2)$$

The main method of tempering is to process the original data, and the main application in this paper is Equation (1) and Equation (2). Where, represents the data value after tempering, represents the original data value, and represents the maximum and minimum original data value.

Secondly, the coefficient of variation method is used to calculate the proportion of indexes.

Coefficient of variation weight Formula (3):

$$\omega_{i,t} = \frac{CV_{i,t}}{\sum_1^n CV_{i,t}} = \frac{\frac{\sigma_{i,t}}{\mu_{i,t}}}{\sum_1^n \frac{\sigma_{i,t}}{\mu_{i,t}}} \quad (3)$$

Formula (4) can be used to obtain the weighted aggregate comprehensive green finance index and inclusive economic growth index.

$$X = \sum_1^n \omega_{i,t} X_{i,t} \quad (4)$$

where, is the coefficient of variation, is the standard deviation, is the average, is the weight and is the composite index.

Finally, the entropy method is used to comprehensively evaluate the size of green finance and inclusive economic growth indicators.

Formula (5) is used to calculate the specific gravity of each indicator:

$$p_{i,t} = \frac{x_{i,t}}{\sum_1^n x_{i,t}} \quad (5)$$

Formula (6) is used to obtain the information entropy of the index:

$$e_{i,t} = -K \sum_1^n p_{i,t} \ln(p_{i,t}) \quad (6)$$

Formula (7) is used to obtain the information entropy redundancy of the index:

$$d_{i,t} = 1 - e_{i,t} \quad (7)$$

Formula (8) can be used to obtain the comprehensive green finance index and

inclusive economic growth index.

$$X = \sum_1^n \omega_{i,t} P_{i,t} = \sum_1^n \left( \frac{d_{i,t}}{\sum_1^n d_{i,t}} P_{i,t} \right) \quad (8)$$

### 3.3. Results and Analysis of the Weights of Indicators

#### 3.3.1. Green Finance Indicator System

The indicator system of green finance in this paper is based on the definition of green finance indicators by Liu (2019) to construct the indicator system. The weight of green finance index system is obtained by using coefficient of variation method, as shown in Table 1. Table 1 shows that the proportion of green credit in the indicator system of green finance is 0.2863, which is relatively small, while the proportion of green investment is 0.7137, which is relatively large. This indicates that in the development process of green finance, it is more significant to promote green finance through green investment. The green finance index obtained by entropy weight method is shown in Table 2.

#### 3.3.2. Inclusive Economic Growth Indicator System

The weight of inclusive economic growth indicator system is obtained by using coefficient of variation method, as shown in Table 3. Table 3 shows that in the inclusive economic growth indicator system, the proportion of economic development level is 0.4177, the proportion of economic structure development status is 0.2060, the proportion of sustainable development level is 0.0160, the proportion of equitable opportunity coverage is 0.3594, and the proportion of achievement

**Table 1.** Green finance evaluation system.

Level 1 index	Weight	Level 2 index	Weight	Level 3 index
Green Finance indicator system	0.2863	<u>green loan</u>	0.3006	Per capita green loan balance
			0.3924	The ratio of green loans to loans
			0.1206	Green loan Non-performing loan ratio
			0.0081	Per capita ratio of major risk enterprises such as environment and safety to loans
			0.1783	The proportion of enterprises with major risks such as environment and safety in all kinds of loans
	0.7137	green investment	0.4281	Forestry investment proportion
			0.3272	The proportion of urban environmental infrastructure construction investment
			0.1115	The ratio of investment in environmental protection acceptance projects to GDP was completed in that year
			0.1331	The proportion of investment in industrial pollution control

**Table 2.** Development of green finance index.

Province/year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Beijing	0.67	0.74	0.95	1.17	1.20	0.87	0.78	1.77	2.43	3.12	3.30	2.08	2.11	2.11	2.31
Tianjin	0.49	0.85	0.64	0.71	0.69	0.59	0.47	0.56	0.37	0.50	0.74	0.69	0.45	1.23	0.58
Hebei	0.93	1.04	0.78	0.72	0.78	0.68	0.53	0.87	0.93	1.08	1.51	1.22	1.20	1.38	1.91
Shanxi	2.12	1.94	2.44	2.69	3.29	2.97	2.29	3.07	2.92	3.42	3.98	3.48	2.79	2.77	2.77
Inner Mongolia	3.11	2.73	2.56	2.11	2.04	2.15	2.02	2.63	2.71	3.28	3.43	3.23	3.63	3.45	3.47
Liaoning	0.71	0.96	0.92	0.68	0.78	0.85	0.66	1.68	1.81	1.69	1.58	1.24	0.73	0.64	0.66
Jilin	1.39	1.67	1.11	1.20	1.72	1.81	1.59	1.72	1.79	1.50	1.72	1.94	1.81	2.72	2.56
heilongjiang	1.24	1.16	1.12	1.80	1.58	2.73	2.70	4.35	3.76	2.82	2.21	2.81	2.90	3.81	3.40
Shanghai	0.50	0.49	0.37	0.37	0.28	0.26	0.22	0.26	0.30	0.26	0.43	0.39	0.64	0.46	0.62
<u>Jiangsu</u>	0.55	0.73	0.70	0.83	0.82	0.77	0.60	0.74	0.67	0.84	0.86	0.73	0.63	0.62	0.46
Zhejiang	0.28	0.33	0.34	0.32	0.26	0.25	0.20	0.76	0.89	1.05	1.01	0.89	0.77	0.63	0.59
Anhui	0.62	0.56	0.48	0.67	0.58	0.53	0.42	0.85	0.89	1.76	1.54	1.48	1.46	1.05	1.11
Fujian	0.91	1.19	0.61	0.44	0.44	0.34	0.35	2.81	3.41	3.45	3.49	3.09	2.53	1.97	1.28
Jiangxi	0.72	0.56	0.64	0.69	0.86	0.88	0.90	1.49	1.72	1.82	1.97	1.42	1.93	2.24	1.57
Shandong	0.71	0.84	0.76	0.75	0.78	0.52	0.41	1.08	1.72	1.71	2.04	1.61	1.71	1.75	1.72
Henan	0.59	0.68	0.62	0.62	0.54	0.96	0.53	1.21	1.07	1.19	1.25	1.15	1.15	0.77	0.74
Hubei	0.85	0.97	0.90	0.91	0.87	0.94	0.81	0.71	0.83	0.98	1.20	1.32	1.65	1.58	1.52
Hunan	0.89	0.90	0.92	0.87	0.81	0.85	0.79	0.99	1.77	2.02	2.18	2.18	2.54	2.39	2.61
Guangdong	0.30	0.36	0.27	0.28	0.24	0.19	0.21	0.38	0.45	0.58	0.46	0.53	0.39	0.38	0.39
Guangxi	1.30	1.61	1.28	1.60	3.22	8.92	9.92	12.30	14.79	16.47	20.00	17.61	16.92	16.34	14.00
Hainan	1.13	1.20	0.95	0.77	0.73	0.57	0.70	1.22	1.86	1.59	1.49	1.23	1.15	1.03	1.12
Chongqing	1.90	1.93	1.74	1.61	2.04	2.49	2.02	1.32	1.40	1.20	1.04	1.22	1.00	0.99	1.22
SIchuan	2.51	2.16	1.93	2.73	3.01	3.04	2.62	2.04	2.20	2.21	2.65	2.23	2.33	2.07	1.95
Guizhou	3.24	3.17	2.80	2.25	2.71	2.53	2.08	2.03	1.77	1.75	1.56	1.40	1.55	3.13	4.77
Yunnan	1.82	1.89	1.63	1.79	1.93	1.86	1.86	2.49	2.63	2.42	2.39	2.83	2.21	1.93	1.94
Xizang	1.18	0.65	0.35	3.11	2.80	1.60	4.06	6.57	6.28	5.87	5.93	8.34	8.57	7.17	6.31
Shaanxi	1.37	1.66	1.06	0.91	1.56	1.71	1.46	1.54	1.84	2.24	2.23	2.13	2.11	1.87	1.87
Gansu	3.92	4.02	3.64	3.54	4.16	4.21	5.01	3.74	4.21	4.04	4.29	4.03	4.43	4.20	5.19
Qinghai	3.47	3.60	2.70	3.06	3.14	3.21	2.93	3.09	3.59	3.96	4.28	4.67	4.66	5.00	4.75
Ningxia	3.71	2.19	2.06	1.88	3.95	2.62	2.70	2.98	2.31	3.34	3.60	2.45	4.22	2.71	2.66
Xinjiang	1.54	1.76	1.64	1.81	2.14	2.19	1.66	2.29	2.71	2.84	3.10	3.45	3.46	3.07	2.77

sharing is 0.0009. By weighting can learn about the economic development level is a big contribution for inclusive economic growth, the resulting economic effect is to promote the development of the society, social fair chance to get the better popularization, but from the analysis of weighting can understand the inclusive economic growth to the people's effect is small, thus to promote inclusive

**Table 3.** Evaluation system for inclusive economic growth.

Level 1 index	Weight	Level 2 index	Weight	Level 3 index
Inclusive Economic Growth	0.4177	<u>Economic Development Level</u>	0.1051	<u>Per Capita GDP</u>
			0.1567	Ratio of per capita GDP growth
			0.5779	<u>Annual per capital income</u>
	0.2060	The State of Economic Structure Development	0.1602	Per capita annual income growth rate
			0.7091	The ratio of primary industry to GDP
			0.0918	The ratio of secondary industry to GDP
			0.1733	The ratio of tertiary industry to GDP
			0.0258	Ratio of financial added value
			0.2880	The ratio of R&D expenditure to GDP
			0.0023	Employment rate
	0.0160	Level of Sustainable Economic Development	0.1273	<u>Internet availability rate</u>
			0.1366	The ratio of secondary industry to tertiary industry
			0.0147	Inflation rate
			0.0027	Sulfur dioxide emissions per GDP
			0.2592	Ammonia nitrogen emissions per GDP
	0.3594	Equitable Access	0.1691	Emissions per GDP of wastewater
			0.0155	Urban-rural income ratio
			0.0182	The ratio of rural per capita income to GDP
			0.0332	The ratio of urban per capita income to GDP
			0.0450	The ratio of premiums per person to GDP
			0.0536	Urban unemployment rate
			0.0092	The number of financial institution outlets per capita
			0.0550	The number of bank outlets per capita
			0.0300	Per capita has the number of insurance outlets
			0.1972	The number of securities outlets per capita
	0.0009	Sharing of Results	0.2404	Bank penetration rate
			0.1407	Insurance permeability
0.1619			Permeability of securities	
0.2734			Gini coefficient	
			0.2230	<u>Per capita consumption expenditure</u>
			0.5036	<u>Urban unemployment rate</u>

growth at the same time, should strengthen the development of the people's livelihood, enables the development of the economy to better meet people's demand for the better. The green inclusive economic growth index obtained by entropy weight method is shown in **Table 4**.

**Table 4.** Shows the development of inclusive economic growth indicators.

Province/year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Beijing	0.96	0.99	1.21	1.29	1.34	1.20	1.26	1.33	1.43	1.48	1.60	1.68	1.78	1.91	2.05
Tianjin	1.61	1.53	1.51	1.49	1.55	1.58	1.66	1.76	1.86	1.86	1.94	2.03	2.17	2.29	2.53
Hebei	4.66	4.37	4.59	4.51	4.61	4.64	4.43	4.56	4.50	4.50	4.43	4.28	4.37	4.28	4.21
Shanxi	2.44	2.26	2.23	2.44	2.77	2.74	2.77	2.95	2.93	3.16	3.24	3.35	3.20	3.32	3.48
Inner Mongolia	5.08	4.49	4.28	4.07	3.79	3.84	3.94	4.06	4.10	4.15	4.30	4.43	5.04	5.24	5.74
Liaoning	4.36	4.13	4.37	4.24	4.21	3.31	3.28	3.37	3.25	3.27	3.41	3.88	3.76	3.81	3.86
Jilin	5.66	5.37	5.04	4.91	4.84	4.47	4.53	4.62	4.50	4.36	4.51	4.17	4.01	3.60	4.65
heilongjiang	4.30	4.28	4.57	4.73	4.88	4.73	5.16	5.80	6.35	6.50	6.60	6.71	7.00	7.08	8.67
Shanghai	1.38	1.40	1.44	1.53	1.59	1.63	1.71	1.78	1.88	1.92	2.02	2.14	2.32	2.58	2.78
<u>Jiangsu</u>	2.80	2.64	2.67	2.63	2.70	2.62	2.76	2.89	2.81	2.81	2.89	2.93	2.87	2.94	3.00
Zhejiang	2.56	2.43	2.32	2.30	2.43	2.49	2.58	2.69	2.80	2.75	2.81	2.93	2.97	3.00	3.15
Anhui	5.89	5.53	5.51	5.54	5.26	5.08	4.89	4.87	4.68	4.62	4.58	4.53	4.29	4.16	4.01
Fujian	4.32	4.03	3.93	4.05	3.76	3.72	3.81	3.91	3.89	3.87	3.88	4.03	3.70	3.75	3.75
Jiangxi	6.66	5.61	5.47	5.48	5.29	4.87	4.80	4.86	4.71	4.65	4.70	4.90	4.86	4.85	4.93
Shandong	3.58	3.38	3.39	3.46	3.44	3.38	3.35	3.37	3.33	3.28	3.32	3.23	3.18	3.22	3.53
Henan	5.70	5.10	4.92	5.01	4.87	4.90	4.68	4.68	4.67	4.56	4.26	4.27	4.28	4.50	4.84
Hubei	5.31	4.95	4.95	7.22	4.75	4.69	4.69	4.68	4.56	4.42	4.39	4.46	4.31	4.03	3.95
Hunan	5.51	5.52	5.79	5.69	5.34	5.22	5.24	5.21	4.98	4.75	4.81	4.88	4.87	4.39	4.76
Guangdong	2.55	2.52	2.39	2.47	2.41	2.44	2.55	2.65	2.70	2.64	2.68	2.77	2.88	2.95	3.03
Guangxi	7.29	7.02	6.91	6.92	6.36	6.04	6.15	6.00	5.80	5.70	5.74	5.82	5.61	5.86	6.29
Hainan	10.27	9.54	9.20	9.40	9.12	8.64	8.77	8.52	8.25	8.29	8.38	8.50	8.23	8.00	8.01
Chongqing	4.50	3.50	3.71	3.69	3.54	3.49	3.53	3.53	3.47	3.25	3.22	3.35	3.34	3.44	3.47
SIchuan	6.55	6.12	6.42	6.08	5.53	5.19	5.24	5.23	5.04	4.95	4.95	4.94	4.94	4.83	4.78
Guizhou	6.15	5.88	5.66	5.79	5.24	5.14	5.00	5.20	5.22	5.56	6.15	6.27	6.12	6.15	5.97
Yunnan	6.22	6.27	5.95	6.19	6.08	5.55	5.89	5.97	6.07	5.92	5.86	5.86	5.69	5.83	5.67
Xizang	7.11	6.58	6.37	6.35	6.24	6.03	5.80	5.70	5.39	5.21	5.18	5.37	5.30	5.20	5.18
Shaanxi	4.15	3.99	4.05	4.24	3.95	4.08	4.19	4.21	4.29	4.18	4.28	4.32	4.20	4.20	4.44
Gansu	5.56	5.31	5.30	5.17	5.23	5.04	4.88	4.98	4.83	4.83	5.25	5.61	6.68	6.23	6.88
Qinghai	4.36	4.02	4.10	4.22	4.16	4.31	4.25	4.37	4.57	4.53	4.41	4.53	4.75	4.99	5.35
Ningxia	4.32	4.20	4.19	4.10	4.00	3.91	3.89	3.89	3.98	3.97	4.17	4.14	4.28	4.43	4.56
Xinjiang	6.42	5.84	6.12	5.83	6.30	6.98	6.28	6.56	6.60	6.37	6.48	6.67	6.30	5.96	5.88

## 4. Empirical Analysis

### 4.1. Selection of Variables

The core explained variables are represented by the inclusive Economic Growth Composite index (ieg). The core explanatory variables are mainly represented by

green Finance index (gf) in this paper to explore the impact of green finance on inclusive economic growth from the perspective of multi-dimensional inquiry. Among them, the core explanatory variables of multi-dimensional inquiry are represented by green credit (gl) and green Investment (gi). The control variables are mainly composed of per capita GDP (pgdp), environmental governance input (iiem), government intervention (gov), urban-rural income ratio (urir) and per capita expenditure (pce). The descriptive statistical analysis is shown in **Table 5**.

In **Table 5**, the observed values of all variables based on panel data from 2005 to 2019 are 465. It can be seen that the mean value, minimum value, maximum value and standard deviation of the explained variable of inclusive economic growth are 4.4195, 0.9581, 10.2660 and 1.6034, indicating that the inclusive economic growth among Chinese provinces has important development potential and the inclusive economic development is in good condition. The mean value, minimum value, maximum value and standard deviation of green finance in the core interpretation are 2.0850, 0.1913, 20.0021 and 2.3280. Among them, the mean value of green credit is 0.0604, the minimum value is 0.0135, the maximum value is 0.1659, and the standard deviation is 0.0315. The mean value of green investment is 2.0246, the minimum value is 0.1444, the maximum value is 19.9469, and the standard deviation is 2.3285, indicating that green finance and green credit are closely related to green investment. From the perspective of control variables, the average per capita GDP was 1.5269, the minimum, the maximum and the standard deviation were 0.1794, 5.6083 and 1.0123, the mean of environmental governance investment was 0.0045, the minimum, the maximum and the standard deviation were 0.0000, 1.0000 and 0.0464, the mean of government intervention was 0.0348, the minimum, the maximum and the standard deviation were 0.0001, 1.0000 and 0.0642, respectively. Urban and rural income than the average is 0.2747, the minimum value is 0.1560, the maximum of 0.5900, the standard deviation is 0.0679, the average per capita spending is

**Table 5.** Descriptive analysis of each variable.

Variable	obs	mean	min	max	std. dev.	Variable meaning
ieg	465	4.4198	0.9581	10.2660	1.6034	Inclusive Economic Growth
gf	465	2.0850	0.1913	20.0021	2.3280	Green Finance
gl	465	0.0604	0.0135	0.1659	0.0315	<u>Green Loan</u>
gi	465	2.0246	0.1444	19.9469	2.3285	Green Investment
pgdp	465	1.5269	0.1794	5.6083	1.0123	GDP per capita
iiem	465	0.0045	0.0000	1.0000	0.0464	Investment in environmental management
gov	465	0.0348	0.0001	1.0000	0.0642	Government intervention
urir	465	0.2747	0.1560	0.5900	0.0679	Urban-rural income ratio
pce	465	0.6319	0.0440	3.9840	0.7450	<u>Per capita expenditure</u>

0.6319, the minimum value is 0.0440, the maximum of 3.9840, the standard deviation is 0.745, shows that control variables have influence on all inclusive economic growth, and there is a certain role in promoting, the control variables of per capita GDP, environmental governance investment, government intervention, the urban and rural income ratio, per capita spending can lead the inclusive economic growth of China's 31 provinces toward a better direction.

## 4.2. Model Construction

Based on the panel data from 2005 to 2019 as the research basis, this paper takes green finance and inclusive economic growth as the research objects to explore the internal relationship between them. Therefore, the panel data model set in this paper is shown as Equation (9).

$$ieg_{i,t} = \alpha + \beta gf_{i,t} + \mu_{i,t} \quad (9)$$

Secondly, in order to reduce the impact of omitted variables on the regression structure, per capita GDP (PGDP), environmental governance input (IEM), government intervention (Gov), urban-rural income ratio (URIR) and per capita expenditure (PCE) are introduced as control variables on the basis of Equation (9), and Equation (10) is obtained.

$$ieg_{i,t} = \alpha + \beta gf_{i,t} + \beta_1 pgdp_{i,t} + \beta_2 iem_{i,t} + \beta_3 gov_{i,t} + \beta_4 urir_{i,t} + \beta_5 pce_{i,t} + \mu_{i,t} \quad (10)$$

Finally, in order to explore the impact of regional green finance on inclusive economic growth, this paper will explore the impact of green finance on inclusive economic growth from the eastern, central and western regions.

The influence of green finance on inclusive economic growth in the eastern region is given in Equations (11) and (12).

$$ieg_{i,t} = \alpha + \gamma gf_{i,t} + \mu_{i,t} \quad (11)$$

$$ieg_{i,t} = \alpha + \gamma gf_{i,t} + \gamma_1 pgdp_{i,t} + \gamma_2 iem_{i,t} + \gamma_3 gov_{i,t} + \gamma_4 urir_{i,t} + \gamma_5 pce_{i,t} + \mu_{i,t} \quad (12)$$

Equations (13) and (14) can be obtained in the middle region:

$$ieg_{i,t} = \alpha + \eta gf_{i,t} + \mu_{i,t} \quad (13)$$

$$ieg_{i,t} = \alpha + \eta gf_{i,t} + \eta_1 pgdp_{i,t} + \eta_2 iem_{i,t} + \eta_3 gov_{i,t} + \eta_4 urir_{i,t} + \eta_5 pce_{i,t} + \mu_{i,t} \quad (14)$$

Equations (15) and (16) can be obtained in the western region:

$$ieg_{i,t} = \alpha + \xi gf_{i,t} + \mu_{i,t} \quad (15)$$

$$ieg_{i,t} = \alpha + \xi gf_{i,t} + \xi_1 pgdp_{i,t} + \xi_2 iem_{i,t} + \xi_3 gov_{i,t} + \xi_4 urir_{i,t} + \xi_5 pce_{i,t} + \mu_{i,t} \quad (16)$$

## 4.3. Analysis of National Overall Empirical Regression Results

**Table 6** shows the empirical regression results of China's green finance on inclusive economic growth. In column (1) of **Table 6**, China's green finance has a positive promotion effect on inclusive economic growth, with a coefficient of 0.183, which is significantly established at a significance level of 1%. It shows that the development of green finance contributes to the improvement of inclusive economic growth to a certain extent, and then drives the development

**Table 6.** Empirical regression results of national overall green finance on inclusive economic growth.

	(1)	(2)	(3)	(4)	(5)	(6)
gf	0.183*** (0.0309)	0.142*** (0.0262)	0.140*** (0.0262)	0.181*** (0.0307)	0.166*** (0.0297)	0.125*** (0.0267)
pgdp		-0.828*** (0.0602)	-0.830*** (0.0602)			-0.916*** (0.0686)
iiem			1.748 (1.306)			1.842 (1.299)
gov				-2.492** (1.114)		
urir					6.671*** (1.017)	
pce						0.241** (0.0935)
_cons	4.038*** (0.0964)	5.388*** (0.127)	5.387*** (0.127)	4.129*** (0.104)	2.241*** (0.289)	5.398*** (0.127)
N	465	465	465	465	465	465
R <sup>2</sup>	0.071	0.341	0.343	0.081	0.150	0.352

Note: \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01, the \*\*\*, \*\* and \* said regression results under the condition of 0.1, 0.05, 0.01, significantly. The same below.

among surrounding areas. At the same time, under the influence of the control variables, the influence of green finance on inclusive economic growth presents different degrees of positive influence. The effects of the control variables are shown in Column (2)-(6) of **Table 6**. Under the effect of per capita GDP in column (2), green finance still has a significant positive effect on inclusive economic growth, which is significantly established at the significance level of 1%, with a coefficient of 0.142. Under the combined effect of per capita GDP and investment in environmental governance in column (3), green finance still has a significant positive effect on inclusive economic growth, with a coefficient of 0.140. Under the influence of government intervention in column (4), the coefficient of green finance on inclusive economic growth is 0.181. Under the effect of Rural-urban income ratio in column (5), the coefficient of green finance on inclusive economic growth is 0.166, among which the coefficient of rural-urban income on inclusive economic growth is 6.671, which has a significant positive promotion effect. In the first column (6) the per capita GDP, under the action of environmental investment and expenditure per capita, green finance of inclusive economic growth coefficient is 0.125, along with environmental governance effect is improved, and the improvement of people's consumer spending is a significant positive effect on inclusive economic growth, this suggests that the popularity of inclusive growth is to realize the purpose of economy and the people.

## 4.4. Analysis of Regional Empirical Regression Results

### 4.4.1. The Impact of Green Finance on Inclusive Economic Growth in Eastern China

In order to explore the impact of green finance on inclusive economic growth in eastern China, empirical regression results of eastern China are obtained by using panel data model, as shown in **Table 7**. Listed in **Table 7** (1) in our country's green finance on inclusion has a positive role in promoting economic growth, coefficient is 0.178, established under the significance level of 1% and significantly, and above the national green financial impact on inclusive economic growth, by contrast, in eastern China green finance for inclusive economic growth promoting effect of relatively large. At the same time, based on the effect of different control variables on the impact of green finance on inclusive economic growth presents different degrees of positive impact, the empirical results of the impact of control variables are shown in Columns (2)-(6) of **Table 7**. Under the effect of per capita GDP in column (2), green finance still has a significant positive effect on inclusive economic growth, which is significantly established at the significance level of 1%, with a coefficient of 0.135. In column (3), under the combined effect of per capita GDP, investment in environmental governance and government intervention, green finance still has a significant

**Table 7.** Empirical regression results of green finance on inclusive economic growth in the eastern region.

	(1)	(2)	(3)	(4)	(5)	(6)
gf	0.178*** (0.0436)	0.135*** (0.0378)	0.135*** (0.0377)	0.158*** (0.0426)	0.158*** (0.0425)	0.144*** (0.0349)
pgdp		-0.844*** (0.105)	-0.785*** (0.113)			-1.544*** (0.163)
iiem			-92.50* (51.75)			
gov			1.421 (1.343)	0.120 (1.473)		1.999 (1.239)
urir				9.597*** (2.682)	9.544*** (2.594)	-5.636* (2.889)
pce						1.218*** (0.219)
_cons	3.333*** (0.163)	5.206*** (0.272)	5.307*** (0.279)	1.008 (0.687)	1.027 (0.647)	7.087*** (0.932)
<i>N</i>	180	180	180	180	180	180
<i>R</i> <sup>2</sup>	0.085	0.329	0.343	0.150	0.150	0.439

In this paper, 31 provinces in China are divided into the east and the middle and the west, among which the east includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi and Hainan. The same below.

positive effect on inclusive economic growth, with a coefficient of 0.135. Moreover, government intervention can improve the strength of inclusive economic growth, and has a positive effect on it of 1.421. Under the influence of government intervention and urban-rural income ratio in column (4), the coefficient of green finance on inclusive economic growth is 0.158. Under the effect of urban-rural income ratio in column (5), the coefficient of green finance to inclusive economic growth is 0.158, and the coefficient of urban and rural income to inclusive economic growth is 9.544, which is significantly established at 1%. In the first column (6) the per capita GDP, government intervention, urban and rural income ratio and per capita spending, under the action of green financial coefficient is 0.144, the coefficient of government intervention is 1.999, the coefficient of per capita spending is 1.218, along with the enhancement of government intervention and the improvement of people's consumer spending has a significant positive effect on inclusive economic growth.

#### 4.4.2. Impact of Green Finance on Inclusive Economic Growth in Central China

In order to explore the impact of green finance on inclusive economic growth in central China, empirical regression results of central China are obtained by using panel data model, as shown in **Table 8**. In Column (1) of **Table 8**, China's

**Table 8.** Empirical regression results of green finance on inclusive economic growth in central china.

	(1)	(2)	(3)	(4)	(5)	(6)
gf	0.0781 (0.0964)	0.372*** (0.120)	0.386*** (0.120)	0.342*** (0.117)	0.226* (0.128)	0.322*** (0.0972)
pgdp		-0.439*** (0.118)	-0.421*** (0.121)			-1.677*** (0.170)
iiem			-8.173 (10.23)			
gov				-11.67*** (3.286)		
urir					3.082* (1.825)	
pce						5.668***
_cons	4.576*** (0.312)	4.617*** (0.326)	4.591*** (0.344)	4.480*** (0.328)	3.503*** (0.708)	4.596*** (0.342)
N	135	135	135	135	135	135
R <sup>2</sup>	0.011	0.126	0.131	0.127	0.043	0.482

The central part includes Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan. The same below.

green finance has a positive promotion effect on inclusive economic growth, with a coefficient of 0.0781, which has a positive promotion effect on inclusive economic growth. At the same time, based on the effect of different control variables on the impact of green finance on inclusive economic growth presents different degrees of positive impact, the empirical results of the impact of control variables are shown in Columns (2)-(6) of **Table 8**. Under the effect of per capita GDP in column (2), green finance still has a significant positive effect on inclusive economic growth, which is significantly established at the significance level of 1%, with a coefficient of 0.372. Under the combined effect of per capita GDP and environmental governance investment in column (3), green finance still has a significant positive effect on inclusive economic growth, with a coefficient of 0.386. Under the influence of government intervention in column (4), the coefficient of green finance on inclusive economic growth is 0.342. In the first column (5) under the action of urban and rural income ratio, green finance of inclusive economic growth coefficient is 0.226, the urban and rural income of inclusive economic growth coefficient is 3.082, which suggests that the central region green finance on inclusion have a significant role in promoting economic growth, and with the increase of income of people's living standard has been significantly improved, people's happiness will also be enhanced, this indicates that the improvement of inclusive economic growth depends on the improvement of people's income level, urban and rural income levels have significant to its positive role in promoting. Under the effect of per capita GDP and per capita expenditure in column (6), the coefficient of green finance is 0.322 and the coefficient of per capita expenditure is 5.668, both of which are significantly established at the significance level of 1%, indicating that with the increase of people's consumption expenditure, inclusive economic growth has also been significantly developed.

#### **4.4.3. Impact of Green Finance on Inclusive Economic Growth in Western China**

In order to explore the impact of green finance on inclusive economic growth in western China, empirical regression results of eastern China are obtained by using panel data model, as shown in **Table 9**. In column (1) of **Table 9**, China's green finance has a positive promotion effect on inclusive economic growth, with a coefficient of 0.0891. In the western part of **Table 9**, green finance also has a positive promotion effect on inclusive economic growth. At the same time, based on the effect of different control variables on the impact of green finance on inclusive economic growth in western China, the empirical results of the impact of control variables are shown in Columns (2)-(6) of **Table 9**. Under the effect of per capita GDP in column (2), green finance still has a significant positive effect on inclusive economic growth, which is significantly established at the significance level of 1%, with a coefficient of 0.105. Under the combined effect of per capita GDP and investment in environmental governance in column (3), green finance still has a significant positive effect on inclusive economic growth,

**Table 9.** Empirical regression results of green finance on inclusive economic growth in western China.

	(1)	(2)	(3)	(4)	(5)	(6)
gf	0.0891 (0.0562)	0.105* (0.0538)	0.0916* (0.0538)	0.154*** (0.0524)	0.140** (0.0579)	0.132** (0.0662)
pgdp		-0.525*** (0.131)	-0.532*** (0.130)	-1.027*** (0.164)		-1.205*** (0.256)
iiem			1.729* (0.933)	1.195 (0.884)		
gov				21.08*** (4.661)	12.61** (5.214)	25.74*** (6.531)
urir					4.062*** (1.417)	
pce						0.121 (0.146)
_cons	4.840*** (0.176)	5.341*** (0.210)	5.372*** (0.209)	5.233*** (0.198)	3.111*** (0.614)	5.284*** (0.219)
<i>N</i>	150	150	150	150	150	150
<i>R</i> <sup>2</sup>	0.017	0.113	0.133	0.240	0.071	0.235

In the west are chongqing, Sichuan, Guizhou, Yunnan, Xizang, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang. The same below.

with a coefficient of 0.0916. Increasing the amount of investment in environmental governance can improve the ecological environment and ensure people's livelihood so as to achieve inclusive economic growth with a better life. In the first column (4) the per capita GDP, investing in environmental governance, and under the action of government intervention, green finance of inclusive economic growth coefficient is 0.154, and the impact of government intervention coefficient is 21.08, and suggests that in the western region to achieve the good health of the economy development, the need to strengthen the government's intervention, balance regional development gap between, realize the regional coordinated development. In the first column (5) under the action of government intervention, and urban and rural income ratio, green finance of inclusive economic growth coefficient is 0.140, the coefficient of government intervention is 12.61, the urban and rural income coefficient is 4.062, was set up under the 1% level significantly, showed that in the west for government policy effect on packet oh let you happy to have a significant role in promoting economic growth. In column (6), the coefficient of green finance is 0.132, the coefficient of government intervention is 25.74, and the coefficient of per capita expenditure is 0.121, indicating that the enhancement of government intervention and the increase of people's consumption expenditure all have a significant positive effect on inclusive economic growth.

## 5. Spatial Measurement Robustness Test Analysis of the Impact of Green Finance on Inclusive Economic Growth

In order to further test the spatial relevance of green finance to inclusive economic growth, five spatial weight matrices are established in this paper. The first is the spatial weight matrix (W1) in economic distance, which represents the inverse of the absolute difference in GDP per capita between Region I and Region J, represented by  $W_{ij}$ . The second is the spatial weight matrix (W2) in geographical distance, which represents the reciprocal of the absolute amount of the difference between the input value of pollution control between region I and Region J represented by  $W_{ij}$ . The third is the spatial weight matrix (W3) on the distance of government intervention, which represents the inverse of the absolute difference of local fiscal expenditure between Region I and Region J, represented by  $W_{ij}$ . The fourth is the spatial weight matrix (W4) of urban and rural income, which represents the reciprocal of the absolute amount of urban-rural income difference between Region I and Region J, represented by  $W_{ij}$ . Fifth, the spatial weight matrix (W5) on financial per capita expenditure represents the inverse of the absolute difference of per capita expenditure between Region I and Region J represented by  $W_{ij}$ .

Where, the spatial autocorrelation is measured by Moran's I Formula (17) and Geary's C Formula (18).

$$\text{Moran's } I = \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} \times C_{ij}}{S^2 \sum_{i=1}^n \sum_{j=1}^n w_{ij}} = \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{S^2 \sum_{i=1}^n \sum_{j=1}^n w_{ij}} \quad (17)$$

$$\text{Geary's } C = \frac{(n-1) \sum_{i=1}^n \sum_{j=1}^n w_{ij} (x_i - x_j)^2}{2 \left( \sum_{i=1}^n \sum_{j=1}^n w_{ij} \right) \left[ \sum_{i=1}^n (x_i - \bar{x})^2 \right]} \quad (18)$$

Among them, W1, W2, W3, W4 and W5 are spatially correlated. Therefore, this paper will construct a spatial autoregressive model (SAR model), which is more general in measuring the spatial spillover effect. Therefore, the SAR model constructed in this paper is shown as Equation (19):

$$ieg_{i,t} = \alpha + W\phi gf_{i,t} + W\phi_1 controls + \mu_{i,t} \quad (19)$$

The spatial robustness test results obtained are shown in **Table 10**, indicating that green finance has a significant promoting effect on inclusive economic growth, which further indicates that the empirical regression results are robust and effective.

## 6. The Conclusions and Policy Suggestions

### 6.1. The Conclusion

Green finance and inclusive economic growth and development are key issues to balance regional development. Based on empirical regression results of annual data of 31 provinces spanning 15 years from 2005 to 2019, this paper uses provincial panel data model to explore the impact of green finance on inclusive

**Table 10.** Empirical regression results of the spatial measurement robustness test of green finance for inclusive economic growth.

	(1)	(2)	(3)	(4)	(5)
	W1	W2	W3	W4	W5
Wgf	0.0615*** (0.0204)	0.0623*** (0.0205)	0.0615*** (0.0204)	0.0613*** (0.0205)	0.0599*** (0.0202)
Wpgdp	-0.00314 (0.114)	0.0320 (0.115)	0.0119 (0.116)	0.0139 (0.116)	-0.00310 (0.119)
Wiiem	1.609*** (0.107)	1.571*** (0.0992)	1.576*** (0.100)	1.579*** (0.100)	1.517*** (0.0995)
Wgov	-0.0775 (0.124)	-0.204* (0.110)	-0.172 (0.110)	-0.164 (0.113)	-0.193* (0.116)
Wurir	0.464 (1.243)	0.902 (1.266)	0.858 (1.287)	0.909 (1.292)	1.151 (1.296)
Wpce	0.149 (0.198)	0.114 (0.200)	0.124 (0.198)	0.126 (0.199)	0.137 (0.198)
_cons	4.811*** (0.660)	4.051*** (0.657)	4.247*** (0.640)	4.309*** (0.619)	3.588*** (0.681)
rho	-0.158 (0.0981)	0.00749*** (0.00291)	-0.0107 (0.0125)	-0.0329 (0.0260)	0.153*** (0.0384)
lgt_theta	-2.448*** (0.211)	-2.586*** (0.225)	-2.511*** (0.218)	-2.497*** (0.212)	-2.541*** (0.211)
sigma2_e	0.212*** (0.0603)	0.210*** (0.0580)	0.215*** (0.0581)	0.215*** (0.0581)	0.207*** (0.0572)
<i>N</i>	465	465	465	465	465
<i>R</i> <sup>2</sup>	0.062	0.057	0.039	0.039	0.009

economic growth from regional perspectives in eastern, central and western regions. There are three main conclusions: First, green finance has a significant positive impact on inclusive economic growth; second, green credit and green investment also have a significant positive effect on inclusive economic growth. Third, the impact of green finance on inclusive economic growth in the eastern, central and western regions of China is different.

## 6.2. Policy Suggestions

Green finance mainly relies on the support of the relevant policies of the government, and the goal of the relevant policies of the government is mainly to achieve economic growth by relying on the relevant policies, so as to achieve economic development and maintain the fairness and stability of life. The goal of inclusive economic growth emphasizes reducing the income gap between urban

and rural areas, improving people's employment levels and meeting people's living needs. Based on green finance and the correlation between the two and inclusive economic growth targets can learn green finance by influencing the green credit and green investment to inclusively positively affect the economic growth, and realize China's economic development and progress in the direction of the high quality unceasingly, achieve coordinated development of the balance of China's 31 provinces.

From the national perspective, inclusive growth of eastern, central and west development regional differences, green finance for inclusive economic growth in the western region is larger, the influence of the second is the central region, and in the eastern region of the promoting effect is less, this may be due to the economic development of the eastern region more quickly and the technical level is higher, and the effect of omitted variables will cause certain influence to the regression results. Only by accelerating the role of green finance in promoting inclusive economic growth can we achieve balanced, coordinated and sound development among the eastern, central and western regions.

From the perspective of the eastern region, green finance has a better effect on promoting inclusive economic growth in the eastern region than in the central and western regions, and has made great contributions to China's economic development. For the eastern region to promote inclusive economic growth through green finance, it is necessary to constantly improve the environmental management system and improve the efficiency of environmental policy facilities in the province, so as to drive economic development and progress and improve the green and healthy development of economic finance.

From the perspective of the central region, the relationship between green finance and inclusive economic growth lies in the active adjustment of the structure and the rational optimization of resource allocation. Between the provinces are different, the development of green finance promote also is different, the traditional continuously to promote the development of economy at the expense of environmental pollution in the new era of China's economic development cannot be sustainable development, extensive polluting enterprises is the obstacle that baffles the development of inclusive economic quality, it also requires that the central region needs to actively adjust the structure, to optimize the allocation of resources to pursue the stable and healthy development of economy.

From the perspective of the western region, green finance has a significant positive impact on inclusive economic growth, but the impact of government intervention is more obvious, so it can be seen that increasing government input and intervention is an important foundation for the development of the western region. This indicates that the sustainable development of the inclusive economy in the western region should follow closely the development in the eastern and central regions. At the same time, the Chinese government should also enhance technical and fiscal policy support and green finance to drive inclusive economic

growth. Therefore, the development of the western region needs technical support from the state, and government intervention plays an important role in the western region.

## 7. The Practical Significance and Deficiency

### 7.1. The Practical Significance

At present, China's economy has realized the transformation from high-speed development to high-quality development. The purpose of high-quality economic development is to serve the people, constantly improve the imbalance in economic development and other problems, so as to improve people's living standard and realize people's common prosperity. To explore the relationship between the green finance and inclusive economic growth as well as practical, to solve the problem facing the real life, this for our country to develop relevant contemporary economic development of the green financial policy has a significant meaning, which is helpful to improve the inclusive economic growth, it can help realize the goal of inclusive economic growth and improving people's quality of life has significant practical significance.

### 7.2. The Deficiency

1) There is a lack of research literature on the relationship between green finance and inclusive economic growth at home and abroad, so there are few references in paper writing, which may lead to some deficiencies in research methods.

2) Since this paper mainly collects panel data from 31 provinces in China, it is faced with great difficulties in data collection. Difficulties in data availability may lead to incomplete and inaccurate systematic analysis of green finance and inclusive economic growth.

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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