

# Does Green Finance Affect the High-Quality Development of Real Economy?

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**Abstract:** Based on the panel data of 11 prefecture-level cities in Hebei Province of China from 2015 to 2020, the high-quality development level of green finance and the real economy are calculated by entropy method. The two-step system GMM model is used to analyze the effect of green finance on the high-quality development of real economy. The research results show that green finance can significantly promote the high-quality development of the real economy. The robustness of this conclusion is proved by the test of increasing or decreasing the control variable and replacing the measurement standard of the explained variable. Finally, some suggestions are put forward.

**Keywords:** Green Finance; The Real Economy; High-Quality Economic Development

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## 1. Introduction

Economic development has always been the focus of scholars' research. Early research mainly focused on the speed of economic development and how to improve the economic growth rate. With the increasingly prominent environmental problems, the progress of science and technology and the improvement of labor quality in recent years, it is generally recognized that simply realizing "high-speed" economic development can no longer meet people's needs for a better life. Under the correct guidance of the country's pursuit of "high-quality economic development", the focus of the country's economic development has gradually shifted from the pursuit of speed to the control of quality, and more and more research has been done on high-quality economic development.

The high-quality development of the economy depends on the high-quality of the real economy, which focuses on the coordinated development of the industrial structure, economic benefits, scientific and technological innovation and the ecological environment of the real economy<sup>[1]</sup>. At present, the problem of China's economy "turning from reality to emptiness" and the real economy "hollowing out" is serious. Only by solving various problems in the process of high-quality development of the real economy can the pace of national economy achieve high-quality development be accelerated.

Green finance has gradually developed as a new means with both green and financial attributes. It has entered the market in diversified forms, provided efficient and convenient financial services for green industries such as energy conservation and environmental protection, and provided an effective channel to change the original extensive type of economic, control pollution and improve the environment. The application of green finance can guide the transfer of resources from energy-intensive industry to green development field, and achieve the purpose of improving environmental quality and promoting green sustainable development of economy by promoting the transformation and upgrading of industrial structure and enhancing the intensity of environmental regulation<sup>[2-4]</sup>. Therefore, green finance can optimize the allocation of resources, improve the efficiency of resource use, promote supply-side structural reform and promote high-quality development of the real economy by directing capital to important areas in the development of the real economy.

The existing researches have made a comprehensive analysis on the theoretical aspects of green finance and high-quality development of the real economy, such as the connotation, development goals, and paths<sup>[5-6]</sup>, but few researches have linked the two together. In view of the current background of green sustainable development and high-quality development, it is necessary to study

the relationship between them.

## 2. Research design

### 2.1 Model Building

Taking 11 prefecture-level cities in Hebei Province from 2015 to 2020 as research samples, the high-quality development (QEL) of the real economy in Hebei Province as the explanatory variable, green finance (GF) as the explanatory variable, and adding urbanization level (Urban), government support (Gov), human capital level (K), average size of enterprises (Size) and material capital level (TZ) as the control variables, this paper studies the effect of green finance on the high-quality development of the real economy in Hebei Province.

Considering the influence of various factors on the high-quality development of the real economy, there will be a certain time lag and continuity, and there may be a "two-way causal" relationship between green finance and the high-quality development of the real economy, which will lead to endogenous problems. In view of this, drawing on the research ideas of existing scholars [7], the dynamic panel model is constructed and the systematic GMM method is adopted to study the effect of green finance on the high-quality development of the real economy. The model is constructed as follows:

$$QEL_{i,t} = \alpha_0 + \alpha_1 QEL_{i,t-1} + \alpha_2 GF_{i,t} + \beta Z_{i,t} + \varepsilon_{i,t} \quad (1)$$

Among them,  $i$  represents each prefecture-level city,  $t$  represents the year,  $QEL_{i,t-1}$  is the first-order lag term of high-quality growth of the real economy, and  $Z$  is the control variable, including urbanization level, government support, human capital level, average enterprise size and investment level.  $\varepsilon_{i,t}$  is a perturbation term.

### 2.2 Selection of Variables

#### 2.2.1 Interpreted variables

High-quality development of real economy (QEL). Most scholars often use gross national product to measure the development level of the real economy, excluding the real estate and financial markets. However, the high-quality development of the real economy not only emphasizes the increase of economic output value, but also pays attention to science and technology, ecological environment and other aspects. Based on the research of existing scholars and considering the availability of data, this paper selects 8 secondary indicators from 4 perspectives and calculates the high-quality development level of the real economy of 11 cities in Hebei Province by

entropy method [1,8]. Among them, the rationalization of industrial structure is calculated by  $S = \sum_{i=1}^3 \frac{Y_i}{Y} * \ln\left(\frac{Y_i/L_i}{L_i/Y}\right)$ , where  $S$  is the rationalization index of industrial structure,  $Y_i$  is the added value of industry  $i$ ,  $Y$  is the total output value of the three industries,  $L_i$  is the number of workers in industry  $i$ ,  $L$  is the total number of employees in the three industries, and  $i$  represents the industry. See Table 1 for the selection of other specific indicators.

#### 2.2.2 Explanatory variables

Green finance (GF). The concept of "green finance" was formally put forward in 2015. Relying on the national concept of green sustainable development, green finance has developed rapidly since it was put forward. As for the measurement of green finance, on the basis of learning from the research of existing scholars, green investment is selected to measure the development level of green finance in various cities of Hebei Province, and the number of personnel in the environmental protection industry and the investment in environmental protection are selected to measure the development level of green finance from the perspectives of personnel investment and capital investment respectively [9]. See Table 1 for the specific meaning of each secondary indicator of green finance.

#### 2.2.3 Control variables

In order to better study the effect of green finance on the high-quality development of the real economy, urbanization level, government support, human capital level, average size of enterprises and investment level are added as control variables. See Table 1 for the specific meaning of the indicators.

Table 1 Construction of Indicator System

variable name	class A index	symbol	secondary index	Indicator meaning	attribute
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			Total industrial profits	Total profit of industrial enterprises above designated size	+
			Total industrial assets	Total fixed assets and current assets of industrial enterprises above designated size	+
			Number of patents granted	Number of patents granted	+
Be explained variable	high-quality development of economy	QEL	Expenditure on science and technology	Scientific expenditure/expenditure within the general budget of local finance	+
			rationalize the structure of production	Coupling Degree between Output Structure and Labor Structure	+
			Advanced industrial structure	Output value of tertiary industry/output value of secondary industry	+
			Waste management	Harmless Treatment Rate of Domestic Waste	+
			Waste discharge	Industrial sulfur dioxide emissions	—
explain variable	green finance	GF	Environmental protection industry employee	Number of employees in water conservancy, environment and public facilities management industry/number of employees at the end of the year	+
			Investment in environmental protection	Investment in water, environmental and public facilities management industry /GDP	+
		Urban	Urbanization level	Total urban population	
		Gov	Government support	Local finance general budget expenditure/GDP	
		K	Human capital level	Year-end employment figures	
control variable		Size	Average enterprise size	Total industrial profits above scale/number of industrial enterprises above scale	
		TZ	Investment level	The amount of investment in fixed assets is the natural logarithm.	

## 2.2.4 Data sources

The research data are mainly from the National Tai 'an Database, *China City Statistical Yearbook*, *Hebei Economic Yearbook*, etc. The missing values in the original data are filled by interpolation.

## 3. Empirical research

### 3.1 Description of development situation

The concept of "green finance" was formally proposed in 2015. The development of green finance as measured by various environmental indicators and high-quality development of the real economy in Hebei Province, in the five years before and after the proposal of green finance are shown in Table 2. The observed data show that the average value of high-quality development of green finance and real economy has been significantly improved after 2015. It can be seen that after the "green finance" was put forward, the high-quality development level of the real economy in Hebei Province has increased year by year and gradually moved towards the

high-quality development of the real economy.

Table 2 Summary of Changes in Development Level of Major Indicators around 2015

variable name	Year	sample number	mean value	standard deviation	Min	Max
GF	2010-2014	55	0.344	0.269	0.0333	0.980
	2015	11	0.394	0.242	0.138	0.894
	2016-2020	55	0.434	0.251	0.0181	1
QEL	2010-2014	55	0.366	0.149	0.142	0.783
	2015	11	0.365	0.168	0.203	0.775
	2016-2020	55	0.409	0.169	0.186	0.861

### 3.2 Descriptive Statistics of Variables

The study selected 11 cities in Hebei Province from 2015 to 2020 as samples for analysis. The following table carries out descriptive statistics on each variable.

Table 3 Descriptive Statistical Tables

variable name	sample number	mean value	standard deviation	min	max
GF	66	0.427	0.249	0.0181	one
QEL	66	0.558	0.0532	0.466	0.702
Urban	66	0.0187	0.0105	0.00174	0.0529
Gov	66	0.0184	0.0148	0.00374	0.0525
K	66	2.974	1.392	1.017	5.935
Size	66	0.452	0.601	-0.741	1.739
TZ	66	0.427	0.249	0.0181	one

### 3.3 Positive Results

Considering the time lag and sustainability of the impact of green finance on the high-quality development of the real economy and the possible endogenous problems between them, this paper estimates the effect of green finance on the high-quality development of the real economy in Hebei Province by using the two-step systematic GMM method. The specific empirical results are shown in the basic regression column (1) in Table 4.

From the analysis of regression results, it can be seen that  $AR(2)=0.448>0.1$  cannot reject the original assumption, i.e. there is no autocorrelation of the perturbation term; In the over-recognition test,  $Hansen=0.565>0.1$  cannot reject the original assumption, that is, all the tool variables are exogenous variables, the tool variables are valid, and L.QEL has passed the 10% significance test, which verifies the rationality of choosing the two-step system GMM model.

By observing the regression results, it is found that the first-order lag term of the high-quality development of the real economy is significantly positive, which proves that green finance has a lag effect on the high-quality development of the real economy, i.e. the current level of green finance will have a significant positive impact on the next level of high-quality development of the real economy. In the regression results, the green finance passed the significance test of 5% and the coefficient was positive, indicating that the green finance has a significant positive effect on the high-quality development of the real economy, vigorously developing the green finance can promote the progress of the high-quality development of the real economy, and the conclusion that the green finance has a significant promoting effect on the high-quality development of the real economy is drawn.

Table 4 Regression Results

VARIABLES	Basic regression		Robustness tests		
	(1)	(2)	(3)	(4)	(5)
L. QEL	1.428***	0.987**	1.494***	1.479***	1.416***

	(0.280)	(0.416)	(0.202)	(0.217)	(0.150)
GF	0.584**	0.525**	0.427**	0.416**	0.409***
	(0.276)	(0.238)	(0.179)	(0.181)	(0.148)
Open		-5.989			
		(4.784)			
Urban	0.992	2.054			
	(1.041)	(1.738)			
Gov	-0.322	-0.899	0.168		
	(0.208)	(0.667)	(0.289)		
K	-10.69***	-9.665	-3.290***	-3.324**	
	(2.674)	(6.378)	(1.254)	(1.345)	
Size	-0.0780*	-0.0702*	-0.0546**	-0.0535**	-0.0547***
	(0.0428)	(0.0375)	(0.0229)	(0.0228)	(0.0194)
TZ	-0.0918**	-0.0940***	-0.0773	-0.0836	-0.0913*
	(0.0373)	(0.0299)	(0.0503)	(0.0542)	(0.0491)
Constant	-0.423	-0.632	-0.133	-0.0887*	-0.119**
	(0.381)	(0.551)	(0.0948)	(0.0480)	(0.0500)
Observations	55	55	55	55	55
Number of id	11	11	11	11	11
AR(1)	0.282	0.238	0.171	0.191	0.147
AR(2)	0.448	0.407	0.982	0.908	0.959
Hansen test	0.565	0.925	0.631	0.641	0.658

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ; All results are estimated by two-step system GMM. AR(1), AR(2) and Hansen coefficient are the values of probability  $p$ . The following table is consistent with this.

## 4. Robustness tests

### 4.1 Increase or decrease control variable

Increase the control variable. Considering that the level of opening to the outside world may affect the green finance and the high-quality development level of the real economy to a certain extent, the level of opening to the outside world (Open) is added to the control variable to expand the benchmark model to verify whether the effect of green finance on the high-quality development of the real economy will be affected after adding other control variables. The level of opening to the outside world is expressed by the actual amount of foreign capital utilized by the region/the region's gross domestic product. As shown in column (2) of table 4.

Delete the control variable. On the basis of the original reference model, the control variables are reduced in turn to verify whether the original conclusion is related to the selection of specific control variables. The regression results are shown in columns (3), (4) and (5) of Table 4.

By observing the regression results, it can be seen that the significance of the first-order lag term of the explanatory variable and the explained variable still holds after the control variable is increased or decreased, i.e. the original conclusion has certain robustness.

### 4.2 Replace the measure of the explained variable

The proportion of the output value of the secondary and tertiary industries to GDP is chosen to represent the level of industrial structure upgrading, the explained variables are measured by entropy method again, and the high-quality development of the real economy after replacing the measurement method is represented as Qel. The Qel is subjected to benchmark regression and control variable deletion regression, and the regression results are shown in Table 5. By observing the regression results, we can see that the conclusion is consistent with the benchmark model after deleting the control variables and replacing the measures of the explained variables. It can be seen that the original conclusion has certain robustness.

Table 5 Regression Results after Replacing the Meaning of QEL

VARIABLES	(1)	(2)	(3)	(4)
L.Qel	1.720*** (0.493)	1.409*** (0.174)	1.348*** (0.213)	1.345*** (0.168)
GF	0.159* (0.0942)	0.245*** (0.0922)	0.220* (0.121)	0.212** (0.0932)
Urban	-0.649 (0.780)			
Gov	0.522 (0.488)	0.226 (0.254)		
K	-0.267 (0.935)	-1.352** (0.679)	-1.317* (0.769)	
Size	-0.0253 (0.0156)	-0.0336** (0.0162)	-0.0295 (0.0187)	-0.0288* (0.0161)
TZ	-0.121* (0.0721)	-0.0834* (0.0429)	-0.0828 (0.0591)	-0.0905* (0.0540)
Constant	0.0431 (0.195)	-0.144* (0.0865)	-0.0761 (0.0502)	-0.0968** (0.0453)
Observations	55	55	55	55
Number of id	11	11	11	11
AR(1)	0.216	0.208	0.225	0.205
AR(2)	0.381	0.986	0.861	0.954
Hansen	0.669	0.660	0.630	0.697

## 5. Conclusions and recommendations

### 5.1 Conclusion

Based on the panel data of 11 cities in Hebei Province of China from 2015 to 2020, this paper estimates the effect of green finance on the high-quality development of the real economy by using the two-step systematic GMM method. The multiple regression tests prove that the research conclusion: green finance can significantly promote the high-quality development of the real economy, and the conclusion has certain robustness.

### 5.2 Recommendations

The government and relevant enterprises should increase investment in scientific and technological research and development, comprehensively enhance innovation capability, promote the transformation and upgrading of industrial structure, and provide a solid force for high-quality development of green finance and real economy. At the same time, we will fully improve the green financial service system, popularize the knowledge of green financial services, learn from the service systems of other regions where green finance is well developed, and expand the channels for green finance to serve the high-quality development of the real economy and the service coverage so that green finance can give full play to its advantages in supporting the high-quality development of the real economy.

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