

# Green Finance, Industrial Structure Adjustment and High-quality Development

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## Abstract

Based on the panel data of 30 provinces and cities across the country in 2010-2020, the relationship between the panel returning (PVAR) model explores the relationship between green finance, industrial structure adjustment and high-quality economic development. The results show that green finance is the reason why industrial rationality is rationalized. Industrial rationalization is the reason for the advanced industrial Granger. There is a two-way causal relationship between green finance and high-quality economic development; there is a mutual promotion role between green finance and high-quality economic development, and this promotion effect will gradually weaken over time; in addition, the advanced industrial structure is one of the causes of the rationalization of the industrial structure. But this impact only acts in the short term. Therefore, in order to promote high-quality economic development, we must implement regional coordinated development strategies, implement accurate green financial policies, properly handle the reasonable and advanced relationship between the industrial structure and continuously promote the rationalization of industrial structure, improve industrial production efficiency and economy operation efficiency.

## Keywords

Green Finance; Panel Vector Returning; High-Quality Economic Development.

## 1. Introduction

Since the reform and opening up, China's rapid economic growth has created a miracle in the history of world economic growth. However, in the past few decades, the Chinese economy has maintained high-speed growth, accompanied by serious waste of resources and environmental pollution. In this context, the country has begun to re-examine environmental issues, and economic green and low-carbon development is imperative. The Fifth Plenary Session of the Eighteenth Central Committee of the Communist Party of China proposed the five major development concepts. The report of the 19th National Congress of the Communist Party of China proposed that "the concept of establishing and practicing green mountains and green mountains is the golden mountains and silver mountains", which has raised green development to a new height. It can be seen that promoting green development has long become a social consensus. However, the green development related to the fate of all human beings is facing a severe challenge of insufficient capital supply and inefficient capital allocation. Green Finance is an economic activity that responds to climate change and prevent the environment from further deterioration. It has become the main support for the development of the green economy at the moment, and has become a new driving force for adjusting the industrial structure and promoting high-quality economic development. As a link of financial and environment, it can reduce environmental pollution by guiding the inflow of funds into the industrial transformation and pollution control process, provides a good external environment for industrial transformation, realizes the optimization and upgrading of the industrial structure, and promotes economic transformation to intensive types. In this context, exploring

the influence between environmental pollution and the optimization and upgrading of industrial structure, and exploring the effective path of using green financial means to improve environmental pollution problems is of great significance for the future transformation and development of my country's economy.

## 2. Literature Review

For a long time, economic development has been a hot issue for the academic circles. With the increasingly serious environmental pollution, some scholars have begun to pay attention to the relationship between green finance and economic development. As far as the impact of macroeconomics is concerned, green finance helps to promote the development of the low-carbon economy [1], and can solve the resource and environmental problems through the optimal combination of financial instruments [2], which is critical to the development of China's renewable energy. [3] Green finance and traditional economic policies are complementary, which can not only optimize macroeconomic development, but also improve micro-economic efficiency [4]. Taking Huzhou, Zhejiang Province as an example, scholars have found that green credit investment can promote the development of green industries, thereby driving regional economic development [5]. Green credit policy has a significant promotion of the overall industrial structure upgrade and has a positive effect on the development of the second industry, but it has played a suppression of the tertiary industry [6]. In terms of the relationship between Green Finance and environmental performance, after the analysis of the theoretical model plus the analysis of the theoretical model, it is found that green finance has the function of optimizing the allocation of resources and can effectively respond to excessive consumption of resource consumption and environmental pollution [7]. Labatt & White [8] explains the function of environmental finance that transmits environmental information and can effectively improve environmental performance. The essence of economic development and environmental pollution is the impact of industrial structure and technological innovation. Therefore, the relationship between economic development and environmental pollution alone cannot fully explain the phenomenon of economic phenomena [9], so the industrial structure adjustment should be incorporated into the analysis framework.

In summary, many existing studies are directly studying the impact of green finance on economic development, and lack of detailed research on the integration of green finance, industrial structure upgrades, and economic development quality. At the same time, industrial structure adjustment is often used as the object of evaluation, and rarely examines its intermediary effect that affects economic quality in green finance. Green finance is an important measure to achieve green development, and its internal support is essentially supporting high-quality development. Combining the adjustment of green finance and industrial structure, discussing its impact mechanism on high-quality development is conducive to promoting the integration of the above research fields, expanding new research horizons, and enriching the existing research system.

## 3. Research Design

### 3.1. Model Construction

Because the panel vector returns (PVAR) model does not have any advance constraints on the relationship between variables, and it is estimated that the dynamic impact of the combined endogenous variables can be well reflected in the complex interconnection between variables. PVAR models to study the relationship between green finance, industrial structure adjustment, and high-quality economic development. The basic expression of the model is:

$$y_{it} = \alpha_0 + \sum_{j=1}^p \alpha_j y_{i,t-j} + \chi_i + \eta_t + \mu_{it} \quad (1)$$

Among them:  $y_{it}$  refers to core variables, that is, green finance, reasonable industrial structure, high -level industrial structure, and high -quality economic development;  $i$  refers to various samples;  $t$  refers to the year;  $\alpha_0$  refers to the interception vector;  $\alpha_j$  refers to the parameter matrix;  $\rho$  is the lag order;  $\chi_i$  is the individual effect of the sample, reflecting the individual heterogeneity of various samples on the cross section;  $\eta_t$  is the time effect, reflects the changes in the time trend of each variable;  $\mu_{it}$  is a random interference item that obeys the normal distribution.

### 3.2. Variable Selection

#### (1) Green Finance (gf)

Refer to Liu Dawei et al. [10], Shao Xuefeng and Fang Tianshu [11], select 6 indicators to build a green financial evaluation index system from five aspects: green credit, green securities, green insurance, green investment and carbon finance, as shown in Table 1. At the same time, the entropy value method is used to calculate the level of green financial development in various regions.

**Table 1.** Green Financial Evaluation Index

First -level Indicator	Secondary Indicator	Three -level Indicator	Index Definition	Attribute
reen Finance	reen Credit	high energy consumption industrial interest proportion	high energy -consuming industrial interest/industrial interest	-
	reen Securities	high energy industry market value proportion	six high energy consumption A shares market value/total market value of A shares	-
	reen Investment	investment proportion of environmental pollution	treatment of pollution investment/DP	+
	reen Insurance	agricultural insurance scale ratio	agricultural insurance income/total agricultural output value	+
	Carbon Finance	carbon strength	carbon dioxide emissions/DP	-

#### (2) Industrial structure adjustment

Because industrial structure adjustment is a dynamic evolution process, this article divides industrial structure adjustment into two dimensions: rationalization of industrial structure and high -level industrial structure.

Industrial structure rationalization (tl): The rationalization of the industrial structure reflects the reasonable configuration of the production factors and the coordinated development of the industry. At present, there are two main indicators of the rationalization of the industrial structure, namely the structure deviation and the Ter index. In view of the fact that the structure deviation ignores the importance of different industries in the economy and the Ter index itself may have negative values, this article is based on the practice of Gan Chunhui [12], and the Tur Index has been corrected Use its absolute value to measure the rationalization level of the industrial structure.

High -level industrial structure (th): High -level industrial structure is actually a measure of industrial structure upgrade. It reflects that the proportion of the three industries has continuously climbed from the first industry to the second industry and then climbed to the tertiary industry. Therefore, this article directly draws on the practice of Gan Chunhui, and uses the ratio of the output value of the tertiary industry to the output value of the second industry

to reflect the trend of "economic service" [12]. The larger the TH value, the higher the level of industrial structure.

### (3) High -quality economic development (he)

This article draws on the research results of Sun Hao and others [13], with the five major development concepts proposed by General Secretary Xi Jinping in the Fifth Plenary Session of the 18th Central Committee of the Party as the theoretical basis, and from the five aspects of "innovation, coordination, green, openness, sharing" Establish a system of high -quality economic development index.

### 3.3. Data Source and Descriptive Statistics

Considering that the lack of data in various indicators in Tibet, Hong Kong, Macao and Taiwan is serious, this article will no longer be included in the research category. Therefore, this article uses panel data in 30 provinces in my country from 2010 to 2020 as research samples. Data are from the authoritative data of "China Statistical Yearbook", local statistics yearbook, and the National Bureau of Statistics. The descriptive statistics of each variable are shown in the table below.

**Table 2.** Variable descriptive statistics

Variable	Number	Average	Standard Deviation	Minimum	Maximum
df	330	0.297	0.133	0.118	0.777
tl	330	0.516	0.285	0.008	1.411
th	330	1.296	0.721	0.527	5.297
he	330	0.176	0.103	0.060	0.677

## 4. Empirical Analysis

### 4.1. Stability Test

**Table 3.** unit root test results

Variables	IPS Test	LLC Test	Fisher ADF Test	Fisher PP Test	Conclusion
gf	-4.363***	-8.289***	106.752***	74.118	non -stable
d.gf	-6.872***	-11.144***	141.134***	248.295***	stable
tl	-0.090	-8.047***	122.137***	103.257***	non -stable
d.tl	-4.553***	-9.650***	132.152***	191.523***	stable
th	-1.773**	-7.851***	58.600	29.593	non -stable
d.th	-4.707***	-8.026***	64.164*	83.002**	stable
he	-6.114***	-7.566***	128.530***	226.850***	stable
d.he	-7.901***	-16.770***	253.357***	517.353***	stable

Notes: \*, \*\*, \*\*\* indicate that the level of confidence of 10%, 5%, and 1% respectively respectively; the numbers in the table represent the corresponding statistics in each test, and retain all the numbers of three decimal numbers to all numbers.

In order to avoid the "pseudo -return" phenomenon, the data needs to be checked in a stable test. This article uses IPS inspection, LLC inspection, Fisher ADF inspection, and Fisher PP inspection method. If the results occur, the first -order difference is performed on the original sequence, and then the corresponding unit root test is re -examined until the result is stable. Table 3 reports the test results of each variable. It can be seen from Table 3 that some sequences of gf, tl, th, and hE have not passed the unit root test, but after the first -order difference, all variables pass the unit root test, indicating that each variable is a first -order single rectification, it can be organized. For the above variables, the KAO co-inspection method is used. The results

show that the T value of ADF is -5.704, and the permission probability is 0.000, that is, the original fakes that have no coordination relationship at a significant level of each variable at a significant level of each variable. Therefore, although the original variable sequence is partially unstable, in the long run, there is a coordination relationship between various variables, which can establish a PVAR model.

#### 4.2. Estimation of the Optimal Lag Order

When PVAR returns to the model, the best lag is required. First of all, the models of AIC, BIC, and HQIC information standards are compared and compared to the models in each order. Sexuality and effectiveness, as shown in Table 4. It can be seen from Table 4 that the optimal lag of the PVAR model is 1.

**Table 4.** Outstanding lag order Selection results

Lag Order	CD value	J value	P value	AIC	BIC	HQIC
1	0.402	74.563	0.460	-258.423*	-73.437*	-148.034*
2	0.939	65.783	0.225	-195.206	-50.217	-108.685
3	0.985	41.500	0.493	-147.492	-42.500	-84.838
4	0.984	27.036	0.407	-89.959	-24.964	-51.174
5	0.806	8.219	0.607	-36.779	-11.781	-21.862

#### 4.3. GMM Estimate

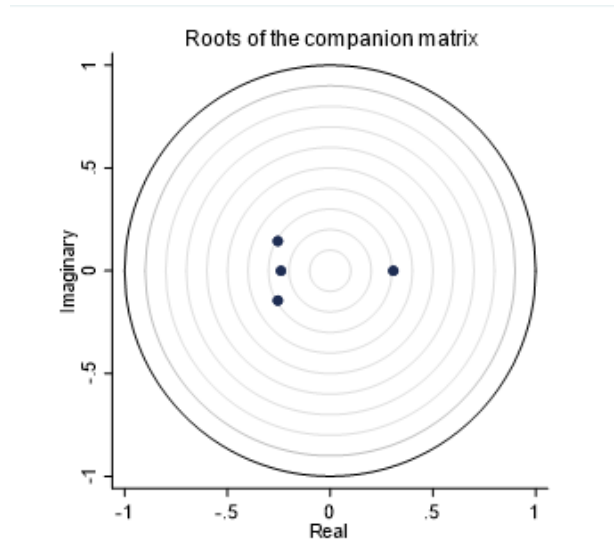
This article first transforms the Helmert process conversion of the data to eliminate the effect of fixed effects and avoid parameter estimation errors. Then, the GMM estimation of the PVAR model in 30 provinces is based on the selected best level. The estimated results are shown in Table 5. However, due to the interaction of endogenous variables, the PVAR model's GMM estimation parameters have no actual economic significance [14-15]. Therefore, this article does not pay too much attention to the estimation results. It is only analyzed for the Granger causal test, pulse response results, and square differential decomposition results of the GMM estimation.

**Table 5.** GMM estimation result

Variables	df	tl	th	he
L1.df	-0.090 (0.103)	0.083*** (0.031)	0.204 (0.144)	-0.186** (0.076)
L1.tl	-0.430 (0.529)	-0.447 (0.287)	-0.482 (0.896)	0.470 (0.445)
L1.th	-0.041 (0.106)	0.078** (0.032)	0.400*** (0.153)	0.050 (0.071)
L1.he	0.142** (0.070)	0.007 (0.033)	-0.117 (0.129)	-0.304*** (0.064)

Notes: The standard errors are in parentheses; \*, \*\*, \*\*\* indicate at the level of 10%, 5%, and 1% confidence, respectively

Next, check the stability of the PVAR model. Through the unit root feature value of the unit's unit, whether it all falls in the unit circle (less than 1) to verify the stability of the model. From Figure 1, we can see that the three estimates of the PVAR model are all in the unit circle, indicating that the PVAR model constructed is stable, and there is a long-term stability relationship between variables.



**Figure 1.** Stability test

#### 4.4. Pulse Response Function

The GMM estimation results above show the static interactive relationship between green finance, industrial structure adjustment, and high-quality economic development. Therefore, this article analyzes the pulse response of the three variables. The path further determines the specific dynamics and relationships between the three. This article uses the impact of a standard deviation of each variable, and uses Monte Carlo to simulate 300 times to obtain the pulse response function diagram of each variable lag 10. The result is shown in Figure 2. In Figure 2, the horizontal coordinate represents the response period, the vertical coordinate represents the response value, the solid line represents the pulse response function, and the shadow part is the 95% confident interval generated.

It can be seen from Figure 2 that ① Green finance, industry rationalization, industrial advanced, and high-quality economic development all reached the largest value when it was impacted by itself, and then maintained a continuous positive response until the decay was 0, indicating that all variables existed in all variables. It has strengthened its own mechanism, but gradually weakened over time. Each variable not only responds to the rapid impact of information from itself, but also significantly positive in the early stage, which indicates that the four have strong economic inertia in the short term and have a good self-enhancement effect. ② The impact of green finance, the rationalization of the industrial structure did not respond in the current period, and the response value in the first phase quickly became negative. The second phase of the response value was positive. It shows that the impact of green finance on the rationalization of the industrial structure in the short term is volatility, but in the long run, it can promote the improvement of the rationalization level of the industrial structure. The high-level response value of the industrial structure has remained negative in the short term, and the decay after the third phase is 0, indicating that green finance may hinder the level of advanced industrial structure in the short term. ③ From the perspective of the two dimensions of industrial structure adjustment, when facing the impact of the industrial structure's high-level impact, the rationalization of the industrial structure is positive and negative, and the pulse value after the second phase has decreased to 0, indicating that the industry The impact of high-level structure on rationalization only acts in the short term. When the industrial structure was highly impacted by the rationalization of the industrial structure, there was no response in the current period. It reached its peak in the first phase, and gradually narrowed to 0 in the later period, indicating that the rationalization of the industrial structure has a positive effect on the advanced industrial structure. ④ When the high-quality development of the economy is used

as a response variable, first of all, green finance responds to its response value and then negative, and the later attenuation is 0; The rationalization of the industrial structure is positive, while the industrial structure is highly manifested.

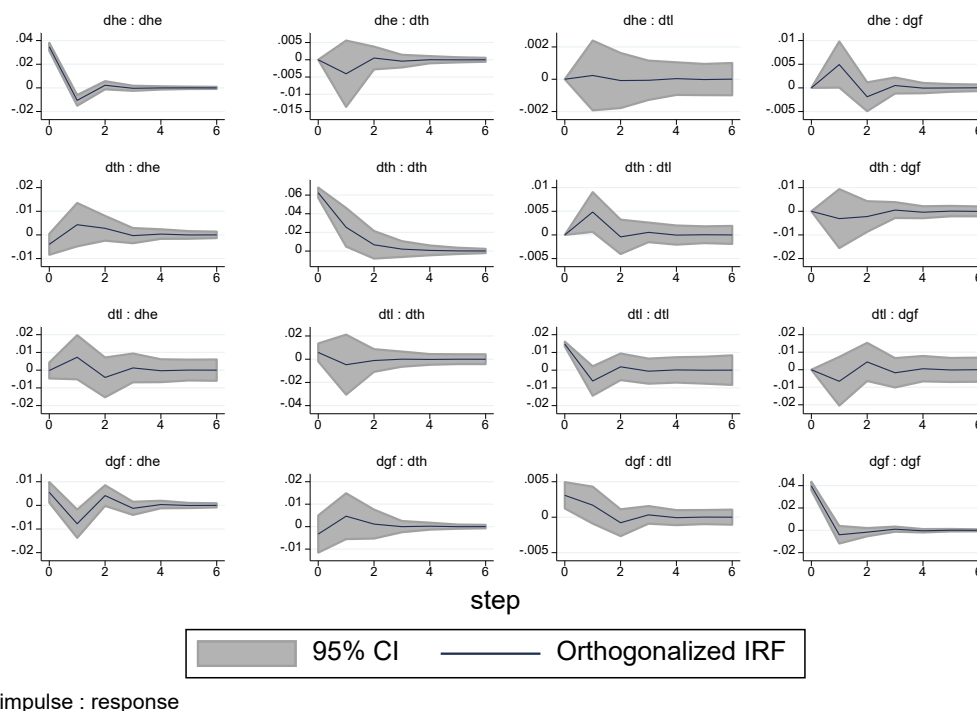


Figure 2. Pulse response diagram

4.5. Differential Decomposition

Table 6. Differential decomposition results

	Number	gf	tl	th	he
gf	1	1.0000	0.0000	0.0000	0.0000
	2	0.9536	0.0260	0.0058	0.0146
	3	0.9378	0.0372	0.0086	0.0164
	4	0.9359	0.0389	0.0087	0.0165
	5	0.9357	0.0390	0.0088	0.0165
	6	0.9356	0.0391	0.0088	0.0165
	7	0.9356	0.0391	0.0088	0.0165
	8	0.9356	0.0391	0.0088	0.0165
	9	0.9356	0.0391	0.0088	0.0165
	10	0.9356	0.0391	0.0088	0.0165
tl	1	0.0421	0.9579	0.0000	0.0000
	2	0.0428	0.8762	0.0809	0.0002
	3	0.0442	0.8753	0.0803	0.0002
	4	0.0445	0.8743	0.0811	0.0002
	5	0.0445	0.8742	0.0811	0.0002
	6	0.0445	0.8742	0.0811	0.0002
	7	0.0445	0.8742	0.0811	0.0002
	8	0.0445	0.8742	0.0811	0.0002
	9	0.0445	0.8742	0.0811	0.0002
	10	0.0445	0.8742	0.0811	0.0002
th	1	0.0028	0.0085	0.9887	0.0000
	2	0.0070	0.0121	0.9774	0.0035

	3	0.0072	0.0122	0.9771	0.0035	
	4	0.0072	0.0122	0.9771	0.0036	
	5	0.0072	0.0122	0.9770	0.0036	
	6	0.0072	0.0122	0.9770	0.0036	
	7	0.0072	0.0122	0.9770	0.0036	
	8	0.0072	0.0122	0.9770	0.0036	
	9	0.0072	0.0122	0.9770	0.0036	
	10	0.0072	0.0122	0.9770	0.0036	
	he	1	0.0243	0.0000	0.0127	0.9630
		2	0.0606	0.0352	0.0231	0.8811
3		0.0698	0.0451	0.0275	0.8577	
4		0.0706	0.0460	0.0275	0.8559	
5		0.0707	0.0460	0.0276	0.8557	
6		0.0707	0.0460	0.0276	0.8557	
7		0.0707	0.0460	0.0276	0.8557	
8		0.0707	0.0460	0.0276	0.8557	
9		0.0707	0.0460	0.0276	0.8557	
10		0.0707	0.0460	0.0276	0.8557	

In order to accurately explore the degree of interaction between green finance, industrial structure adjustment and high-quality economic development, this article uses the contribution of different disturbance items to the fluctuation of endogenous variables by PVAR square differential decomposition. The analysis period is set to 10 phases, and the variety decomposition results are shown in Table 6.

It can be seen from Table 6 that the contribution rate of green finance to its own variance is more than 93%, that is, more than 90% of the changes in green finance can be explained by itself. This may be because the green financial means are mostly policy-oriented, forming a certain path dependence, so that other variables explain the explanation of it less; the high-level industrial structure and the rationalization of the industrial structure contribute to the variance decomposition of the high -quality development of the economy. However, the high degree of contribution of the industrial structure is greater than that of the industrial structure. This shows that at this stage, the high -level industrial structure has promoted the high -quality economic development; the high -quality development of the economy's contribution to its own variance is more than 85%, which shows that the high -quality development of the provinces has certain inertia and the self -enhancement effect is good.

#### 4.6. Granger Causality Test

Next, this article conducts Granger causal tests on the estimation results to determine whether there is a causal relationship between the three people of green finance, industrial structure adjustment, and high -quality economic development. The test results are shown in Table 7. It can be seen from Table 7 that green finance is the reason why industrial rationalization is. There is a two -way causal relationship between green finance and high-quality economic development. It shows that the development of green finance at this stage is the reason for promoting the rationalization of the industry. At the same time, the interactive effect of high-quality development of green finance and economy is relatively obvious; industrial advanced is the reason why industrial rationalization is rationalized, indicating that the advanced industrial structure can promote the industry to promote the industry Structural rationalization, but advanced, still lacks the foundation of the rationalization of industrial structure.



**Table 7.** Granger causal test result

Null hypothesis	$\chi^2$ value	Degree of freedom	P value	conclusions
tl is not the ranger reason for gf	0.661	1	0.416	accept
th is not the ranger reason for gf	0.147	1	0.701	accept
he is not the ranger reason for gf	4.070	1	0.044	reject
all variables is not the ranger reason for gf	4.323	3	0.229	accept
gf is not the ranger reason for tl	7.268	1	0.007	reject
th is not the ranger reason for tl	5955	1	0.015	reject
he is not the ranger reason for tl	0.042	1	0.838	accept
all variables is not the ranger reason for tl	10.528	3	0.015	reject
gf is not the ranger reason for th	2.008	1	0.156	accept
tl is not the ranger reason for th	0.289	1	0.591	accept
he is not the ranger reason for th	0.819	1	0.366	accept
all variables is not the ranger reason for th	2.257	3	0.521	accept
gf is not the ranger reason for he	5.942	1	0.015	reject
tl is not the ranger reason for he	1.116	1	0.291	accept
th is not the ranger reason for he	0.486	1	0.486	accept
all variables is not the ranger reason for he	8.618	3	0.035	reject

## 5. Conclusion and Suggestions

### 5.1. Research Conclusion

Based on the data of the 30 provinces and cities nationwide from 2010-2020, the PVAR model is used to explore the relationship between green finance, industrial structure adjustment and high-quality development of the economy. The following conclusions are mainly obtained: ① Green Finance is the reason for the reasonable industrialization of Granger. Industrial rationality is the reason for the advanced industrial Granger. There is a two-way causal relationship between green finance and high-quality economic development. It shows that there is a direct and indirect impact mechanism between green finance, industrial structure adjustment and high-quality development. ② Analysis of the analysis of the broader torque estimation and pulse response shows that green finance has a lagging role in the industry's rationalization before promoting; there is a mutual promotion effect between green finance and high-quality economic development. Gradually weakened; in addition, the advanced industrial structure is one of the causes of the rationalization of the industrial structure, but this impact only acts in the short term. ③ The result of the differential decomposition shows that compared with the rationalization of the industrial structure, the high-level industrial structure has a large promotion effect, and the high-quality development of the economy has a certain inertia, and the self-enhancement effect is good.

### 5.2. Research Recommendations

Based on the above conclusions, the following suggestions are put forward: First, improve the green financial system, enrich green financial instruments, enhance the development of green finance in the market, and provide a good environment for the development of green finance. The second is to enhance the ability of green finance to promote industrial structure optimization. Only coordination and cooperation between government departments, companies, and commercial banks can achieve the development and growth of the entire green financial ecology, thereby promoting further optimization of the industrial structure. The third is to accelerate the high-quality economic development. Accelerating the high-quality development of economic and industrial structures is inseparable from the transformation and upgrading of green finance and industrial structures. Governments at all levels should strengthen preferential policies for rewarding green environmental protection enterprises and promote the green transformation of the industry.

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