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The Impact of Green Finance on High-Quality Economic Development in China: Vertical Fiscal Imbalance as the Moderating Effect

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Abstract: The vigorous development of green finance has become a national strategy in China. Green finance is gradually becoming a key driver of high-quality economic development and a key area of concern for China's economy and ecological environment. Based on the panel data of 30 Chinese provinces from 2001 to 2019, we analyzed the impact and mechanism of vertical fiscal imbalance (VFI) and green finance (GF) on high-quality economic development (HQD) and then used the fixed-effect model and spatial Durbin model for empirical testing. We found that GF can significantly contribute to HQD, but VFI has a negative moderating effect in contrast to the positive effect of GF on HQD. This negative moderating effect is strongest in the central region. According to the analysis of the spatial econometric model based on geography, economy, and the nested spatial weight matrix, we found that the local GF has a negative spatial transmission effect on the HQD of other regions. Therefore, it is recommended that the coordinated development of green finance among regions be promoted, while affairs and expenditure responsibilities be reasonably distributed between the central and local governments to drive HQD effectively.

Keywords: green finance; vertical fiscal imbalance; high-quality economic development; moderating effect; spatial spillover effect; China

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1. Introduction

Currently, China's economy has shifted from high-speed growth to high-quality development. The key to high-quality economic development lies in coordinating the relationship between economic output and the environment, focusing on improving the level of sustainable economic development. Green development is defined as achieving the highest economic output with the least negative ecological impact for a given investment of resources [1]. It is, therefore, an objective reflection of the sustainable level of economic development. However, to achieve green development, it is necessary to determine where funds are obtained from and find ways to improve their efficient utilization.

"Green finance," which considers environmental protection as an integral part of financial operations [2,3], is a major source of funds to promote high-quality economic development, i.e., the coordinated development of environmental protection and the economy [4,5].

Green finance is in a key position to advance high-quality economic development by promoting the development of a low-carbon economy [6–8]. Its function is to regulate the flow of funds in the direction of green development and ecological civilization, deepen the structural reform of the supply side, and, thus, promote sustainable economic development [9]. Green finance can impact high-quality economic development by optimizing macroeconomic development, improving microeconomic efficiency, and complementing traditional economic policies [10]. Therefore, green finance, as an internal factor, determines the success or failure of the green transformation of economic development [11].

In addition, green finance is closely related to the fiscal system; an efficient fiscal system can usually provide a mature regional environmental infrastructure and strong R&D funds to enhance the value of green finance. The fiscal system of a country, as an important basis for government macrocontrol, inevitably impacts the effectiveness of financial instruments. As Kindleberger emphasizes, the financial revolution starts with a change in the fiscal system [12]. Therefore, there is also an urgent need for government regulations to indirectly promote economic transformation using green finance as a grip [13]. Falcone, Morone, and Sica (2018) also stressed that support at the national level is necessary to motivate the participation of commercial banks and other financial organizations in green finance [14]. This is particularly applicable to China, where the market mechanism is not perfect, and there is considerable crossover and overlapping between fiscal and finance functions. Since the 1994 tax reform, there has been an imbalance between the local and central governments wherein "the central government concentrates a large amount of fiscal revenue while assuming less responsibility for public expenditure, while local governments allocate less disposable fiscal resources, while assuming most responsibility for public expenditure." This has also shaped a distinctive feature of China's fiscal system—vertical fiscal imbalance. As an external factor, the fiscal system with vertical imbalance plays a key role in resource allocation and is increasingly becoming an important factor affecting economic development. Hettich and Winer (1986) argue that a scientific fiscal relationship is a vertical intergovernmental one that is compatible with fiscal expenditure decisions that enhance social returns [15]. Fisman and Gatti (2002) found that a high VFI is conducive to corruption and thus inhibits economic development [16]. Ahmad and Brosio (2019) found that a higher VFI reflects poorer national governance [17].

Although previous research yields many valuable results, it has some limitations. First, the existing literature has seldom studied vertical fiscal imbalance, green finance, and high-quality economic development in a unified theoretical framework, neglecting to examine the economic development effects of green finance in the objective context of the fiscal system imbalance in China. Second, it has primarily focused on the unidirectional relationship between green finance and high-quality economic development, without considering its spatial spillover pattern.

In summary, to investigate the effect of green finance on quality economic development, especially with vertical fiscal imbalance, we established a comprehensive research framework integrating vertical fiscal imbalance, green finance, and quality economic development at the theoretical level. We analyzed the effect of green finance on economic quality development by constructing a fixed-effect model and a spatial econometric model, with a sample of 30 Chinese provinces from 2001 to 2019, focusing on the moderating effects of vertical fiscal imbalance, green finance, and quality economic development.

It is observed, first, that there is a significant positive relationship between green finance and quality economic development. Second, vertical fiscal imbalance has a negative moderating effect on the relationship between green finance and quality economic development. Finally, by building a spatial econometric model to test this relationship, we found that green finance in one province has a negative spatial transmission effect on the quality of the economic development of other provinces.

The possible innovations of this study are mainly in three areas. First, we examined the mechanism of the impact of green finance on high-quality economic development at the macro level, empirically testing this, using panel data at the provincial level in China, thereby enriching and expanding the research literature on the effects of green finance on economic development. Second, we introduced the vertical fiscal imbalance as a moderating variable to clarify the boundary conditions for green finance to affect high-quality economic development. Third, we rendered our research more comprehensive by considering the possible spatial spillover effects of green finance on HQD through a spatial econometric model.

The remainder of this paper is organized as follows: Section 2 presents the theoretical basis and research hypothesis; Section 3 describes the research design; Section 4 presents the results of the regression analysis; and Section 5 concludes the study.

2. Theoretical Basis and Research Hypothesis

2.1. The Intrinsic Mechanism of Green Finance Impacting High-Quality Economic Development

Green finance is a financial instrument that incorporates green development. By playing the core functions of capital financing, innovation incentives, green supervision, and risk diversification, green financial development can promote the formation of scale effects of high-quality production enterprises and investment and financing support for the development of new environmentally friendly production technologies. It can also regulate the production behavior of enterprises and promote the healthy and sustainable use of green capital to enhance the organic synergy of green technology development, the green production of enterprises, and green economic transformation, realizing the balanced development of economic growth and environmental quality improvement, thereby boosting high-quality economic development.

First, as the financial market is an important place for enterprise capital financing, the rapid development of the green financial market can play the role of "capital pool", largely solving the problem of capital shortage of green production subjects [18,19], providing them with sufficient funds for pollution control and ecological purification, and continuously improving the environmental benefits of economic development to promote high-quality development.

Second, the banking industry and other financial institutions release green development signals to the market through measures such as reducing financing lines and raising financing costs for high-energy-consuming and high-polluting enterprises. This will guide the flow of funds from the "two high and one surplus" production fields, wherein "two high" refers to high pollution and high energy consumption of resource-based industries, and "surplus" industry implies having the overcapacity of industry in green production fields while stimulating the polluting and energy-consuming enterprises to explore and innovate low-carbon production technologies [20,21], thus gradually improving green productivity and promoting high-quality economic development.

Third, in the green financial system, investors can provide financing services based on enterprises' disclosure of their green development information, including the ex-ante assessment and ex-post supervision of relevant information [18,22].

Finally, green financial institutions can recommend green financial products and services that meet the needs of investment subjects based on the type of risk appetite of investors while also providing guarantees, developing graded products, disclosing information, and other means to further diversify the risks that investment subjects may face and provide guarantees for the economy to achieve sustainable and high-quality development.

As a result, we propose the following research hypothesis:

Hypothesis 1. *Green financial development is conducive to promoting high-quality economic development.*

2.2. The Moderating Role of Vertical Fiscal Imbalances

Under the China-style fiscal system, the economic behavior of local governments must conform to the central government's development goals while maximizing their own interests. Hence, a moderate VFI can strengthen the identity of local governments as "active governments" and enable them to optimize their public expenditure structure based on their local comparative advantages, which, in turn, effectively contributes to high-quality economic development while responding positively to the central government's objectives [23]. Excessive VFI represents a low match between the central and local governments in terms of affairs and fiscal powers. Local governments are under greater fiscal pressure due to budget constraints, which is likely to cause them to directly compete

for financial resources within their jurisdictions and trigger a variety of financial risks; this is not conducive to high-quality economic development.

Specifically, to relieve fiscal pressure, local governments urgently need to allocate bank funds to cover the fiscal gap, while the central government's "paternalistic" underwriting strategy leads to the illusion of "bailout expectations" by local governments. This illusion will further motivate local governments to expand their debt. In case there are liquidity constraints, diverting these credit funds to local government debt will exacerbate the financing constraints of the green industry, in turn, reducing the efficiency of capital allocation [24] and inhibiting the role of green finance in enhancing high-quality economic development.

This conclusion is also related to the investment direction of local government debt funds; for example, if these funds are utilized to improve the quality of economic development, the aforementioned inhibiting effect may be relatively alleviated. However, in the context of China's specific reality, although the existing performance appraisal system has incorporated green development, the economic growth index always has precedence. Therefore, under the pressure of promotion based on GDP, local officials will not only invest funds in very profitable but highly polluting enterprises but also have a strong incentive to put pressure on banks to lend to such enterprises in their jurisdictions. This is not only unhelpful for the development of green finance but also impacts high-quality economic development negatively.

As a result, we propose the following research hypothesis:

Hypothesis 2. *Vertical fiscal imbalance has a negative moderating effect on the green finance process and positively influences high-quality economic development.*

2.3. Spatial Spillover Effect

In China, since green finance has a high human capital threshold and relies on technical support and perfect infrastructure, its development is generally greater in developed regions. Therefore, less-developed regions cannot have a latecomer advantage to rapidly improve the level of green finance development. Developed regions, meanwhile, are more capable of attracting significant high-quality knowledge, technology, capital, and other factors, which will form a siphon effect on high-quality factors in other regions and inhibit the quality economic development of neighboring regions.

As a result, we propose the following research hypothesis:

Hypothesis 3. *There is a negative spatial spillover effect of the augmentative effect of green financial development on high-quality economic development.*

3. Research Design

3.1. Variable Description and Data Sources

3.1.1. Variable Description

(1) The explained variable: high-quality economic development (HQD)

Referring to the existing studies [25,26], we measured the HQD index based on the undesired output of the super-efficiency SBM model. The model is set up as in Equation (1).

$$\delta^* = \frac{1-\frac{1}{n}\sum_{i=1}^{n}\frac{\overline{x_i}}{x_{i0}}}{1+\frac{1}{m_1+m_2}\left(\sum_{r=1}^{m_1}\frac{\overline{y_r^a}}{y_{r0}^a}+\sum_{r=1}^{m_2}\frac{\overline{y_r^b}}{y_{r0}^b}\right)} s.t. \begin{cases} \overline{x} \geq \sum\limits_{j=1,j\neq 0}^{q}\lambda_j x_j \\ \overline{y^a} \geq \sum\limits_{j=1,j\neq 0}^{q}\lambda_j \overline{y_i^a} \\ \overline{y^b} \geq \sum\limits_{j=1,j\neq 0}^{q}\lambda_j \overline{y_i^b} \\ \overline{x} \geq x_0; \overline{y^a} \leq y_0^a; \overline{y^b} \leq y_0^b; \overline{y^a} \geq 0; \lambda \geq 0 \end{cases} \quad (1)$$

In Equation (1), q denotes the number of decision units, n is the number of inputs, m_1 is the number of desired outputs, and m_2 is the number of undesired outputs. $\overline{x}$, $\overline{y^a}$, and $\overline{y^b}$ denote the slack of inputs, desired outputs, and undesired outputs, respectively. y^a and

y^b denote the desired and undesired outputs, respectively. δ^* is the target value, and the larger it is, the higher the level of quality economic development of the decision unit. Based on the above formula, we used MAXDEA7.0 software for the specific measurements.

Based on the meaning and characteristics of HQD, we constructed an HQD index system for the economy, ecological environment, and social services, as shown in Table 1.

Table 1. Measurement index system for HQD.

Indicators	Specific Indicators	Meaning	Calculation
Input Indicators	Energy	Total energy consumption	Convert the various energy consumption categories into tons of standard coal uniformly and add them up.
	Physical capital	Fixed investments	$K_{it} = (1-\sigma) * K_{it-1} + I_{it}K_{it}$, K_{it-1} denote the capital stock of province i in period t and period $t-1$, respectively, I_{it} is the amount of fixed asset investment in province i in period t, and σ is the capital depreciation rate (according to Shan (2008) [27], σ = 10.96%).
	Human capital	Number of employed persons at the end of the year	
Output Indicators	Desired output	Gross regional product	
	Undesired outputs	Carbon dioxide	
		Industrial sulfur dioxide	
		Industrial wastewater	
		General industrial solid waste	

(2) Core explanatory variable: green finance (GF)

Referring to the relevant literature and combining the data available at the inter-provincial level, we set up a multidimensional evaluation system consisting of five secondary indicators of green credit, green securities, green investment, green insurance, and carbon finance, as shown in Table 2, and with the method of principal component analysis (PCA), standardized their data and then downscaled them to obtain the GF index.

Table 2. Measurement index system for GF.

Objective	Measurements	Measurement Method	Contribution	Related Literature
Green Finance	Green investment	Environmental pollution control investment/regional GDP	Positive	[28]
	Green credit	Interest expenses of non-energy-consuming industries/total interest expenses of industrial industries	Positive	[29]
	Green securities	Market capitalization of environmental companies/total A-share market capitalization	Positive	[30]
	Green insurance	Agricultural insurance expenditures/total insurance expenditures	Positive	[31]
	Carbon finance	Carbon dioxide emissions/regional GDP	Negative	[32]

(3) Moderating variable: vertical fiscal imbalance (VFI)

To make the measurement results more consistent with the practice of Chinese-style fiscal decentralization reform, following Chu and Chi (2018) [33], we constructed a measure of vertical fiscal imbalance, as shown in Table 3.

Table 3. Measurement method for VFI.

Formula	Variable Meaning
$VFI = 1 - \frac{FD^R}{FD^E} \times (1 - LBD)$	VFI: Vertical fiscal imbalance FE_i: Local government public budget expenditure FR_i: Local government public budget revenue FE_c: Central government public budget expenditure FR_c: Central government public budget revenue FD^E: Decentralization of fiscal expenditure FD^R: Decentralization of fiscal revenue LBD: Local government fiscal self-sufficiency gap rate POP_i: Total local population POP_n: Number of people in the country

(4) Control variables

To control for other variables that affect HQD, referring to Wu et al. (2020) and Ding et al. (2022) [1,34], we set the following control variables: industrial structure (IND), expressed as the share of value added of secondary industry in regional GDP; human capital level (EDU), expressed as the average years of education of the population aged 6 years or older in each province; government intervention (GOV), expressed as the ratio of general fiscal budget expenditure to its investment; foreign direct investment (FDI), measured as the share of foreign direct investment in regional GDP; and urbanization rate (URB), expressed as the share of the urban population in the total regional population.

3.1.2. Data Sources

The sample for the empirical analysis comprised panel data from 30 provinces in mainland China (Tibet, Hong Kong, Macau, and Taiwan were excluded because of data unavailability) from 2001 to 2019. The raw data for each variable were obtained from the *China Statistical Yearbook*, *China Population and Employment Statistical Yearbook*, *China Green Finance Development Report*, *China Insurance Yearbook*, *China Trust Industry Corporate Social Responsibility Report*, official statistical yearbooks of each province, China Carbon Emission Accounts and Datasets (CEADs), Chinese Research Data Services Platform (CNRDS), and China Stock Market and Accounting Research Database (CSMAR). In addition, all variables measured in monetary terms are based on 2001 and deflated according to the GDP deflator. The descriptive statistics of the variables are shown in Table 4.

Table 4. Results of descriptive statistics of variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
HQD	570	1.338	0.286	1.022	2.644
GF	570	0.139	0.084	0.05	0.551
VFI	570	0.679	0.194	0.196	0.927
IND	570	0.456	0.081	0.204	0.59
EDU	570	8.616	1.031	6.348	12.028
GOV	570	0.219	0.103	0.086	0.675
FDI	570	0.026	0.023	0.001	0.108
URB	570	0.518	0.149	0.257	0.891

3.2. Model Design

3.2.1. Baseline Regression Model

To observe the impact of green finance on the quality of economic development, we constructed the following baseline regression model:

$$HQD_{it} = \alpha_0 + \alpha_1 GF_{it} + \alpha_2 VFI_{it} + \alpha_3 IND_{it} + \alpha_4 EDU_{it} + \alpha_5 GOV_{it} + \alpha_6 FDI_{it} + \alpha_7 URB_{it} + \mu_i + \omega_t + \varepsilon_{it} \quad (2)$$

In Equation (2), i denotes the province; t is the year; α_0 is the constant term; α_1, ..., α_7 represent the regression coefficient of each variable; and ε_{it} is the model random disturbance term. The explained variable is high-quality economic development (HQD), and the core explanatory variable is green finance (GF).

3.2.2. Moderating Effect Model

To further elucidate the moderating role of vertical fiscal imbalances in the impact of green finance on quality economic development, we constructed the following model by incorporating the interaction term of green finance and vertical fiscal imbalances, which are decentralized, into Equation (2):

$$HQD_{it} = \beta_0 + \beta_1 GF_{it} + \beta_2 VFI_{it} + \beta_3 GF_{it} \times VFI_{it} + \beta_4 IND_{it} + \beta_5 EDU_{it} + \beta_6 GOV_{it} + \beta_7 FDI_{it} + \beta_8 URB_{it} + \mu_i + \omega_t + \varepsilon_{it} \quad (3)$$

In Equation (3), VFI_{it} represents the vertical fiscal imbalance.

3.2.3. Spatial Econometric Model

To verify the possible spatial spillover effects of green finance, we constructed the following spatial econometric model:

$$HQD_{it} = \varphi_0 + \varphi_1 GF_{it} + \rho_1 \sum_{i \neq j}^{n} W_{ij}^{d} GF_{it} + \varphi_2 GF_{it} \times VFI_{it} + \rho_2 \sum_{i \neq j}^{n} W_{ij}^{d} GF_{it} \times VFI_{it} + \varphi \sum Control_{jt} + \rho \sum_{i \neq j}^{n} W_{ij}^{d} Control_{jt} + \varepsilon_{it} \quad (4)$$

In Equation (4), W_{ij}^{d} represents the spatial weight matrix; the other variables have the same meaning as above. Based on general practice [35,36], the specific spatial weight matrix was calculated as follows:

$$W_{ij}^{dis} = \begin{cases} \frac{1}{d_{ij}^2} & i \neq j \\ 0 & i = j \end{cases} \quad (5)$$

$$W_{ij}^{eco} = \begin{cases} \frac{1}{|PGDP_i - PGDP_j|} & i \neq j \\ 0 & i = j \end{cases} \quad (6)$$

$$W_{ij}^{dis\ \&\ eco} = \begin{cases} 0.5W_{ij}^{dis} + 0.5W_{ij}^{eco} & i \neq j \\ 0 & i = j \end{cases} \quad (7)$$

where W_{ij}^{dis}, W_{ij}^{eco}, and $W_{ij}^{dis\ \&\ eco}$ denote the geographic, economic, and nested spatial weight matrices, respectively. d_{ij} denotes the distance between two places measured based on latitude and longitude, and $PGDP$ denotes GDP per capita.

4. Results

4.1. Analysis of Baseline Regression Model and Moderating Effect Model

The relationships between vertical fiscal imbalance, green finance, and the economic quality development index are shown in Table 5. Column (1) shows the results of the baseline regression model. The coefficient of GF is significantly positive, indicating that it has a catalytic effect on HQD, which verifies Hypothesis 1. The coefficient of VFI is significantly negative, indicating that it inhibits HQD. According to the analysis of the moderating effect model in columns (2) to (4), the coefficient of the cross-product term for VFI and GF is significantly negative, indicating that VFI weakens the role of GF in promoting HQD. Thus, Hypothesis 2 is verified.

Table 5. Analysis of baseline regression model and moderating effect model.

	Baseline Regression Model	Moderating Effect Model		
	(1)	**(2)**	**(3)**	**(4)**
GF	3.495 ***	2.785 ***		2.968 ***
	(0.125)	(0.270)		(0.272)
VFI	−0.434 ***		−0.158	−0.399 ***
	(0.113)		(0.124)	(0.114)
GF × VFI		−1.722 ***	−7.664 ***	−1.402 **
		(0.645)	(0.326)	(0.645)
IND	−0.301 ***	−0.098	0.275 **	−0.196 *
	(0.109)	(0.116)	(0.122)	(0.119)
EDU	0.036 *	0.052 **	0.074 ***	0.036 *
	(0.021)	(0.021)	(0.023)	(0.021)
GOV	0.066	0.111	−0.002	0.090
	(0.114)	(0.116)	(0.127)	(0.115)
FDI	−0.979 ***	−0.634 **	−0.540 *	−0.915 ***
	(0.277)	(0.269)	(0.306)	(0.278)
URB	−2.298 ***	−2.091 ***	−1.753 ***	−2.132 ***
	(0.178)	(0.195)	(0.211)	(0.193)
_cons	1.897 ***	1.351 ***	1.198 ***	1.942 ***
	(0.201)	(0.164)	(0.221)	(0.183)
Province	Y	Y	Y	Y
Year	Y	Y	Y	Y
N	570	570	570	570
R^2	0.888	0.886	0.863	0.889

Note: *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

The reasons for this are as follows: (1) The higher the degree of VFI, the more likely it is to reduce the efficiency of local government public expenditure or even cause inefficient operation [37], which is not conducive to HQD. (2) VFI intensifies active intervention by local governments in banks' credit decisions and behaviors. This will lead to enterprises with stronger political connections having better access to credit resources at more favorable terms [38], which will have an impact on the development of GF.

4.2. Analysis of Robustness Tests

We tested the robustness of the regression results in the previous section in terms of removing outliers, the adjusted sample period, and the instrumental variables method in Table 6. (1) Outliers were removed. Considering that the explained variable may have extreme values and thus affect the estimation results, we applied a 1% and 99% two-way tail reduction to the explained variables. (2) Adjusted sample periods: In 2016, the People's Bank of China, the Ministry of Finance of China, and seven other departments jointly issued the "Guidance on Building a Green Financial System," and green financial services, such as carbon finance and green credit from commercial banks, flourished. Considering the possible impact of this macroenvironmental change, we excluded the samples in 2016 during and after testing. (3) Lagged explanatory variables: Considering that the impact of explanatory variables, such as green finance and vertical fiscal imbalance, on high-quality economic development may require a certain time lag to fully emerge, we used explanatory variables with a one-period lag for regression testing. (4) Instrumental variable (IV) method:

We included as many variables affecting the quality of economic development in the model as possible; however, the endogeneity problem due to two-way causality could still be unavoidable. Therefore, we ran two-stage least-square (2SLS) regressions with one-period lags of the core explanatory variable as the instrumental variable. All the above tests revealed that, similar to the empirical results of the regressions in Table 6, the coefficient of GF remains significantly positive, whereas the coefficient of the interaction term for GF and VFI remains significantly negative, proving the robustness of the results in Table 5.

Table 6. Results of robustness tests.

	Baseline Regression Model				**Moderating Effect Model**			
	Remove Outliers	**Adjusted Sample Period**	**Lagged Explanatory Variables**	**IV**	**Remove Outliers**	**Adjusted Sample Period**	**Lagged Explanatory Variables**	**IV**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
GF	3.031 ***	3.463 ***	3.679 ***	3.659 ***	2.433 ***	1.156 ***	2.886 ***	4.423 ***
	(0.160)	(0.149)	(0.134)	(0.157)	(0.295)	(0.296)	(0.299)	(0.295)
VFI	−0.488 ***	−0.361 ***	−0.410 ***	−0.666 ***	−0.455 ***	−0.023	−0.358 ***	0.232
	(0.112)	(0.098)	3.679 ***	(0.171)	(0.113)	(0.099)	(0.117)	(0.200)
GF × VFI					−1.517 **	−6.804 ***	−2.084 ***	−1.485 *
					(0.630)	(0.655)	(0.703)	(0.830)
IND	−0.377 ***	−0.175 *	−0.308 ***	−0.317 **	−0.270 **	0.380 ***	−0.147	−0.257 **
	(0.107)	(0.103)	(0.112)	(0.124)	(0.116)	(0.102)	(0.124)	(0.120)
EDU	0.017	0.023	0.037 *	0.020	0.016	0.061 ***	0.036 *	0.028
	(0.021)	(0.019)	(0.022)	(0.020)	(0.021)	(0.016)	(0.022)	(0.018)
GOV	−0.065	0.192 *	−0.066	0.054	−0.047	0.520 ***	−0.038	0.245 **
	(0.114)	(0.101)	(0.117)	(0.109)	(0.114)	(0.096)	(0.117)	(0.110)
FDI	−1.248 ***	−0.683 **	−0.563 *	−1.133 ***	−1.196 ***	−0.412	−0.463	−0.917 **
	(0.277)	(0.281)	(0.297)	(0.386)	(0.276)	(0.324)	(0.297)	(0.407)
URB	−2.279 ***	−2.295 ***	−2.379 ***	−2.338 ***	−2.095 ***	−0.484 ***	−2.155 ***	−1.126 ***
	(0.174)	(0.180)	(0.189)	(0.195)	(0.190)	(0.175)	(0.202)	(0.223)
_cons	2.179 ***	1.870 ***	1.524 ***	2.692 ***	2.115 ***	0.687 ***	1.978 ***	1.572 ***
	(0.202)	(0.180)	(0.169)	(0.295)	(0.178)	(0.130)	(0.189)	(0.212)
Province	Y	Y	Y	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y	Y	Y	Y
N	563	450	540	540	563	450	540	540
R^2	0.847	0.864	0.875	0.942	0.848	0.810	0.880	0.923

Note: *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

4.3. Analysis of Heterogeneity Tests

These results suggest that VFI plays a negative moderating role in the GF process, which influences HQD. Considering the large size of China and the regional differences in development, there may also be regional heterogeneity in the negative moderating effects of VFI. Therefore, we divided the sample into eastern, central, and western regions, according to the classification criteria in the *China Statistical Yearbook*, to conduct a regional heterogeneity test. According to the results in Table 7, in the baseline regression model, as shown in columns (1), (2), and (3), GF promotes HQD in all three regions. However, the effect is greater in the eastern and western regions than in the central region. In the

moderating effect model, as shown in columns (4), (5), and (6), the negative moderating effect of VFI is greater in the central region, followed by the western region.

Table 7. Results of heterogeneity test.

	Baseline Regression Model			Moderating Effect Model		
	Eastern	**Central**	**Western**	**Eastern**	**Central**	**Western**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GF	3.992 ***	2.486 ***	4.079 ***	2.764 ***	4.969 ***	4.634 ***
	(0.196)	(0.663)	(0.543)	(0.493)	(0.954)	(0.482)
VFI	−0.142	−0.698 ***	0.553 **	0.106	−1.002 ***	0.016
	(0.173)	(0.246)	(0.218)	(0.193)	(0.252)	(0.205)
GF × VFI				−3.226 ***	−19.171 ***	−14.585 ***
				(1.192)	(5.482)	(2.090)
IND	−0.440 *	−0.524 ***	0.536 **	−0.208	−0.329 *	0.305
	(0.232)	(0.192)	(0.210)	(0.243)	(0.193)	(0.187)
EDU	−0.088 **	0.014	0.009	−0.072 *	−0.007	0.010
	(0.041)	(0.041)	(0.028)	(0.041)	(0.040)	(0.025)
GOV	0.611 *	−1.419 ***	−0.431 ***	0.846 ***	−0.892 *	−0.022
	(0.316)	(0.482)	(0.153)	(0.322)	(0.487)	(0.146)
FDI	−1.411 ***	−1.558	−5.175 ***	−1.382 ***	−1.340	−4.297 ***
	(0.362)	(1.111)	(0.929)	(0.356)	(1.070)	(0.822)
URB	−2.376 ***	−3.226 ***	−0.306	−1.984 ***	−3.522 ***	−0.211
	(0.258)	(0.354)	(0.501)	(0.292)	(0.351)	(0.439)
_cons	2.972 ***	2.913 ***	0.268	3.001 ***	3.014 ***	1.139 ***
	(0.356)	(0.447)	(0.327)	(0.369)	(0.382)	(0.240)
Province	Y	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y	Y
N	209	171	190	209	171	190
R^2	0.956	0.756	0.777	0.958	0.776	0.830

Note: *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

The main reason for the above conclusion is that the current green finance in China mainly serves the research and development of low- or even zero-carbon emission technologies, such as those involving carbon emission reduction and clean energy. However, the central region is the heavy industrial base of China, and its investment area or market regulation mechanism impedes reasonable access to green financial resources. This also expands the role of the "active government" in the process of green finance influencing high-quality economic development; that is, it increases the negative regulation of the vertical fiscal imbalance in the central region.

4.4. Analysis of Spatial Spillover Effect Test

To test Hypothesis 3, we used a spatial econometric model for subsequent empirical analysis. Before conducting the spatial econometric analysis, it was necessary to test whether there is a spatial effect on the research object, that is, to conduct a spatial autocorrelation test on GF and HQD. We calculated the spatial effects for each year using the geographical distance spatial weight matrix and Moran's I method, as shown in Table 8. According to Table 8, Moran's I for GF and HQD is significantly positive at the 1% level in

most years, indicating a significant spatial correlation between both GF and HQD in China; thus, a spatial econometric model was used for subsequent testing.

Table 8. Moran's I of green finance and high-quality economic development during 2001–2019.

Green Finance		High-Quality Economic Development	
Moran's I	**z-Value**	**Moran's I**	**z-Value**
0.118 *	1.793	0.057	1.126
0.154 **	2.229	0.220 ***	2.665
0.182 ***	2.562	0.209 ***	2.565
0.192 ***	2.690	0.229 ***	2.798
0.197 ***	2.756	0.238 ***	2.897
0.192 ***	2.782	0.206 **	2.557
0.186 ***	2.762	0.185 **	2.318
0.199 ***	2.929	0.204 **	2.514
0.208 ***	3.021	0.234 ***	2.834
0.220 ***	3.151	0.263 ***	3.217
0.228 ***	3.223	0.285 ***	3.503
0.224 ***	3.195	0.297 ***	3.662
0.218 ***	3.148	0.316 ***	3.934
0.223 ***	3.289	0.316 ***	4.045
0.204 ***	3.068	0.315 ***	4.102
0.176 ***	2.808	0.285 ***	3.770
0.146 **	2.480	0.329 ***	4.331
0.214 ***	3.237	0.312 ***	4.139
0.221 ***	3.323	0.331 ***	4.344

Note: *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

To verify the applicability of the spatial econometric model, we selected the SDM model with double fixed effects in space and time for regression, based on the results of the LM test, the Hausman test, and the simplified test of the SDM model; the regression results are detailed in Table 9. According to Table 9, the sigma2_e of each model is small, indicating that our spatial econometric model is robust, and all spatial spillover terms (ρ) are positive and significant at the 1% level, indicating that there is a spatial spillover effect in HQD.

The positive spatial spillover effects of HQD can be attributed to the following two aspects: (1) Competition effect: With the inclusion of binding indicators, such as energy consumption and ecological and environmental protection, in national economic and social development plans, the "quality" of economic growth has significantly increased weightage in the performance assessment of government officials, and the pursuit of high-quality economic development has become one of the development goals of local governments at all levels. Therefore, the implementation of an environmental protection constraint target policy can help promote healthy competition among local governments to boost high-quality economic development. (2) Economic linkage effect: The high-quality development of a regional economy implies that its economic growth mode has undergone a corresponding green transformation. The optimal adjustment of this growth mode will be transmitted to geographically or economically related areas through inter-regional industrial linkages under the market mechanism, thereby generating new "green" development points in these areas and driving the synergistic transformation of economic growth mode in these regions.

Table 9. Results of spatial spillover effect test.

	W_{ij}^{dis}		W_{ij}^{eco}		$W_{ij}^{dis\ \&\ eco}$	
	Direct Effects	**Spillover Effects**	**Direct Effects**	**Spillover Effects**	**Direct Effects**	**Spillover Effects**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GF	2.485 ***	−2.168 ***	2.783 ***	−1.087 **	2.744 ***	−0.928 *
	(0.260)	(0.461)	(0.260)	(0.517)	(0.267)	(0.511)
VFI	−0.290 ***	0.762 ***	−0.092	0.618 ***	−0.039	0.439 **
	(0.098)	(0.173)	(0.105)	(0.195)	(0.107)	(0.195)
GF × VFI	−2.813 ***	−0.342	−2.054 ***	−3.505 **	−1.943 ***	−3.226 **
	(0.608)	(1.028)	(0.697)	(1.469)	(0.706)	(1.470)
IND	−0.096	−0.130	−0.109	0.130	−0.085	0.131
	(0.103)	(0.149)	(0.109)	(0.169)	(0.110)	(0.163)
EDU	0.030	0.016	0.047 **	−0.034	0.045 **	−0.019
	(0.018)	(0.028)	(0.019)	(0.028)	(0.019)	(0.028)
GOV	0.117	−0.251	0.236 **	−1.220 ***	0.269 **	−1.077 ***
	(0.109)	(0.191)	(0.105)	(0.203)	(0.107)	(0.207)
FDI	−0.777 **	1.117 *	−0.216	4.051 ***	−0.236	2.504 **
	(0.340)	(0.650)	(0.307)	(1.027)	(0.323)	(0.975)
URB	−1.618 ***	1.770 ***	−1.218 ***	2.162 ***	−1.176 ***	1.740 ***
	(0.195)	(0.303)	(0.174)	(0.338)	(0.177)	(0.319)
ρ	0.593 ***		0.283 ***		0.293 ***	
	(0.047)		(0.059)		(0.057)	
sigma2_e	0.006 ***		0.006 ***		0.007 ***	
	(0.000)		(0.000)		(0.000)	
Province	Y		Y		Y	
Year	Y		Y		Y	
N	570		570		570	
R2	0.528		0.647		0.665	

Note: *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

To measure the marginal impact accurately, following LeSage and Pace (2009) [39], we obtained the direct and spillover effects of the explanatory variables on the explained variable, using partial differential methods. In terms of direct effects, as shown in columns (1), (3) and (5), the coefficients of GF are all significantly positive at the 1% level, while the coefficients of the interaction term between VFI and green finance are significantly negative at the 1% level, which again verifies the promotion effect of GF on HQD and the negative moderating effect of VFI; additionally, as shown in columns (2), (4) and (6), the negative spillover effect of GF on HQD is significantly present. Thus, Hypothesis 3 is verified.

The reason is that the research and development of green financial products require the support of professional researchers and considerable funds, and there is objective "exclusive competition" for human and physical capital among spatially connected regions, so local breakthroughs in the research and development of green financial products and improvement in green financial services are likely to be accompanied by the crowding-out effect on green financial factors in spatially connected regions.

5. Conclusions and Discussion

5.1. Conclusions

Green finance has become a key factor in promoting high-quality economic development. The existing research has been more focused on the relationship between green finance and regional economic development, ignoring the influence of the external constraints of the fiscal system, which is the focus and entry point of this study. Based on panel data from 30 Chinese provinces from 2001 to 2019, we focused on the impact of green finance on high-quality economic development and the moderating effect of vertical fiscal imbalances. We found that (1) GF can contribute significantly to HQD and is an important tool for improving the quality of economic development. (2) The degree of VFI significantly and negatively moderates the contribution of GF to HQD; the greater the degree of VFI, the more significantly the positive impact of GF on HQD is weakened. (3) According to the region heterogeneity test, GF will significantly promote HQD, and the promotion effect among east, central, and western regions shows a "U" shape; meanwhile, in the process of green finance promoting HQD, the negative adjustment effect of VFI is greater in the central region. (4) According to the spatial econometric model test, GF has a negative spatial spillover effect.

The findings of this paper on the effect of GF on HQD are consistent with most existing studies [9,40–43]. The findings related to spatial spillover effects, however, are somewhat different from those of existing studies. Many studies have verified the positive spatial spillover effect of GF from the perspective of the ecological environment [44,45], but the negative spatial spillover effect of GF is verified in the index of HQD constructed by considering the ecological environment and economic growth, which seems to verify the existence of "greenwashing" behavior in the production process of enterprises from the side [46]. The negative impact of VFI is also consistent with the findings based on data from European countries [47,48], indicating that there is no country heterogeneity in the negative impact of VFI, which also warns that managers should be alert to the many negative impacts of VFI on the long-term sustainable development of the economy and society.

5.2. Contribution

On the theoretical side, this paper provides a theoretical explanation for the relationship between VFI, GF, and HQD. The existing literature studying the relationship between GF and HQD rarely considers the moderating role of VFI as an important external factor. This paper argues that the impact of VFI on GF and HQD is clearly negative, enriching the research perspective on GF and HQD.

In terms of practice, we verified the promotion and negative spatial spillover effects of GF on HQD and elaborated on the moderating factors for this effect. The findings of this study provide clarity to governments at all levels about the quality effects of economic development and the paths for GF to play a role, highlighting the importance of developing GF. This can strengthen the importance of government departments in developing GF and formulating corresponding policies for the better use of financial policies to support and promote quality and sustainable economic development.

5.3. Policy Recommendations

Based on the above findings, we offer the following policy implications:

(1) Because of the important impact of green finance on high-quality economic development, Chinese authorities should seize the opportunity of the booming development of green finance and promote its overall speed and quality through measures such as accelerating the construction of infrastructure, green finance integrated service platforms, and green data collection platforms.

(2) The central government should appropriately delegate a certain amount of "financial power" to local governments to stabilize their financial resources and reduce the negative impact of vertical financial imbalance; at the same time, the weight of indicators, such as environmental management and economic development quality,

should be significantly increased in the performance evaluation system, and the promotion of local government officials should be combined with the high-quality development of the local economy to promote a benign competition model in line with the long-term development interests of the region.

(3) Each region should take full advantage of local endowments, such as resources and the environment, to accelerate the cultivation of green industries; learn from the management capabilities and investment experience of green finance in other regions; establish corporate information disclosure and risk-warning mechanisms to eliminate potentially risky green investments; establish additional pilot zones for green finance reform and innovation to develop clean energy projects; gradually increase the proportion of transfer payments to the central region to regulate its fiscal gap; and increase the transparency of transfer payments to ensure the reasonable and effective use of fiscal funds to reduce the negative regulation of vertical fiscal imbalance on the effect of green finance on high-quality economic development.

(4) Local governments should create more favorable external conditions for the development of green finance, such as accelerating the elimination of barriers to green financial elements between regions, promoting the interaction of green financial platforms and linkage of information resource sharing and development, and compensating for the negative impact of the "siphon effect" of green finance in neighboring regions.

5.4. Research Limitations and Perspectives

First, although this study constructs economic quality development indicators based on the existing literature, it still has the limitation of comprehensively reflecting the level of economic quality development because of the availability of data. Subsequent studies can further improve and optimize on this basis.

Second, subsequent studies could explore the mechanism variables of green finance that affect quality economic development.

Third, this study analyzes the heterogeneity of green finance influencing quality economic development from the perspective of geographic location based on the degree of economic development. China is a vast region with significantly variable factor endowments between regions, with classification according to criteria, such as resource abundance or administrative level, so the sample can still be further refined in the future to explore the influence of green finance on quality economic development in different regions.

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