The Impact of Green Finance on Investment Returns of Real Economy

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Abstract. As China enters a new era of development, the importance of ecological environment and sustainable development is becoming increasingly prominent. Green finance (GF), compared with traditional finance, can better promote environmental protection and sustainable development. Starting from the mechanism of the impact of GF on the return on investment (ROI) of real economy, this paper analyzes the regulatory effects of marketization and government intervention, and then empirically examines the relationship between GF and the ROI of real economy in 30 provincial-level administrative regions of China from 2007 to 2020. The main findings of this paper are: Firstly, GF can improve the ROI of real economy, and marketization and government intervention play a promoting and inhibitory regulatory role respectively. Secondly, the study found that GF has a significant promoting effect on the ROI of real economy in the eastern region, while it has not yet shown a significant improvement in the ROI of real economy in the central and western regions. Finally, the role of GF in promoting the ROI of real economy has become more significant after 2012, and green finance has no significant effect on return of investment of real economy before 2012. This paper provides a useful reference for how to achieve effective connection between GF, marketization and industrial demand, and formulate GF policies suitable for actual conditions.

Keywords: GF; Real Economy; ROI; Marketization; Government Intervention.

1. Introduction and Literature Review

With the development of China entering a new era, the importance of the ecological environment and sustainable development is becoming increasingly prominent. Facing a once-in-a-century major transformation, General Secretary Xi Jinping has coordinated the domestic and international situations and innovatively put forward a new development concept: Leading the comprehensive green transformation of economic and social development, with a focus on promoting green and low-carbon energy development as a key priority. Accelerating the establishment of an industrial structure, production methods, lifestyles, and spatial patterns that prioritize resource conservation and environmental protection. Provides guiding ideology for a widespread and profound systemic transformation of China's economic and social system. Compared to traditional finance, GF can better promote environmental protection and sustainable development, and has become more and more important in China's financial system.

The construction of China's GF system began in 2005. Since the proposal of the "double carbon" target in 2020, China has always adhered to promoting GF policy support, guiding the healthy development of GF in China, encouraging innovation in GF products and services, and attracting the entire industry to invest more financial resources into green industries. Currently, China is in a leading position in the global development of GF. By the end of 2021, the total amount of green loans denominated in both RMB and foreign currency in China has reached 15.9 trillion yuan, reflecting a year-on-year growth of 33.1%. This places China as the world's top country in terms of the stock size of green loans.

The real economy serves as the fundamental pillar of social and economic progress and the material basis for ensuring the people's livelihood. As China enters a new era of economic development, there is an increasingly urgent need for optimizing and upgrading the industrial chain and constructing new types of infrastructure. Strengthening technological innovation, enhancing the stability and competitiveness of the industrial chain and supply chain, deepening the supply-side structural reform, and enhancing the endogenous driving force and innovation ability of the real

economy are key contents of the 14th Five-Year Plan. The real economy is crucial for the smooth development of the national economy and the foundation of economy. It is essential to spare no effort in ensuring the healthy development of the real economy, and it is also an urgent requirement for upgrading the industrial structure, transforming the economic growth mode, and promoting high-quality economic development.

The real economy refers to the tangible sectors of the economic system, including industry, commerce, and agriculture, etc. The real economy is an important pillar of economic development and has a significant impact on China's economic development. In addition to the basic service and intermediary functions, the financial sector in the economy has core resource allocation functions, expansionary economic regulation functions, expansionary risk avoidance functions, and derivative risk trading, information transmission, corporate governance, and consumer guidance functions (Bai Qinxian and Tan Qinghua, 2006). Li Yang (2017) believes that the financial sector should provide appropriate liquidity for economic development to maintain price stability, which is the main content of serving the real economy. Furthermore, finance has functions of deepening division of labor and cooperation, and providing incentives. Guo Beibei and Lv Chenglun believe that promoting the coordination and development of the financial system with the stage of economic development, and promoting the coordinated development of the financial system with the enhancement of industrial structure and the advancement of technological innovation are necessary for promoting the progress of the tangible sector of the economy.

With the increasing demand for green transformation of development patterns, the effect of GF on the real economy has attracted widespread attention among scholars. Relevant literature includes the following: From a macroeconomic perspective, Xie Tingting and Liu Jinhua (2019) found that green credit has a significant positive effect on green economic growth. Marketization processes and fiscal decentralization mechanisms play important regulatory roles. Yu Bo and Fan Conglai (2022) conducted empirical analysis of 30 provinces in China from 2009 to 2019 and found that the development of GF can promote high-quality economic development, and technological innovation plays a partial intermediary role. Further research on heterogeneity shows that the promoting impact of green finance on high-quality economic development is on the rise. with the increase of per capita GDP level, and decreases with the increase of environmental pollution level. GF optimizes the development path of the macroeconomy, thus improving the level of high-quality economic development. Numerous scholars have conducted research on the correlation between green finance and the advancement of high-quality economic development, and believe that GF can promote industrial structural adjustment and economic transformation and upgrading, such as Ma Jun (2015), An Tongxin et al. (2017), Fu Jingyan and Liu Yingping (2019), and Shi Daimin and Shi Xiaoyan (2022). From the micro-enterprise level, Su Dongwei and Lian Lili (2018) found that green credit policies have suppressed debt financing and long-term liabilities of companies with high levels of pollution, resulting in a significant increase in their debt costs and a significant decrease in investment value and growth potential, indicating that the production and operation activities of heavily polluting enterprises have been significantly negatively affected. Wang Yao (2016) believes that GF can encourage enterprise green innovation, reduce market transaction costs, respond to multi-level risks, supervise and improve enterprise green performance, lead green consumption, and thus improve microeconomic efficiency.

Currently, scholars mainly focus on the macro level when studying GF, and few have studied the impact of GF on enterprises, especially in a unified framework that includes GF, market, government, and enterprise investment returns. Based on an analysis of the impact mechanism and pathways of GF on enterprise investment efficiency, this paper measures the GF index using the multi-level indicator method and uses panel data from 30 provincial-level administrative regions in China (excluding Tibet, Hong Kong, Macao, and Taiwan) from 2007 to 2020 to conduct empirical tests. The study examines the impact mechanisms of GF, returns, and marketization and further investigates the regional differences in this impact, providing useful suggestions for improving GF policies and enhancing enterprise investment efficiency.

2. Theoretical Analysis and Research Hypotheses

2.1 Analysis of the Mechanism of GF's Impact on the ROI Rate of the Real Economy

As an emerging form of finance, GF has attracted widespread attention due to its characteristics of environmental protection, energy conservation, and sustainable development. Unlike traditional financial models, GF considers environmental, social, and governance (ESG) factors in the financial business to promote sustainable development and positively impact the real economy's ROI rate. GF mainly targets enterprises or projects that contribute to environmental protection and Social responsibility and their close association with the sustainable development of the real economy. Through GF investment, funds flow to green projects that are more efficient, energy-saving, and low-pollution, which can promote the sustainable development of enterprises or projects, make them more environmentally friendly, energy-saving, and low-carbon, and further increase their long-term development potential and ROI rate.

Based on the above analysis, this article summarizes the mechanism of GF's impact on the ROI rate of the real economy from a theoretical perspective, which can be summarized into three points. First, GF can improve the resource utilization efficiency of the real economy and the facilitation of production method optimization. Green finance mobilizes additional funds and facilitates the formation of investments in environmentally friendly initiatives through tailored monetary and financial policies. such as credit bias and floating interest rates. The investment targets of GF are enterprises or projects that are effective in environmental, social, and governance areas. Financial institutions can guide enterprises to take more social responsibility through credit support, and these enterprises and projects will actively improve their environmental protection and energy-saving capabilities in response to the evaluation and inspection of financial institutions. This measure will promote enterprises to achieve resource conservation and recycling, reduce waste and pollution, reduce production costs, further improve production efficiency, and obtain more profits, thereby increasing the ROI rate of enterprises. Second, GF investment can bring new business opportunities and innovative development directions. The emergence of GF has brought new sources of funds and financing channels to the real economy and provided new opportunities for innovation in enterprises or projects. Through GF investment, enterprises or projects can obtain more funds to ensure the research and development of green technology, promote the transformation and application of research and development results, and promote technological innovation and industrial upgrading. These opportunities and innovative development directions will collectively increase the ROI rate of enterprises or projects and enhance the advancement of high-quality development in the tangible sector of the economy. Third, GF investment helps to enhance the brand image and market competitiveness of the real economy. As society's attention to environmental protection and sustainable development continues to grow, GF investment is increasingly recognized and sought after by the market. GF funds often flow to green projects that are more efficient, energy-saving, and low-pollution. By obtaining GF investment, enterprises can demonstrate their environmental protection and social responsibility, enhance their brand image and reputation. This improvement in brand value will help enterprises gain advantages in the market competition, thereby increasing their market share and profit level, and increasing the ROI rate of enterprises.

2.2 The Important Roles of Government and Market in the Development of GF

The degree of financial marketization refers to the size of the dominant market forces in the operation of a country or region's financial sector. Promoting financial marketization can effectively play the core function of resource allocation of the financial system, improve industrial structure, and ensure the healthy operation of the national economy (Bai, 2021). The development of GF largely depends on the market, which plays a key role in improving the operating mechanism of GF and building a sound green financial system. Firstly, the market can promote research and development (R&D) innovation and healthy competition, driving the development of GF. GF is still in its early stages, and early market participants are exploring new products, services, and business models. A

good financial market has a positive impact on a company's innovation capability, providing better financial support and market environment for its innovative activities (Sembenelli, 2008). Competition among market participants can also promote innovation, improve product quality, and ultimately benefit investors, promoting the development of GF. Secondly, the market can ensure the transparency and credibility of green financial products, alleviate information asymmetry (Jiang, 2021). The market can establish information disclosure mechanisms, promote independent third-party verification, reduce information barriers, help investors fully obtain relevant information about companies, and thus alleviate the information asymmetry problem between investors and companies (Laeven, L., 2003), ensuring the transparency and credibility of green financial products and reducing transaction costs.

The government plays a crucial role in promoting the development of GF through policy support and regulation, but existing research has found that government intervention may also have adverse effects on the development of GF. Firstly, government intervention may lead to market distortions. Policies, regulations, or laws formulated by the government may cause pricing distortions of GF market products, thereby affecting the normal operation of the market. Administrative orders issued by the government may influence state-owned enterprises to invest in green projects, but these investments may not be the most optimal and are generated under the government's forced requirements. At the same time, government intervention may lead to excessive investment, weakening the stability and sustainability of the GF market. Secondly, government intervention may limit the flexibility of the GF market. Government intervention in the market may slow down and complicate the decision-making, communication, and execution processes of the market. The government may restrict potential market participants' entry into the market by setting up access mechanisms, thereby affecting the market's free competition, weakening market competition and innovation. Finally, government intervention may lead to the GF market's over-reliance on policy biases and government subsidies. Subsidies and financial support provided by the government may attract more investors, but such support may go against the policy-makers' original intentions, resulting in some projects in the market overly depending on government support and even exacerbating the chaos of fabricating data and falsely reporting profits to obtain government subsidies. When the scale of government subsidies and support is reduced, these projects may not be able to maintain normal operations, thereby affecting the stability and sustainability of the GF market.

Based on the above analysis, we propose the second hypothesis:

Hypothesis 2: Marketization can promote the positive impact of GF on the ROI rate of the real economy, while government intervention suppresses the positive impact of GF on the ROI rate of the real economy.

3. Research Design

3.1 Econometric Model

This study uses Ordinary Least Squares (OLS) to analyze the relationship between GF and the R in the real economy, as well as the moderating effects of government and market on the impact of GF on the ROI in the real economy. Relevant control variables are considered and the following models (1) to (3) are set:

$$ROI_{it} = \alpha_0 + \alpha_1 GF_{it} + \alpha_i Controls_{it} + \lambda_i + \mu_{it} + \epsilon_{it} \quad (1)$$

$$ROI_{it} = \beta_0 + \beta_1 GF_{it} + \beta_2 GF \times \mathrm{Gov}_{it} + \beta_i Controls_{it} + \lambda_i + \mu_{it} + \epsilon_{it} \quad (2)$$

$$ROI_{it} = \gamma_0 + \gamma_1 GF_{it} + \gamma_2 GF_{it} \times \mathrm{Mar}_{it} + \gamma_i Controls_{it} + \lambda_i + \mu_{it} + \epsilon_{it} \quad (3)$$

Where ROI_{it}represents the economic high-quality development index of province i in year t, GF_{it} is a measure of GF, $GF \times \mathrm{Gov}_{it}$ is the interaction term between government intervention and GF, $GF_{it} \times \mathrm{Mar}_{it}$ is the interaction term between marketization index and GF, and $Controls_{it}$ represents control variables. Table 2 details the control variables selected in this study. μ_{it} represents individual fixed effects, λ_i represents time fixed effects, and ϵ_{it} is the error term.

3.2 Variables and Data

1.Dependent Variable

The dependent variable in this study is the return on investment (ROI) in the real economy, sometimes referred to as the capital return rate (or capital yield), which is the ratio between current capital gains and capital stock. The estimation of the ROI is based on financial statement data at the micro level of enterprises. In this study, the ROI in the real economy is represented by the total profit of scale-above industrial enterprises/net fixed assets.

2.Independent Variable

The green finance development index (GF). Based on the method proposed by Yu Bo and Fan Conglai (2022), this study uses panel data from 30 provinces and cities in China (excluding Hong Kong, Macao, Taiwan and Tibet) from 2007 to 2020, and constructs a multi-level index of provincial GF using the multi-level indicator method and the entropy weight method. According to the definition of GF, this study selects three primary indicators: green credit, green expenditure, and green investment. Among them, green credit accounts for the largest proportion of GF. However, in recent years, other green financial products have gradually diversified and the proportion of green credit has decreased. For the sake of comprehensiveness and accuracy, this study takes green credit, green expenditure, and green investment as the components of GF.

Table 1. Multilevel Index System for GF Development

Index System	Primary Index	Secondary Index	Measurement Method of Secondary Index	Attribute
Green finance Development Index	Green Credit (37%)	Interest Expense of High Energy-consuming Industries	Six major industries' interest expense of high energy-consuming industries/total interest expense of industrial enterprises	-
	Green Expenditure (41%)	Proportion of Energy-saving and Environmental Protection Public Expenditure	Energy-saving and environmental protection fiscal expenditure/total fiscal expenditure	+
	Green Investment (22%)	Proportion of Investment in Environmental Pollution Control	Pollution control investment/industrial value added	+

3. Regulating Variables

Government intervention and marketization index are used as regulating variables. Government intervention is represented by general budget expenditure of the government as a proportion of GDP, and the marketization index is from the China Marketization Index report compiled by Fan Gang.

Table 2. Definition and Description of Control Variables

Variable Name	Variable Index	Variable Meaning
Manufacturing Industry Proportion	lnd	Proportion of Secondary Industry to GDP
Environmental Regulation	env	Industrial Pollution Control Investment/Industrial Value-Added
RD Input Intensity	rd	R&D Internal Expenditure/GDP
Traffic Density	tra	ln(Railway Mileage + Highway Mileage)/Land Area
Per Capita GDP	agdp	Ln of Per Capita GDP for the Current Year

4. Control Variables

Following the approach of Huang Qinghua et al. (2020), this paper selects the following variables as control variables: Manufacturing Industry Proportion (lnd) is represented by the proportion of the secondary industry to GDP; Environmental Regulation (env) is represented by pollution control investment/industrial value added; RD Investment Intensity (rd) is represented by internal R&D expenditure/GDP; Traffic Density (tra) is represented by logarithm of (railway mileage + highway mileage)/land area; Per Capita GDP (agdp) is represented by the logarithm of per capita GDP for the current year. The descriptive statistics of each variable are shown in Table 2.

5.Data Sources

The data used in this paper mainly come from the "China Statistical Yearbook", "China Industrial Statistics Yearbook", and the annual statistical yearbooks of various provinces. The data covers the period from 2007 to 2020, and missing data were filled using interpolation methods. Additionally, due to incomplete statistical data and inconsistent data standards, this paper selects 30 provinces and municipalities in China (excluding Tibet, Hong Kong, Macau and Taiwan) as inter-provincial samples. Descriptive statistics are presented in Table 3.

Table 3. Descriptive staticstics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROI	420	.189	.086	-.177	.437
gf	420	.259	.09	.084	.647
ind	420	.447	.088	.158	.615
env	420	.003	.003	0	.028
tra	420	8.909	.776	6.622	10.009
rd	420	.016	.011	.002	.064
agdp	420	10.627	.571	8.841	12.013
gov	420	.235	.1	.087	.643
mar	270	6.153	1.795	2.33	10

4. Empirical Analysis

4.1 Baseline Results

Table 4. Baseline Results

	ROI(1)	ROI(2)	ROI(3)	ROI(4)	ROI(5)
gf	0.207***	0.238***	0.136***	0.145***	0.158***
	(5.979)	(6.639)	(3.755)	(3.833)	(4.240)
Ind	0.800***	0.779***	0.731***	0.717***	0.501***
	(9.928)	(9.734)	(9.756)	(9.333)	(5.227)
env		-3.526***	-3.214***	-3.318***	-3.170***
		(-2.964)	(-2.894)	(-2.968)	(-2.881)
rd			9.348***	9.418***	9.978***
			(7.535)	(7.571)	(8.090)
tra				0.032	-0.007
				(0.832)	(-0.175)
agdp					0.094***
					(3.655)
Year fixed	Yes	Yes	Yes	Yes	Yes
Province fixed	Yes	Yes	Yes	Yes	Yes

Constant	-0.244***	-0.223***	-0.284***	-0.557*	-1.050***
	(-5.934)	(-5.407)	(-7.215)	(-1.686)	(-2.983)
R2	0.351	0.364	0.446	0.446	0.464
N	420	420	420	420	420

Note: ***, **, and * indicate significance at the 1 %, 5 %, and 10 % levels, respectively. We report t statistics in parenthesis

In this paper, we computed the pertinent data from 30 provinces in China spanning the period from 2007 to 2020.We chose the panel fixed effects model for the multivariate regression analysis, the findings are presented in Table 4. Models (1) to (5) demonstrate the results of gradually adding control variables to the model. Throughout the progressive inclusion of control variables in the regression analysis, the regression coefficient of GF is always positive and significant at the 1% level, the results reveal a noteworthy positive correlation between GF and the ROI of the real economy. In other words, the development of GF can significantly improve the ROI rate of the real economy. The reason is that GF can improve the resource utilization efficiency of the real economy, Facilitate the optimization of production methods, contributes to the reduction of production costs, further improve production efficiency, and obtain more profits, thereby improving the ROI rate of enterprises. At the same time, GF investment can bring new business opportunities and innovative development directions, and improve the ROI rate of enterprises. GF can also enhance enterprises' brand image and reputation, which can help enterprises gain advantages in the market competition, thereby increasing their market share, profit levels, and ROI rate.

4.2 Heterogeneity Analysis

The above analysis shows that GF has a positive impact on investment returns in the real economy. Taking into account the differences in development levels and technological conditions among different regions, this paper divides the 30 provinces into three regions - East, Central, and West - as samples for regression analysis. The findings indicate that the influence of GF on enterprise investment efficiency varies significantly among different regions, as shown in Table 5. Column (1) shows the regression results of GF on investment returns in the tangible sector of the economy in the eastern region, where the coefficient of GF is significantly positive. Columns (2) and (3) show that the positive impact of GF on enterprise investment efficiency in the central and western regions is not significant, indicating that regional disparities exist in the driving impact of GF on ROI. Possible reasons include differences in resource endowments among the East, Central, and West regions, which lead to differences in the areas and methods of GF investment, thus affecting return on investment. Meanwhile, the East has a more complete industrial system, which makes its GF more developed and thus has a more significant impact on investment returns in the real economy. Secondly, the per capita income level in the East is higher, and residents have higher demand and investment in environmental protection. Enterprises are more likely to accept and support GF products and services, and they are also more likely to obtain higher investment returns. Thirdly, the technological levels in the East, Central, and West regions are also different. The East has a concentration of innovation activities, better scientific research conditions, and technical teams, which can develop green technology products with market competitiveness more quickly and thus increase ROI.

To examine the differences in the impact of GF on ROI in the real economy at different time points, this paper separately regresses the data before and after 2012. The findings reveal the influence of GF on investment returns in the real economy before 2012 is not significant, while the impact after 2012 is significantly positive, indicating that the promoting effect of GF on investment returns in the real economy is more evident after 2012. Possible reasons are as follows: (1) after 2012, the government introduced various GF policies, providing more financing channels and preferential interest rates for GF. The cost for enterprises to obtain GF is reduced, thus improving return on investment. (2) After 2012, many natural disasters caused by pollution, such as haze and sandstorms, have greatly enhanced

people's awareness of environmental protection, and the demand for the environmental protection industry has gradually increased. This makes the market potential for GF investment even greater, thus better guaranteeing investment returns.

Table 5. Heterogeneity Analysis

	East(1)	Mid(2)	West(3)	Before 2012 (4)	After 2012 (5)
GF	0.110**	-0.024	0.040	0.093	0.079**
	(2.461)	(-0.288)	(0.347)	(1.052)	(1.992)
Control	Yes	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes	Yes
Province fixed	Yes	Yes	Yes	Yes	Yes
Constant	-0.734	-2.587***	-2.478***	-2.610***	-1.458***
	(-1.250)	(-4.143)	(-3.544)	(-3.104)	(-3.536)
R2	0.497	0.691	0.514	0.287	0.325
N	154	112	154	180	240

Note: ***, **, and * indicate significance at the 1 %, 5 %, and 10 % levels, respectively. We report t statistics in parenthesis

4.3 Analysis of Moderating Effects

To characterize the potential roles of marketization and government intervention in the ROI of GF and the real economy, following the study by Bo et al. (2022), Table 6 displays the moderating effects of marketization and government intervention on investment returns, by including the interaction terms of marketization index, government intervention, and GF. The marketization index is sourced from the China Marketization Index report compiled by Fan Gang, covering the period from 2008 to 2016. After controlling for other variables, the coefficient of the interaction term between GF and the marketization index is 0.064, statistically significant at the 1% level, the results indicate that financial marketization can facilitate the positive impact of GF on enterprise return on investment. After controlling for other variables, the coefficient of the interaction term between GF and government intervention is significant at the 10% level, indicating that government intervention weakens the positive impact of GF on investment returns of the real economy. In summary, the improvement of marketization can promote the positive role of GF on ROI, while government intervention suppresses the positive impact of GF. Hypothesis 2 is validated.

Table 6. Results of Moderating Effects Regression

	ROI(1)	ROI(2)	ROI(3)	ROI(4)
GF	0.591***	0.276***	-0.457**	-0.269
	(7.944)	(3.873)	(-2.563)	(-1.615)
GF*GOV	-1.757***	-0.523*		
	(-6.220)	(-1.940)		
GF*MAR			0.087***	0.064***
			(3.720)	(2.934)
Control	NO	YES	NO	YES
Year fixed	Yes	Yes	Yes	Yes
Province fixed	Yes	Yes	Yes	Yes
Constant	0.127***	-0.945***	0.175***	-1.319*
	(9.699)	(-2.665)	(8.630)	(-1.871)
R2	0.257	0.468	0.248	0.432
N	420	420	270	270

Note: ***, **, and * indicate significance at the 1 %, 5 %, and 10 % levels, respectively. We report t statistics in parenthesis

4.4 Robustness Checks

To demonstrate the reliability of the model conclusions in this paper, we conduct robustness checks in the following two aspects.

Substituting the core explanatory variable. We re-include green credit as the core explanatory variable in the regression model, and the test result in column (1) of Table 7 still reveal a significant positive effect on the ROI rate. Alternative measures of the dependent variable. We conduct tests on the ROI rate with a one-period and a two-period lag, and the significant positive effects of green finance (GF) are evident in the results presented in columns (2) and (3) of Table 7.

Instrumental variable approach. Following the approach of Zhang and Li (2022), we estimate the model using the first-order lag of GF as an instrumental variable. As evident in column (4) of Table 7, the regression coefficient continues to exhibit a significant positive trend, indicating that the conclusions are robust.

Table 7. Robustness Checks

	Substitute variable(1)	one-period lag (2)	two-period lag (3)	Instrumental variable (4)
GF		0.091**	0.062*	0.166***
		(2.508)	(1.723)	(2.732)
GD	0.022***			
	(3.196)			
Control	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Province fixed	Yes	Yes	Yes	Yes
Constant	-0.804**	-0.689*	-0.601	-0.957**
	(-2.333)	(-1.800)	(-1.554)	(-2.462)
R2	0.453	0.447	0.475	0.788
N	420	390	360	390

Note: ***, **, and * indicate significance at the 1 %, 5 %, and 10 % levels, respectively. We report t statistics in parenthesis

5. Conclusion and Recommendations

This paper systematically explains the direct and indirect impact mechanisms of GF on the ROI rate of the real economy from a theoretical perspective and proposes research hypotheses. Using panel data from China's provincial level between 2007 and 2020, this study examines the impact and mechanism of GF on the ROI rate of the real economy, and summarizes the following three conclusions: First, GF can significantly improve the ROI rate of the real economy, and the results remain robust after using various testing tools. Incorporating the moderating effects of marketization and government intervention in the model, it is found that the market plays a positive regulatory role in the relationship between GF and the ROI rate of the real economy, while government intervention plays a negative regulatory role. Second, viewed from the perspective of regional disparities, the promotion effect of GF on the ROI rate of the real economy is only significant in the eastern region, while it has not yet shown a significant effect in the central and western regions. Third, studying the time dimension, it is found that the effect of GF on the ROI rate of the real economy became more evident after 2012, and the influence of green finance on the ROI rate of the real economy was not significant before 2012.

Based on theoretical analysis and empirical research, this paper provides the following policy recommendations:

First, establish a GF evaluation system and establish indicators for green production by companies. Firstly, there is a need to enhance the evaluation criteria and indicator system of GF. For GF products, use indicators such as corporate social responsibility and sustainable development to assess the degree

of greenization among subjects in the real economy and establish evaluation indicators for green production of enterprises.

Secondly, establish an objective evaluation mechanism and evaluation process, introduce third-party evaluation agencies, and use resources at the social enterprise level to evaluate and supervise GF products and real economy subjects, ensuring the accuracy and impartiality of the evaluation results.

Second, promote the integration of GF and the real economy to achieve effective coordination between GF, technological innovation, product research and development, and industrial demand. Firstly, the development of green industries needs to be promoted. The government can increase policy support for green industries and promote the development of innovative green financial products and services to enhance the level of GF development. Secondly, the GF market system needs to be improved. In order to improve the efficiency of green financial resource allocation, the government should fully utilize the decisive role of the market in resource allocation, reduce intervention, and thereby enhance the ability of GF to serve the real economy. Finally, it is crucial to effectively mobilize the enthusiasm of enterprises for green product investment and innovation by adopting policy support, tax incentives and other means to facilitate the promotion of innovation in green technology.

Third, attention needs to be paid to regional differences, and GF policies suitable for actual conditions need to be formulated. Firstly, green credit and green investment products should be promoted in the eastern region to encourage financial institutions to invest in high-tech, high-value-added and environmentally-friendly enterprises, and to form a pilot innovation of the GF system. Secondly, in the central and western regions, adequate support should be provided for the green transformation of traditional industries, and necessary funding support should be provided through transfer payments to narrow the gap with more developed areas. Finally, regional resource advantages should be integrated, innovative development should be promoted, and a GF market suitable for local characteristics should be created.

References

[1] Bai Qinxian, Tan Qinghua. On the Evolution of Financial Function and Financial Development [J]. Financial Research, 2006(07):41-52.

[2] Xie Tingting, Liu Jinhua. How Does Green Credit Affect China's Green Economic Growth? [J]. Chinese Journal of Population, Resources and Environment, 2019, 29(09):83-90.

[3] Yu Bo, Fan Conglai. GF, Technological Innovation and High-Quality Economic Development [J]. Nanjing Social Sciences, 2022(09):31-43.

[4] Ma Jun. On the Construction of China's Green Financial System [J]. Financial Forum, 2015, 20(05):18-27.

[5] An Tongxin, Hou Xiaomin, Yang Yang. Theoretical Connotation and Implementation Path of China's Green Financial Development [J]. Dongyue Tribune, 2017, 38(06):92-100.

[6] Fu Jingyan, Liu Yingping. Mechanism Analysis of GF Promoting the High-Quality Development of Guangdong-Hong Kong-Macao Greater Bay Area Economy [J]. Environmental Protection, 2019, 47(24):36-38.

[7] Shi Daimin, Shi Xiaoyan. GF and High-Quality Economic Development: Mechanism, Characteristics and Empirical Research [J]. Statistical Research, 2022, 39(01):31-48.

[8] Su Dongwei, Lian Lili. Does Green Credit Affect the Investment and Financing Behavior of Heavy Polluting Enterprises? [J]. Financial Research, 2018(12):123-137.

[9] Wang Yao, Pan Dongyang, Zhang Xiao. Research on the Contribution of GF to China's Economic Development [J]. Comparative Economic and Social Systems, 2016(06):33-42.

[10] Laeven, L. (2003). Does Financial Liberalization Reduce Financing Constraints? Financial Management, 32, (1): 5-34.

[11] Sembenelli, L., F. Schiantarelli, and A. Benfratello. (2008). Banks and Innovation: Microeconometric Evidence on Italian Firms. Journal of Financial Economics, 90, (2): 197-217.

[12] Li Yang. "Identifying 'Financial Services for the Real Economy'" [J]. Economic Research, 2017, 52(06):4-16.

[13] Bai Junhong, Liu Yuying. Financial Marketization and Corporate Technological Innovation: Mechanisms and Evidence [J]. Economic Management, 2021, 43(04):39-54. DOI:10.19616/j.cnki.bmj.2021.04.003.

[14] Jiang Chun, Shen Chunming, Yang Rui. Trade Policy Uncertainty, Financial Marketization, and Corporate Investment Behavior [J]. International Finance Research, 2021(08):87-96. DOI:10.16475/ j. cnki. 1006-1029.2021.08.009.

[15] Xu Zhiyong, Hu Wei, Deng Qing, Deng Chao. Enterprise Financialization, Marketization Process and Risk Undertaking [J]. China Soft Science, 2020(10):165-174.

[16] Liu Haiying, Wang Dianwu, Shang Jing. Does Green Credit Promote Sustainable Economic Growth? Based on the Perspective of Green Low-Carbon Technological Progress [J]. Journal of Jilin University (Social Sciences Edition), 2020, 60