



Green Finance Reform and the High-Quality Development of Chinese Enterprises

Wenhua Xu^{*}  and Qi Zhang

School of Economics and Management, East China Jiaotong University,
Nanchang 330013, China

^{*}Corresponding author's e-mail: 2496@ecjtu.edu.cn

Abstract. The primary task of building a fully modern socialist country is achieving high-quality development. Currently, China's economic development faces challenges of transformation and upgrading, where protecting the ecological environment and maintaining economic growth are equally important. In response, China has introduced key initiatives in green finance reform to drive high-quality economic development, thereby promoting the high-quality development of enterprises. This paper aims to explore the relationship between green finance reform and the high-quality development of Chinese enterprises, using A-share listed companies in China as the research sample. Panel data is constructed, and a DID (difference-in-differences) model is employed for regression analysis. The results indicate that green finance reform positively contributes to the high-quality development of Chinese enterprises, which is further confirmed by robustness tests. Heterogeneity analysis shows that the impact of green finance reform varies across regions: it significantly promotes high-quality development in eastern and western regions, while its effect in central regions is less pronounced, with western regions benefiting more than eastern regions. Mechanism analysis reveals that green finance reform influences high-quality development through the alleviation of financing constraints. Based on the findings, relevant policy recommendations for green finance reform and high-quality development of Chinese enterprises are proposed.

Keywords: Green finance reform; high-quality development of Chinese enterprises; DID model.

1 Introduction

Since the reform and opening-up, China's economy has achieved remarkable success, but it also faces challenges posed by environmental and resource constraints. To address these challenges, the construction of ecological civilization has been integrated into the national strategic agenda, promoting a shift towards a green and low-carbon economy, while setting a clear goal of high-quality development. In this context, financial institutions are increasingly turning towards green finance, supporting green projects to promote sustainable development and drive enterprise green transfor-

mation. However, green finance reform is still in its early stages, and further research and standardization are required to clarify its impact on high-quality development and provide a basis for policy formulation.

Research on green finance has been extensive both domestically and internationally. International scholars, such as (Akberdina et al., 2024), were among the first to explore the issue of environmental financing, pointing out that financing for environmental governance faces significant funding challenges, and that the government needs to play a leading role in this process^[1]. Soundarrajan and Vivek (2016) analyzed the development path of green finance in India^[3]. While domestic research on green finance started later, it has developed rapidly in recent years. Han et al. (2023)^[2] suggested that financial institutions should integrate environmental protection concepts into their activities^[2], while Yu et al. (2021)^[5] emphasized that green finance policies support green projects^[5]. Xu et al. (2023)^[4] analyzed the essence of green finance from the perspective of environmental protection^[4]. Furthermore, Zhang et al. (2022)^[6] studied the effects of green credit and green investment policies on corporate capital allocation and environmental information disclosure, indicating that green finance policies play a positive role in promoting sustainable corporate development^[6].

Although existing research has provided a foundation for understanding the impact of green finance on corporate development, it has certain limitations. Most studies focus on the policy level, especially green credit and green investment, with relatively few studies on green finance reform pilot programs. Additionally, research on the micro-level of high-quality corporate development remains limited, with most studies using total factor productivity (TFP) as a single measure, lacking a more multidimensional approach. These gaps offer space for further exploration.

This paper conducts an empirical analysis to explore the impact of green finance reform on high-quality corporate development. The study selects A-share listed companies from 2014 to 2020 as the sample, using TFP as a measure of high-quality development, and employs a DID model for regression analysis. The study finds that green finance reform significantly promotes high-quality corporate development, particularly in the eastern and western regions, with limited effects in the central region. Mechanism analysis indicates that green finance reform drives high-quality corporate development by alleviating financing constraints. These findings provide empirical support for further promoting green finance reform and corporate green transformation.

The main contributions of this paper are: first, focusing on the micro-level to address the gap in research on the impact of green finance reform on high-quality corporate development; second, applying the DID model with multiple robustness tests, providing reliable empirical evidence for policy optimization and corporate green transformation.

The structure of the paper is as follows: Chapter 1 is the introduction, which outlines the research background, significance, and literature review. Chapter 2 presents the theoretical framework and research hypotheses. Chapter 3 discusses the research design, including data sources and model construction. Chapter 4 presents the empiri-

cal results and analysis, including regression and robustness tests. Chapter 5 concludes with policy recommendations.

2 Theoretical Analysis and Research Hypotheses

(1) Green finance reform guides funds into green industries, effectively reducing corporate financing costs, improving profitability, and encouraging greater investment in green technology innovation and R&D. This accelerates corporate green transformation and sustainable development. Supported by green finance policies, companies gain more financial support, allowing them to prioritize green projects, enhance resource allocation efficiency, and reduce investment in non-green projects, thus promoting high-quality corporate development. Previous research shows that green finance significantly incentivizes companies to adopt green technology innovation strategies, further boosting their market competitiveness.

Hypothesis 1: Green finance reform has a significant positive impact on high-quality corporate development.

(2) Given China's vast geographical area, different regions vary in terms of economic development levels, resource endowments, and financial systems. The impact of green finance reform on high-quality corporate development may differ across regions. Eastern regions, with strong economic foundations and developed financial systems, are better positioned to respond to green finance reform and adjust corporate structures to promote high-quality development. Although western regions face infrastructure and talent challenges, their abundant natural resources and national policy support provide significant potential for development. Central regions, with their transportation hubs and strong academic and research capabilities, may also experience some benefits from green finance reform. Therefore, the impact of green finance reform on high-quality corporate development is likely to vary across regions and requires further analysis.

Hypothesis 2: The impact of green finance reform on high-quality corporate development varies across regions.

(3) Corporate financing channels generally include retained earnings and external financing. However, due to information asymmetry and agency problems, external financing costs are often higher, leading to financing constraints. Green finance reform can guide funds toward green enterprises, alleviating their financing constraints and promoting green transformation and high-quality development. In contrast, non-green enterprises may face stricter financing conditions under green finance reform, compelling them to raise environmental standards and reduce pollution, thereby lowering financing constraints and promoting green transformation. Studies have shown that green finance reform can influence high-quality corporate development through the mechanism of financing constraints.

Hypothesis 3: Green finance reform affects high-quality corporate development by alleviating or increasing financing constraints.

3 Research Design

3.1 Sample Data

This paper selects A-share listed companies in China from 2014 to 2020 as the research sample. The data is sourced from the Wind and Choice databases, with other financial data from the GTA and CNRDS databases. The sample was processed as follows: firms with missing core variables were excluded, as well as those with a debt-to-asset ratio greater than 1 and ST/*ST firms. Firms that were suspended or delisted were also excluded, retaining only normal listed companies. To reduce the impact of extreme values, continuous variables were winsorized at the 1% and 99% levels, yielding a final sample of 18,431 data points.

3.2 Variable Selection

The dependent variable in this paper is the level of high-quality corporate development, measured by total factor productivity (TFP). TFP is calculated using the semi-parametric method proposed by Levinsohn and Petrin (2003) for regression analysis, and robustness is tested using the method of Olley and Pakes (1996).

The independent variable is the implementation of green finance reform pilots. In June 2017, Zhejiang, Jiangxi, Guangdong, Guizhou, and Xinjiang were designated as green finance reform pilot regions. $Treat \times Post$ is used as the independent variable, where $Treat$ indicates whether the firm is in a pilot region (1 for pilot firms, 0 for non-pilot firms), and $Post$ indicates whether the observation year is after 2017 (1 for post-reform years, 0 for pre-reform years).

To control for other factors affecting the regression results, the following control variables were selected based on relevant literature: firm age (Age), debt-to-asset ratio (LEV), profitability (ROA), and ownership nature ($State$). Firm age is expressed as the natural logarithm of the years since the firm's establishment, and $State$ equals 1 for state-owned enterprises and 0 for others.

3.3 Model Construction

This paper aims to analyze the relationship between green finance reform and the high-quality development of Chinese enterprises. To this end, a difference-in-differences (DID) model is constructed, with firms in the five pilot provinces as the treatment group and firms in other provinces as the control group. The following regression model is developed:

$$TFP_{it} = \alpha + \beta_1 Treat_i \times Post_t + \beta_2 X_{it} + \gamma_{it} + \varepsilon_{it} \quad (1)$$

In the model, TFP_{it} represents the total factor productivity of firm ii in year t , $Treat_i \times Post_t$ is the policy variable, X_{it} represents the control variables, γ_{it} denotes the fixed effects, and ε_{it} is the random error term. If β_1 is positive, it indicates that green finance reform promotes high-quality corporate development.

4 Empirical Results and Analysis

4.1 Baseline Regression Analysis

Table 1 presents the baseline regression results of green finance reform on firm total factor productivity (TFP_LP). In column (1), without adding control variables, the regression coefficient for green finance reform is 0.179, significant at the 1% level. In columns (2) to (5), as control variables are gradually included, the coefficients are 0.190, 0.176, 0.171, and 0.138, respectively, all statistically significant. The results indicate that green finance reform significantly enhances firms' total factor productivity, supporting Hypothesis 1.

Table 1. Baseline Regression Results

	(1)	(2)	(3)	(4)	(5)
Treat×Post	0.179***	0.190***	0.176***	0.171***	0.138***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.022)
<i>N</i>	18431	18037	18032	18032	18032
<i>r</i> ² _a	0.233	0.271	0.272	0.286	0.442

$p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, standard errors in parentheses, with province and year fixed effects controlled. Constant terms and control variables are not reported. The same applies below.

4.2 Parallel Trend Test

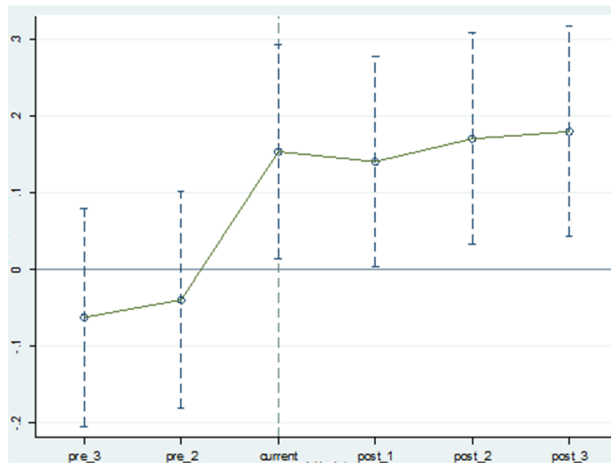


Fig. 1. Parallel Trend Test of Firms' Total Factor Productivity

The parallel trend test is used to verify the assumption of the difference-in-differences (DID) model, which assumes that the trends in total factor productivity between the treatment and control groups were similar before the policy implementation. Model

(2) uses 2016 as the base year to test for differences in years before and after the green finance reform. Figure 1 shows that coefficients for the pre-reform period (pre_2, pre_3) are not significant, indicating no significant differences in total factor productivity between the two groups before the policy. However, coefficients for the post-reform period (post_1, post_2, post_3) are significant, confirming that there were significant differences after the policy was implemented. Thus, the parallel trend test is satisfied.

$$TFP_{it} = \alpha + \sum_{2014}^{2020} \beta_1 Treat_i \times Post_t + \beta_2 X_{it} + \gamma_{it} + \varepsilon_{it} \tag{2}$$

4.3 Robustness Test

To ensure the stability and reliability of the results, robustness tests were conducted through placebo tests, replacing the dependent variable, and shortening the sample period.

Placebo Test. To rule out the influence of non-policy factors on the regression results, a placebo test was performed. By conducting 500 random draws, a false policy shock was simulated and regressed. Figure 2 shows that the estimated coefficients from the random regressions are mostly centered around 0, following a normal distribution. In contrast, the baseline regression coefficient (0.138) is located to the right of 0, indicating that the random shocks had no significant impact on firms' total factor productivity. This confirms that the positive effect of green finance reform on high-quality corporate development is genuine.

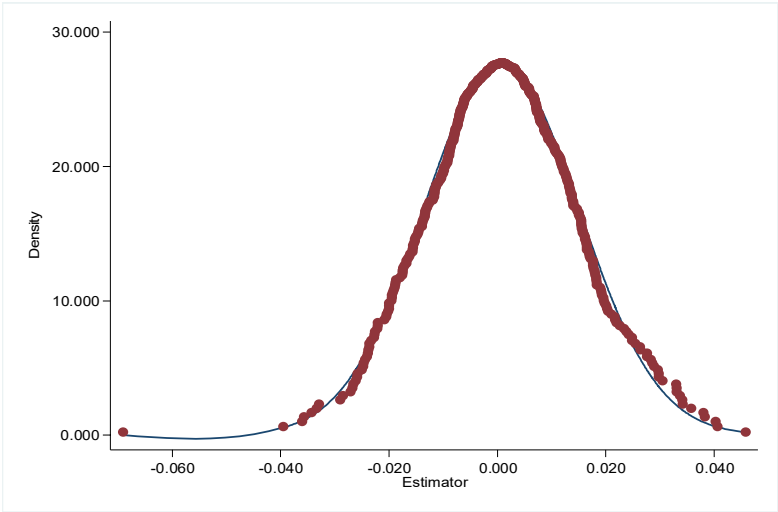


Fig. 2. Placebo Test

Replacing the Dependent Variable. To further test the robustness of the baseline regression results, the OP method was used to replace the total factor productivity (TFP) measure for regression analysis. Table 2 shows that the regression coefficients for green finance reform on total factor productivity, without control variables, is 0.184. After gradually adding control variables, the coefficients are 0.194, 0.179, 0.175, and 0.152, all significant at the 1% level. These results are consistent with those in Table 1, indicating that the impact of green finance reform on total factor productivity is robust.

Table 2. Robustness Results from Replacing the Dependent Variable

<i>TLP_OP</i>	(1)	(2)	(3)	(4)	(5)
Treat×Post	0.184***	0.194***	0.179***	0.175***	0.152***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.018)
<i>N</i>	18431	18037	18032	18032	18032
<i>r2_a</i>	0.289	0.317	0.317	0.328	0.443

Shortening the Sample Time Window. To further assess the robustness of the results, the sample time window was shortened to the 2015-2019 period for regression analysis. Table 3 shows that after shortening the time window, the regression coefficient for green finance reform on firms' total factor productivity is 0.109, and it remains significant at the 1% level. This indicates that the results are robust even with a reduced time frame.

Table 3. Robustness Results from Shortening the Sample Time Window

<i>TFP_LP</i>	(1)	(2)	(3)	(4)	(5)
Treat×Post	0.153***	0.164***	0.158***	0.150***	0.109***
	(0.030)	(0.030)	(0.030)	(0.029)	(0.026)
<i>N</i>	13155	12881	12877	12877	12877
<i>r2_a</i>	0.242	0.278	0.278	0.291	0.451

4.4 Heterogeneity Analysis

Due to regional differences, the impact of green finance reform on total factor productivity (TFP) may vary across different areas. The regions were divided into eastern, central, and western areas for heterogeneity analysis. Table 4 shows that green finance reform has a significant positive effect on the TFP of firms in the eastern and western regions, with a particularly stronger effect in the western region, likely due to government policy support and abundant resources. While the reform also has a positive effect on central region firms, the impact is not statistically significant, indicating that the effectiveness of green finance reform in the central region is limited.

Table 4. Heterogeneity Analysis Regression Results Based on Different Regions

<i>TFP_LP</i>	Eastern region	Central region	Western region
Treat×Post	0.136***	0.143	0.325***
	(0.024)	(0.098)	(0.082)
<i>N</i>	12713	3187	2132
<i>r2_a</i>	0.455	0.488	0.460

4.5 Mechanism Analysis

The baseline regression has shown that green finance reform significantly enhances firms' total factor productivity (TFP). Given that financing constraints are a critical issue for corporate development, this paper posits that green finance reform increases financing constraints to improve productivity. To analyze this mediating effect, the SA index is used as a proxy for financing constraints. Models (3) and (4) test the impact of green finance reform on financing constraints and TFP, respectively. The results in Table 5 show that green finance reform significantly increases firms' financing constraints, and financing constraints exhibit a partial mediating effect. This supports Hypothesis 3, indicating that green finance reform promotes high-quality corporate development by increasing financing constraints.

$$SA_{it} = \alpha + \beta_1 Treat_i \times Post_t + \beta_2 X_{it} + \gamma_{it} + \varepsilon_{it} \tag{3}$$

$$TFP_{it} = \alpha + \beta_1 Treat_i \times Post_t + \beta_2 SA_{it} + \beta_3 X_{it} + \gamma_{it} + \varepsilon_{it} \tag{4}$$

Table 5. ediating Effect Test of Financing Constraints

	(1) <i>SA</i>	(2) <i>TFP_LP</i>
Treat×Post	0.012***	0.123***
	(0.003)	(0.022)
<i>N</i>	18023	18023
<i>r2_a</i>	0.787	0.458

5 Research Conclusions and Policy Recommendations

Based on A-share data from firms in the 2017 green finance reform pilot regions, and through a difference-in-differences (DID) model, this study reached the following conclusions: First, green finance reform significantly enhances firms' total factor productivity (TFP), promoting high-quality development. Second, the reform has a notable impact on firms in the eastern and western regions, with the effect being stronger in the western region, while the impact on firms in the central region is less pronounced. Third, green finance reform promotes high-quality corporate development through the mechanism of alleviating financing constraints.

To further drive high-quality corporate development, the green finance system should be improved, with enhanced legislation and regulatory frameworks tailored to the specific needs of different regions. Additionally, the development of green financial technology should be accelerated to improve the efficiency of financial services and promote green technology innovation and low-carbon transitions. Furthermore, green direct financing should be encouraged, and a green stock index should be launched to attract capital into green enterprises, facilitating sustainable green transformation and development goals.

Acknowledgements

The Jiangxi Provincial Social Science Foundation “Research on the Path and Countermeasures for Digital Economy to Promote High-Quality Economic Development in Jiangxi” (grant No. 20YJ23). The Jiangxi University Humanities and Social Sciences Research Project “Research on the mechanism and path of environmental regulation driving high-quality economic development in Jiangxi” (grant No. JJ19101)

References

1. Akberdina, V., Lavrikova, Y., & Vlasov, M. (2024). Environmental financing: Does digital economy matter? *FRONTIERS IN ENVIRONMENTAL SCIENCE*, 11, 1268286. <https://doi.org/10.3389/fenvs.2023.1268286>.
2. Han, Y., Li, Y., & Wang, Q. (2023). Digital finance, environmental regulation, and green development efficiency of China. *FRONTIERS IN ENVIRONMENTAL SCIENCE*, 11, 1131058. <https://doi.org/10.3389/fenvs.2023.1131058>.
3. Soundarrajan, P., & Vivek, N. (2016). Green finance for sustainable green economic growth in India. *AGRICULTURAL ECONOMICS-ZEMEDELSKA EKONOMIKA*, 62(1), 35–44. <https://doi.org/10.17221/174/2014-AGRICECON>.
4. Xu, L., Liu, Y., Zhang, B., & Xiang, B. (2023). Study on the impact of green finance on low carbon development of manufacturing industry from the perspective of multidimensional space: Evidence from China. *ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH*, 30(17), 50772–50782. <https://doi.org/10.1007/s11356-023-25690-6>.
5. Yu, C.-H., Wu, X., Zhang, D., Chen, S., & Zhao, J. (2021). Demand for green finance: Resolving financing constraints on green innovation in China. *ENERGY POLICY*, 153, 112255. <https://doi.org/10.1016/j.enpol.2021.112255>.
6. Zhang, J., Luo, Y., & Ding, X. (2022). Can green credit policy improve the overseas investment efficiency of enterprises in China? *JOURNAL OF CLEANER PRODUCTION*, 340, 130785. <https://doi.org/10.1016/j.jclepro.2022.130785>.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

