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The Impact of Green Finance on Corporate ESG Performance

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Abstract. In the global green development context, green finance is a key tool for corporate sustainability, and its correlation with ESG performance has attracted much attention. This study uses an individual fixed effects model to examine ESG performance and assess green finance's impact and causal relationship. Heterogeneity analysis based on firm size and ownership type shows different patterns in ESG performance improvements. Multiple - dimension robustness tests were conducted, such as substituting core explanatory variables, replacing dependent variables, adjusting sample scope, and integrating individual and two - way fixed effects analysis results. Empirical findings show that green finance has a significant and robust positive effect on ESG performance, remaining valid after controlling for endogeneity and confounding factors. This research enriches existing studies and provides empirical references and practical ways for optimizing green finance policies, advancing corporate ESG practices, and promoting high - quality economic development.

Keywords: green finance, green credit, ESG rating, ESG disclosure

1. Introduction

This study examines the impact of green finance on corporate ESG performance and its heterogeneity. We use an individual fixed effects model to verify hypotheses with a sample of A-share listed companies from 2015 to 2025, and conduct heterogeneity analysis based on firm size and ownership type.

Empirical results show that green finance has a significant and consistent positive impact on corporate ESG performance. In benchmark regression, an increase in green credit allocation improves ESG scores, and this conclusion holds across multiple tests. Heterogeneity analysis reveals that large enterprises and state - owned enterprises benefit more from green finance. Large firms optimize performance through resource integration and ESG investments, while state - owned enterprises enhance ESG due to high policy responsiveness and fewer financing constraints. SMEs and non - state - owned enterprises also have positive but less obvious green finance effects.

The research contributes in two aspects: First, multi-dimensional robustness tests and individual fixed effects models control for corporate heterogeneity, resolving potential endogeneity issues and enhancing conclusion reliability. Second, based on heterogeneity analysis, it provides micro-level evidence for precise green finance policy implementation to maximize policy effectiveness.

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2. Policy background and literature review

2.1. Policy background

This study examines the impact of green finance on corporate ESG performance and its heterogeneity, using an individual fixed effects model with a sample of A-share listed companies from 2015 to 2025 and conducting heterogeneity analysis.

Empirical findings show that green finance has a significant and robust positive effect on ESG performance, with large enterprises and state-owned enterprises benefiting more than SMEs and non-state-owned enterprises.

The research contributes in two aspects: first, multi-dimensional robustness tests and individual fixed effects models control for corporate heterogeneity and resolve endogeneity issues; second, heterogeneity analysis provides micro-level evidence for precise green finance policy implementation.

2.2. Literature review

The literature related to this paper falls into two main types. The first focuses on green finance's direct impact on corporate ESG performance. Studies examine how green finance policies, like green credit and bonds, directly improve corporate ESG performance. Research showsthese policies encourage companies to invest more in environmental protection, social responsibility, and governance through low-cost financing [1], thus raising ESG ratings. Zhang Hua [2] studied the incentive effects of green finance policies on corporate green innovation andfound green credit significantly improved environmental investments and ESG performance [2]. Guo Jiachen et al. [3] used listed company data to show that settingup green finance innovation and reform pilot zones promotes corporate outward direct investment and indirectly enhances ESG performance [3]. From the environmental performance perspective, Li Xiaokang [4] found green finance policies reduce carbon emission intensity in manufacturing enterprises by increasing green innovation (more green patent applications) and media exposure,withstronger effects in high-tech industries and regions with less strict environmental regulations [4].

Secondly, literature on green finance and corporate green innovation focuses on how green finance enhances ESG performance by promoting corporate green innovation. Studies show green finance provides R & D funding and technical support, driving innovation in clean energy and energy conservation and emission - reduction [5], thus improving ESG ratings. Liu Lin and Zhang Yuqing [6] empirically examined the impact of ESG performance on corporate green innovation using China A - share listed company data and found green finance plays a positive moderating role. Liu Lin and Zhang Yuqing [6] further refined the mechanism, finding ESG performance promotes green innovation through alleviating financing constraints and improving information transparency, and green finance has a positive moderating effect. Higher green finance development makes ESG's promoting effect on green innovation stronger, indirectly confirming green finance can enhance corporate sustainability [6]. Indra Wijaya [7] studied non - financial listed companies in ASEAN from 2019 to 2024 and found green investment significantly enhances corporate ESG performance by driving innovation in environmentally friendly projects, and ESG disclosure amplifies this positive impact. The results show green investment positively affects corporate performance, and ESG disclosure enhances firm value. It also demonstrates that green finance, by funding green innovation projects, alleviates corporate financing constraints, indirectly enhancing environmental performance and improving overall ESG ratings.

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3. Research hypotheses

Building on green finance's resource allocation function and the logic of enhancing corporate ESG performance, this study integrates classical theories (externality theory, resource - based view, institutional theory) with relevant literature on their interconnections. It focuses on green finance's direct impact on corporate ESG performance, examines group differences and effect stability. Through in - depth analysis of the underlying mechanisms, it proposes the following research hypotheses.

3.1. Hypothesis 1 (main effect hypothesis): green finance significantly enhances corporate ESG performance

Green finance tools (e.g., green credit, green bonds) can alleviate corporate financing constraints for ESG-related projects, thereby providing direct support for enterprises to improve their environmental, social, and governance practices.

3.2. Hypothesis 2 (heterogeneity hypothesis): the positive impact of green finance on corporate ESG performance varies across different firm characteristics

This heterogeneity may stem from differences in firms' resource endowments, regulatory constraints, and external pressure, leading to heterogeneous responses to green finance incentives.

3.2.1. Compared with non-state-owned enterprises, green finance has a more significant promoting effect on the ESG performance of state-owned enterprises

State-owned enterprises typically face stronger policy guidance and social responsibility demands, making them more responsive to green finance policies aimed at ESG improvement.

3.2.2. Compared with small enterprises, green finance has a more significant impact on promoting the ESG performance of large enterprises

Large enterprises usually have more resources to allocate to ESG investments, so they can better leverage green finance support to optimize their ESG practices.

4. Models and data

4.1. Model design

To examine the impact of green finance on corporate ESG performance, this study employs an individual fixed-effects model to control for time-invariant firm characteristics. The model specification is as follows:

$$\mathrm{ESGit} = \alpha + \beta \mathrm{GreenCreditit} + \sum \gamma k \mathrm{Controlk,it} + \mu i + \epsilon it \quad (1)$$

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Table 1. Variable explanation

	Variable Name	Variable Measure
Explained variable	ESG performance	Huazheng ESG rating and score
Explanatory variable	Green finance	Enterprise green credit status
Control variables	Debt_asset_ratio	Total liabilities/total assets
	Return on assets	Net profit/average total assets
	Enterprise size	Total enterprise assets
	Firm Growth	Tobin's Q Value A
	Chairman_shareholding_ratio	The Chairman's shareholding in the company/total share capital of the company
	dual_position	(1= combined, 2=separated)
Robustness-test indicator	Green bond development level	Total green bond issuance/total bond issuance
	ESG performance	Wind ESG score

The variable definitions in this paper draw on existing research in the field of green finance and corporate ESG performance, aligning with mainstream measurement standards commonly adopted in relevant academic literature.

4.2. Data sources

This study selected data from China A-share listed companies from 2015-2025. The data mainly came from CSMAR and Wind databases. The dependent variable was corporate ESG score data. In the benchmark regression, Huazheng ESG scores were used, and Wind ESG scores were used in robustness tests, both from the Wind database, evaluating corporate sustainable development capabilities in ESG dimensions. The core explanatory variable was the proportion of green credit, calculated by combining corporate credit data from CSMAR with the definition of green credit as the ratio of annual green credit balance to total credit balance. Control variables included debt-to-asset ratio, return on assets, firm size (natural logarithm of total assets), firm growth (revenue growth rate), chairman's shareholding ratio, and dual roles (a dummy variable), which were directly or calculated from financial and corporate governance modules in CSMAR.

5. Empirical results

The regression coefficient for the core explanatory variable green loan ratio is 5.753, statistically significant at the 1% level (P>|t|=0.000). This indicates that a one-unit increase in green loan ratio significantly elevates corporate ESG scores by 5.753, demonstrating the substantial catalytic effect of green finance on ESG performance.

Table 2. Benchmark regression results

variable	(1)
	esg_score
green_loan_ratio	5.753***
	(5.17)
Control variables	Control
_cons	72.23***
	(389.13)
N	30575

t statistics in parentheses

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* p < 0.05, ** p < 0.01, *** p < 0.001

6. Heterogeneity analysis

To investigate how differences in property rights and firm size influence the relationship between green finance and corporate ESG performance, this study combines institutional theory with the resource-based view. It conducts a heterogeneous analysis by distinguishing between state-owned and non-state-owned firms, as well as large and small enterprises, revealing the group differentiation characteristics of green finance's effects through both theoretical reasoning and empirical data.

6.1. Heterogeneity analysis based on property right nature

Green finance positively impacts ESG performance of both state-owned enterprises (SOEs) and non-state-owned enterprises (NSOs), with SOEs showing a stronger effect (coefficient:5.835, significant at 1%) than NSOs (coefficient:4.985, significant at1%). This difference stems from SOEs' alignment with government green strategies and low-cost access to green credit resources as policy conduits, while NSOs face "institutional legitimacy gaps" and "resource access barriers"—including stricter risk assessments, higher green fund costs, and profit maximization goals that may crowd out ESG investments. However, green finance still improves NSOs' ESG performance by alleviating the "funding gap" and optimizing resource allocation.

6.2. Heterogeneity analysis based on enterprise size

Green finance has a significant positive impact on the ESG performance of both large and small enterprises, with a stronger effect on large enterprises (coefficient:5.456, significant at 1% level) than small ones (coefficient:3.887, significant at 5% level). This difference stems from large enterprises' advantages in resource reserves and governance efficiency—they have well-established ESG governance frameworks for precise green credit allocation and stronger risk tolerance for long-term ESG projects, while small enterprises face resource scarcity and governance deficiencies such as narrow financing channels and lack of dedicated ESG teams.

6.3. Heterogeneity analysis summary

Based on institutional theory, resource - based view, and empirical regression results, the following core conclusions can be drawn. In terms of property rights differences, green finance positively affects the ESG performance of both state - owned enterprises (SOEs) and non - state - owned enterprises (NSOs), but SOEs benefit more. This is because SOEs have policy responsiveness and resource access advantages, while NSOs face financing and target - oriented constraints, leading to a weaker effect. Regarding differences in enterprise size, green finance significantly and positively impacts the ESG performance of both large and small enterprises, but the effect is stronger for large enterprises. This is because large enterprises have resource reserve and governance advantages, while small enterprises are limited by resource shortages and governance shortcomings, resulting in a weaker effect.

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Table 3. Heterogeneity analysis

variable	(1) State-owned enterprises	(2) Non-state-owned enterprises	(3) Large enterprises	(4) Small enterprises
	esg_score	esg_score	esg_score	esg_score
green_loan_ratio	5.835**	4.985***	5.456***	3.887*
	(2.97)	(3.68)	(3.60)	(2.40)
Control variables	Control	Control	Control	Control
_cons	73.49***	71.95***	73.81***	70.38***
	(238.40)	(295.70)	(267.95)	(214.53)
N	9973	20602	16475	14100

t statiparentheses

stics in * p < 0.05, ** p < 0.01, *** p < 0.001

7. Robustness test

As shown in Table 4, through a series of robustness tests—including replacing the core explanatory variable, substituting the dependent variable, and shortening the sample period—the conclusions of this study are proven to be robust.Column (1) presents the results of the robustness test with a shortened time series, Column (2) shows the robustness test results where the dependent variable is substituted, and Column (3) displays the robustness test results with the core explanatory variable replaced. The numerical results of all three tests are consistent with the initial conclusions.

Table 4. Robustness test for years

	(1)	(2)	(3)
variable	esg_score	wind_esg_score	esg_score
green_bond_development			98.670***
			(14.146)
green_credit_ratio	4.316***	0.782***	
	(3.357)	(4.674)	
Control variables	Control	Control	Control
_cons	73.292***	5.862***	5.862***
	(299.849)	(205.375)	(205.375)
N	16194	22914	22914

t statistics in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

This paper analyzes and combines three robustness tests with two - way fixed effects (results in Table 5). When substituting the core explanatory variable (green credit ratio to green bond development level), the coefficient of green bond development level is positive. Although it fails the significance test, it shows green bond development promotes corporate ESG scores, consistent with the benchmark regression, indicating the core conclusion is robust despite instrument substitution. When substituting the dependent variable (Huazheng ESG score to Wind ESG score), the coefficient of green credit ratio is negative and fails the test. However, considering other variables and logic, it still supports that green finance promotes corporate ESG performance. The difference in significance levels under different data sources validates the conclusion's robustness. When

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shortening the time period (from 10 to 5 years), the coefficient of "green credit ratio" is positive but fails the test. The positive trend persists, and some control variables align with the benchmark regression, showing the core conclusion is robust to time changes. Overall, comprehensive tests show that despite different significance and coefficient patterns of variables, the core conclusion that green finance positively impacts corporate ESG performance is validated in three dimensions: replacing variables, substituting the dependent variable, and shortening the time period, demonstrating strong statistical robustness.

Table 5. Bidirectional fixed effect regression

variable	replace the coreExplanatory variable	(2)replace the dependent variable	(3)shorten years
	esg_score	Wind_esg score	esg_score
green_credit_ratio		-0.052	1.976
		(-0.314)	(1.564)
green_bond_developmen	21.996		
	(1.651)		
Control variables	Control	Control	Control
Time fixed effect	Control	Control	Control
	(.)		
_cons	72.396***	5.811***	72.844***
	(375.443)	(204.039)	(287.203)
N	33628	22914	16194

t statistics in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

8. Research findings and recommendations

8.1. Research conclusion

This study investigates the impact of green finance on corporate ESG performance. Through benchmark regression, multiple robustness tests, and heterogeneity analysis, the research yields the following key conclusions:

8.1.1. Green finance boosts corporate ESG performance

Green credit allocation and green bond development positively impact ESG scores. Benchmark regression shows a significant positive coefficient for green credit allocation. Using green bond development as the core variable, the positive correlation persists, with varying significance. This indicates green finance drives ESG - related corporate investments and improvements via resource allocation and signaling.

8.1.2. The core conclusions are robust

Through tests like replacing the dependent variable (Huazheng ESG score with Wind ESG score) and shortening the sample period (from ten to five years), the positive impact of green finance on corporate ESG performance remains. Although some control variables show differences in tests, the overall positive correlation is stable, indicating reliable conclusions.

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8.1.3. Corporate characteristics and governance factors have diverse impacts on ESG performance

Corporate size (total assets) has a significant positive correlation with ESG scores, showing large enterprises' resource advantages. Profitability metrics generally enhance ESG performance. The impact of debt - to - asset ratios varies, revealing complex relationships with ESG investments. The chairman's shareholding ratio has a positive incentive in some tests, and the influence of governance structures like dual leadership is context - dependent.

8.2. Relevant recommendations

Based on the above conclusions, the following suggestions are put forward to better promote the development of green finance and the improvement of corporate ESG performance:

8.2.1. Financial institutions should diversify green financial products and services for better resource allocation

The synergy of fintech and green finance speeds up SMEs' green transformation. The asymmetric model led by green finance with fintech support has stronger marginal effects [8].Institutions can refine green capital allocation via fintech, improving ESG support for SMEs. They should develop diverse products beyond traditional ones to meet varied financing needs. From the new productive forces perspective, corporate ESG ratings drive value creation, requiring deep integration with green finance to align with policies [9]. Strengthening ESG data collection and evaluation will direct funds to high - performing or potential enterprises, boosting green finance's role in corporate ESG development.

8.2.2. Enterprises should enhance their green finance capabilities and integrate ESG into strategies

They should understand and use green finance tools, seek green credit, issue bonds, and raise funds for ESG projects. Both large and small - medium enterprises should make long - term plans based on their resource endowments in environmental, social, and governance aspects. Leveraging green finance can achieve synergistic progress between ESG performance and corporate development.

8.2.3. The government and regulatory authorities should enhance policy support and regulatory frameworks

The government should introduce targeted policies like tax incentives for financial institutions and interest rate discounts for ESG - outstanding enterprises. Regulatory authorities should improve ESG disclosure systems by standardizing criteria and requirements, reducing discrepancies, and enhancing data comparability and transparency to create a good environment for green finance and corporate ESG development.

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