Green Bond Policy and Corporate ESG Performance

Houwen Ge[1,a,*]

[1]*School of International Economics and Trade, Central University of Finance and Economics, Shahe Higher Education Park, Changping District, Beijing, China*

a. gehouwen@163.com

*corresponding author

Abstract: In recent years, green bonds, as a new type of financial instrument, have gradually become an important tool for promoting corporate green transformation and improving environmental, social, and governance (ESG) performance. Based on data from A-share listed companies from 2010 to 2020, this paper empirically analyzes the impact of the 2015 green bond policy guidelines on corporate ESG ratings and its mechanisms using the difference-in-differences (DID) method. The study finds that the implementation of the green bond policy significantly improves corporate ESG ratings and indirectly promotes improvements in environmental protection, social responsibility, and governance structure by reducing financing costs. In addition, this paper reveals the heterogeneous effects of the green bond policy across different regions, types of enterprises, and industries. It finds that the policy has a more significant effect in economically developed regions and non-state-owned enterprises, while its impact is relatively weaker in the central and northeastern regions. Mechanism analysis shows that the reduction in financing costs plays an important mediating role in enhancing corporate ESG performance through the green bond policy. This paper provides empirical support for policymakers to optimize green finance policies and offers new perspectives for companies to use green bonds to improve their sustainable development capabilities.

Keywords: Green bonds, ESG ratings, Financing costs, Difference-in-differences method, Heterogeneity analysis

1. Introduction

1.1. ESG Ratings and Green Bond Policy

In recent years, the world has faced increasingly severe environmental challenges, such as climate change, biodiversity loss, air and water pollution, among others. These issues not only pose a threat to human living environments but also have profound impacts on the sustainable development of the global economy. The report from the Intergovernmental Panel on Climate Change (IPCC) indicates that if global temperatures continue to rise, extreme weather events, rising sea levels, and irreversible damage to ecosystems will become more frequent, severely threatening the economic and social development of countries.

Against this backdrop, ESG (Environmental, Social, and Governance) ratings have emerged as a way to measure corporate performance in terms of environmental protection, social responsibility,

and corporate governance. As an important indicator of a company's sustainable development capabilities, ESG ratings have gradually become a focal point for global investors. Investors recognize that ignoring a company's environmental and social responsibilities can not only lead to financial risks but also affect the company's long-term development prospects. As a result, more and more investors are using ESG ratings as a reference standard to evaluate a company's future growth potential and sustainability. The establishment of the ESG rating system provides a basis for directing capital to green and responsible businesses and has encouraged companies to improve their performance in environmental protection and social responsibility.

In this wave of green transformation, the concept of green finance has gained global attention. The United States and European countries have taken the lead in promoting the development of green finance, providing reference models for the global green economic transition.

While promoting green finance globally, China, as the world's second-largest economy, has also been actively exploring and implementing green financial tools. In 2015, the People's Bank of China issued the "Catalogue of Green Financial Bond Supported Projects," marking the official launch of China's green bond market. This policy set clear standards and regulations for the issuance of green bonds and the use of funds, stipulating that the raised funds must be used for environmental protection-related projects such as renewable energy, pollution control, and energy conservation. The policy not only represents an important milestone in the development of China's green financial system but also provides enterprises and financial institutions with a new avenue for financing in the green sector, encouraging them to raise funds for environmental protection and low-carbon projects through the issuance of green bonds.

As the issuance scale of green bonds expands, an increasing number of Chinese enterprises are using this tool to raise funds for environmental protection projects and demonstrate their responsibility in environmental conservation. This process not only supports the green transformation of companies but may also directly influence their ESG ratings.

1.2. Research Methods and Findings

This study, based on the Difference-in-Differences (DID) method, empirically analyzes the impact of green bond issuance on corporate ESG ratings following the 2015 Green Bond Policy Guidelines, and explores the underlying mechanism, specifically the indirect effect of financing improvements on ESG performance. The research finds that the issuance of green bonds indeed has a positive impact on corporate ESG ratings, especially in terms of financing capacity. Green bond issuance provides positive support for companies, thereby promoting the improvement of their ESG ratings. However, it is worth noting that the impact of green bonds varies by region, with the northeastern region showing a relatively smaller effect. This suggests that policymakers may need to tailor policies based on regional conditions to facilitate the more effective operation of green bonds across the country.

1.3. Contribution of the Study

This study innovatively quantifies ESG ratings into specific ESG scores, providing a more precise measurement tool for studying the impact of green bonds on corporate ESG performance. Additionally, the study conducts a heterogeneity analysis, taking into account the differences in economic conditions and policy environments across regions, revealing significant regional variations in the impact of green bonds on ESG ratings. This provides new insights for regional policy formulation. Moreover, through the mechanism analysis, the study explores the role of financing costs as an intermediary variable, delving into the specific pathways through which green bonds influence ESG ratings. This mechanism analysis adds depth and comprehensiveness to the study.

The research findings indicate that green bonds not only improve corporate ESG ratings but also provide financial support by reducing financing costs. Through the heterogeneity analysis, the study reveals substantial differences in how different regions and types of companies are affected by green bond policies. Specifically, economically developed regions and non-state-owned enterprises benefit more from green bonds, while less-developed regions and state-owned enterprises benefit less.

2. Literature Review

2.1. Progress in ESG Research and Economic Effects

Environmental, Social, and Governance (ESG) are important indicators for measuring a company's sustainable development capabilities. The impact of ESG on corporate innovation, financing costs, and capital market performance has become a focal point of academic research. Studies have found that strong ESG performance can significantly reduce a company's capital acquisition costs by improving the quality of information disclosure and alleviating financing constraints. For instance, Fang Xianming et al. [1] found that in A-share listed companies, firms with excellent ESG performance are more likely to engage in green innovation investments and significantly improve resource allocation efficiency. This effect is particularly evident in state-owned enterprises and companies with greater financing constraints.

Moreover, ESG ratings enhance corporate transparency and help alleviate information asymmetry in capital markets. Qiu Muyuan and Yin Hong [2] pointed out that companies with better ESG performance can attract capital more effectively in both equity and debt markets. Particularly, companies with advantages in the environmental (E) dimension are more likely to gain investors' trust through signaling mechanisms. However, due to the inconsistency in rating standards, there are significant differences in ESG ratings for the same company across different rating agencies, which challenges the reliability of ESG ratings as a basis for investment decisions.

2.2. Economic Effects and Driving Mechanisms of Green Bond Policies

As an important tool of green finance, green bond policies play a significant role in promoting corporate green transformation and sustainable development. Studies have shown that the issuance of green bonds not only directly reduces corporate financing costs but also strengthens a company's environmental performance by improving market signals. Additionally, the green bond market exhibits a significant negative premium effect, where companies can obtain low-cost funds through green bond financing. This advantage is particularly prominent in high-pollution industries [3].

The economic effects of green bond policies are also reflected in their significant spillover effects. The issuance of green bonds not only directly promotes the environmental performance of the issuing entity but also, through strengthening the demonstration effect within the industry, encourages other companies to make green investments. At the same time, green bond policies, with their transparent fund usage and mandatory disclosure requirements, effectively promote the transparency of corporate environmental information, further improving market expectations and trust in corporate green investments [4].

2.3. ESG and Green Bond Policy Interactions

The Impact of ESG on Green Bonds: Research has shown that companies with better ESG performance are more likely to gain financing advantages through the green bond market. For example, a high ESG rating signals a company's sustainability capability to investors, which in turn lowers their perception of risk and reduces the cost of capital. This positive feedback mechanism is

especially significant in state-owned enterprises and high-pollution industries, as these companies often face greater policy pressure and environmental responsibility requirements.

The Promotion of ESG by Green Bond Policies: The issuance of green bonds requires companies to strictly define the use of funds and disclose them transparently, which drives continuous improvement in environmental performance, social responsibility, and corporate governance. Wang Ying [5] pointed out that green bond policies, by reducing financing costs, indirectly promote corporate investment in green innovation, thereby enhancing ESG performance.

Although existing studies provide abundant theoretical and empirical support for the relationship between ESG and green bond policies, there remains a gap in dynamic mechanism analysis. The dynamic process through which green bond policies influence ESG performance by lowering financing costs has not been fully explored. Most existing studies employ cross-sectional analysis, making it difficult to reveal the long-term effects of policies on ESG performance.

2.4. Research Hypotheses

Based on the above literature, this study proposes the following hypotheses:

H1: The implementation of green bond policies significantly improves the ESG ratings of companies.

H2: Green bond policies indirectly enhance ESG performance by reducing corporate financing costs, and this mediating effect is more pronounced in companies with greater financing constraints.

H3: The effects of green bond policies exhibit heterogeneity across different regions, industries, and types of companies, with a more significant impact in high-pollution industries and state-owned enterprises.

Through the validation of these hypotheses, this study aims to uncover the mechanisms of how green bond policies affect corporate ESG performance and their heterogeneity, providing theoretical support and empirical evidence for the optimization and practice of green financial policies.

3. Data Sources, Model, and Statistical Analysis

3.1. Data Sources

This study follows the research methodology of Fang Xianming and Hu Ding [1], selecting A-share listed companies from 2010 to 2020 as the research sample. The data is sourced from the Wind database and the Huazheng ESG Rating System. The Wind database provides the companies' basic financial data.

The dependent variable is the company's ESG rating data, which comes from the Huazheng ESG rating system. This rating divides companies' ESG performance into 9 levels, ranging from 1 to 9, with higher numbers indicating better ESG performance. In this study, ESG ratings are quantified on a scale from 1 to 9 to construct a continuous ESG indicator for quantitative analysis.

The main explanatory variable is whether the green bond policy has been implemented (gb). If the green bond policy was implemented in a given year, the value is 1; otherwise, it is 0.

This study also includes a series of control variables to ensure the robustness of the analysis, including company size (Size), earnings before interest and tax (EBIT), operating cash flow (OCF), return on assets (ROA), asset tangibility (Tangibility), and Tobin's Q (TobinqA). Additionally, this study introduces a dummy variable for company type (EN) to distinguish between state-owned and non-state-owned enterprises. State-owned enterprises are coded as 1, and non-state-owned enterprises as 0.

3.2. Model Design

This study follows the methodology of Wang Xin and Wang Ying [6] in their research on green credit and employs the Difference-in-Differences (DID) method to examine the impact of green bond policies on corporate ESG ratings. The specific model design is as follows:

$$ESG_{i,t} = \beta_0 + \beta_1 Gbond_i + \beta_2 After_t + \beta_3 Gbond_i \times After_t + \varphi X_{i,t} + \varepsilon_{i,t}$$

The Difference-in-Differences (DID) method is suitable for assessing the causal effects of policies. By setting up a treatment group and a control group, and comparing the differences between two periods (before and after the policy), this method controls for time trends and company characteristics, allowing for a more accurate identification of the causal impact of the green bond policy on ESG performance.

Descriptive statistics are presented in Table 1, which displays the descriptive statistics for the variables.

Table 1: Descriptive Statistics and Group Test

	ESG	Size	SG1	NI	OCF	ROA	Tangibility	TobinqA
N	28826	30052	26847	3.01E+04	30052	30052	30052	30052
Mean	4	22	6	5.23E+08	1	0	0	2
p50	4	22	0	1.12E+08	0	0	0	2
SD	1	1	827	3.21E+09	1	0	0	3
Min	1	16	-3	-1.82E+10	0	-5	0	0
Max	8	29	134607	1.51E+11	13	1	1	259
Range	7	13	134610	1.69E+11	13	6	1	259

4. Green Bond Policy and Corporate ESG Rating

4.1. Impact of the Green Bond Policy Release on Corporate ESG Rating

To investigate the impact of green bonds on corporate ESG ratings, this study first conducted a univariate analysis without controlling for fixed effects or other variables. The results are shown in column (1) of Table 1. The findings indicate that green bonds significantly improved the company's ESG scores. Moreover, in terms of economic significance, the issuance of green bonds led to an average increase of 0.026 in the company's ESG rating. The study further controlled for variables such as company size and earnings before interest and taxes (EBIT), which may influence ESG ratings, to mitigate endogeneity. The results are presented in column (2). Additionally, we cannot ignore the differences between provinces in implementing the green bond policy and the heterogeneity of corporate ESG performance. Therefore, the results reflect that companies in economically developed provinces tend to have higher ESG ratings, rather than the influence of the green bond policy itself. Similarly, referencing the work of Li Jinglin, Yang Zhen, Chen Jin, and Cui Wenqing [7], it is recognized that ESG ratings are also influenced by industry factors.

Considering these factors, the study further controlled for province and industry fixed effects to exclude the impact of these variables on the results. In Table (2), the coefficient for gb (green bond) is significantly positive in all columns, indicating that the green bond policy has a positive impact on corporate ESG ratings. In the most stringent specification in column (5), with control variables and fixed effects, the regression coefficient for gb is 0.207, meaning that the issuance of green bonds leads to an average increase of 0.022 basis points in the company's ESG score.

Table 2: Baseline Regression: Impact of Green Bond Policy on Corporate ESG Performance

esg	(1)	(2)	(3)	(4)	(5)
gb	0.122***	0.071***	0.211***	0.211***	0.207***
	(0.026)	(0.027)	(0.022)	(0.022)	(0.022)
Size		0.155***	0.139***	0.136***	0.143***
		(0.009)	(0.015)	(0.015)	(0.015)
EBIT		4.580***	1.401	1.413*	1.327
		(0.971)	(0.858)	(0.858)	(0.857)
OCF		-0.029**	-0.029	-0.032	-0.031
		(0.012)	(0.022)	(0.021)	(0.021)
ROA		-2.379**	-0.594	-0.609	-0.575
		(1.091)	(0.912)	(0.912)	(0.908)
Tangibility		-0.429***	-0.190**	-0.203***	-0.238***
		(0.042)	(0.079)	(0.079)	(0.079)
tobinqA		-0.023***	0.003	0.003	0.002
		(0.008)	(0.003)	(0.003)	(0.003)
EN1		0.079***	0.036	0.036	0.040
		(0.015)	(0.048)	(0.048)	(0.049)
Year Fixed Effects	Not Controlled	Not Controlled	Controlled	Controlled	Controlled
Company-Level Fixed Effects	Not Controlled	Not Controlled	Controlled	Controlled	Controlled
Province Fixed Effects	Not Controlled	Not Controlled	Not Controlled	Controlled	Controlled
Industry Fixed Effects	Not Controlled	Not Controlled	Not Controlled	Not Controlled	Controlled
Observations	28,730	25,985	25,811	25,811	25,810
R-squared	0.011	0.098	0.589	0.589	0.593

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2. Parallel Trends

This study aims to assess the impact of the 2015 Green Bond Policy on corporate ESG ratings. In 2016, China, as the host of the G20 summit, emphasized sustainable development issues. That same year, China formally approved the Paris Agreement, committing to emission reductions and promoting green development. This encouraged corporate investment in emission reductions, energy efficiency, and environmental technologies, which further affected their ESG ratings. To ensure the accuracy of the results and avoid potential confounding effects from the 2016 G20 Hangzhou Summit and the Paris Agreement on ESG ratings, we conducted a parallel trends test. This method allows for a clearer identification of the direct impact of the 2015 Green Bond Policy on corporate ESG ratings, ensuring that the policy effect is independent of the international environmental and policy changes in 2016. The variable current represents the year of the G20 Hangzhou Summit and the Paris Agreement, pre4 refers to the four years before the G20 Summit and Paris Agreement, and post1 refers to the year following the G20 Summit and Paris Agreement. Other variables follow a similar pattern. The changes in corporate ESG ratings align with the parallel trends assumption, and the green bond policy resulted in a decline in the company's ESG performance.

Table 3: Parallel Trends Test of Corporate ESG Performance

esg	(1)	(2)	(3)
pre_5	2.012***	2.009***	1.993***
	(0.122)	(0.123)	(0.123)
pre_4	1.985***	1.982***	1.966***
	(0.121)	(0.121)	(0.122)
pre_3	1.919***	1.916***	1.900***
	(0.121)	(0.122)	(0.122)
pre_2	1.887***	1.883***	1.869***
	(0.121)	(0.121)	(0.121)
pre_1	2.006***	2.003***	1.987***
	(0.121)	(0.121)	(0.121)
current	2.102***	2.099***	2.079***
	(0.119)	(0.120)	(0.120)
post_1	2.137***	2.135***	2.118***
	(0.119)	(0.119)	(0.119)
post_2	2.141***	2.140***	2.122***
	(0.119)	(0.119)	(0.119)
post_3	2.230***	2.227***	2.207***
	(0.119)	(0.120)	(0.120)
post_4	2.266***	2.263***	2.240***
	(0.119)	(0.120)	(0.120)
Size	0.143***	0.140***	0.148***
	(0.015)	(0.015)	(0.015)
EBIT	1.419	1.433*	1.334
	(0.863)	(0.863)	(0.860)
OCF	-0.030	-0.034	-0.032
	(0.022)	(0.021)	(0.021)
ROA	-0.692	-0.709	-0.658
	(0.927)	(0.926)	(0.919)
Tangibility	-0.196**	-0.208***	-0.244***
	(0.079)	(0.079)	(0.079)
tobinqA	0.004	0.004	0.003
	(0.003)	(0.003)	(0.002)
EN1	0.029	0.029	0.032
	(0.047)	(0.048)	(0.048)
Year Fixed Effects	Controlled	Controlled	Controlled
Company-Level Fixed Effects	Controlled	Controlled	Controlled
Province Fixed Effects	Not Controlled	Controlled	Controlled
Industry Fixed Effects	Not Controlled	Not Controlled	Controlled
Observations	25,907	25,907	25,906
R-squared	0.596	0.597	0.601

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3.   Robustness Check

4.3.1. Heterogeneity Analysis of State-owned vs. Non-State-owned Enterprises

In the robustness check, the study employs a heterogeneity analysis method, performing separate regression analyses for state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs) to examine their ESG performance. This grouped regression approach allows for an in-depth exploration of whether the impact of the 2015 Green Bond Policy guidance differs significantly between state-owned and non-state-owned enterprises. The theoretical basis for this analysis is that SOEs and non-SOEs often have different goals and constraints when it comes to corporate governance, social responsibility, and environmental management. SOEs are generally more influenced by policy directives, whereas non-SOEs are more driven by market incentives. Therefore, conducting independent regressions for SOEs and non-SOEs helps reveal the heterogeneity of the policy's effects across different types of enterprises and captures the different pathways through which the Green Bond Policy guidance impacts their ESG performance. Through this heterogeneity analysis, the study further validates the robustness of the main findings, ensuring the external validity and policy applicability of the results.

Table 4: Heterogeneity Analysis of Enterprise Nature

esg	Non-State-Owned Enterprises	State-Owned Nnterprises
	(1)	(2)
gb	0.195***	0.064**
	(0.031)	(0.032)
Size	0.163***	0.206***
	(0.021)	(0.024)
EBIT	2.419**	-1.377
	(1.090)	(1.290)
OCF	-0.048*	0.071*
	(0.026)	(0.039)
ROA	-1.965*	1.921
	(1.143)	(1.393)
Tangibility	-0.282***	0.000
	(0.107)	(0.122)
tobinqA	0.004**	-0.001
	(0.002)	(0.007)
Year Fixed Effects	Controlled	Controlled
Company-Specific Fixed Effects	Controlled	Controlled
Province Fixed Effects	Controlled	Controlled
Industry Fixed Effects	Controlled	Controlled
Observations	16,223	9,523
R-squared	0.593	0.624

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results show that while the policy has a significant impact on both state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs), its effect is more pronounced for non-SOEs. The issuance of green bonds leads to an average increase of 0.195 basis points in the ESG ratings of non-SOEs, compared to an average increase of 0.064 basis points in the ESG ratings of SOEs. This

phenomenon likely reflects the differentiated response mechanisms of these two types of enterprises to the policy. State-owned enterprises typically have stronger policy compliance and long-term strategic planning, whereas non-state-owned enterprises are more sensitive to market changes and policy incentives. As a result, the Green Bond guidance has a more pronounced effect on improving the ESG performance of non-SOEs. This grouped regression analysis reveals the heterogeneous effects of the 2015 Green Bond guidance on different types of enterprises, further reinforcing the robustness of the research findings. This result provides policymakers with more targeted recommendations, indicating that future policies promoting green development should take into account the differences in ownership structures among enterprises.

Table 5: Robustness Check Excluding Special Events

esg	Excluding Green Credit Policy Effect	Excluding Green Securities Index Effect	Excluding COVID-19 Impact	Excluding All
gb	0.207***	0.198***	0.191***	0.182***
	(0.022)	(0.023)	(0.023)	(0.024)
Size	0.143***	0.153***	0.119***	0.124***
	(0.015)	(0.016)	(0.017)	(0.018)
EBIT	1.327	1.435	0.443	0.458
	(0.857)	(0.891)	(0.888)	(0.928)
OCF	-0.031	-0.027	-0.016	-0.011
	(0.021)	(0.023)	(0.022)	(0.024)
ROA	-0.575	-0.723	0.336	0.296
	(0.908)	(0.943)	(0.936)	(0.976)
Tangibility	-0.238***	-0.183**	-0.231***	-0.157*
	(0.079)	(0.085)	(0.083)	(0.090)
tobinqA	0.002	-0.001	0.002	-0.004
	(0.003)	(0.004)	(0.003)	(0.004)
Year Fixed Effects	Controlled	Controlled	Controlled	Controlled
Company-Specific Fixed Effects	Controlled	Controlled	Controlled	Controlled
Province Fixed Effects	Controlled	Controlled	Controlled	Controlled
Industry Fixed Effects	Controlled	Controlled	Controlled	Controlled
Observations	25,810	23,573	22,561	20,324
R-squared	0.593	0.604	0.601	0.612

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3.2. Exclusion of Other Exogenous Events' Interference

In research analysis, excluding the interference of other exogenous events is a critical step in ensuring the validity and accuracy of the conclusions. To avoid confounding the effect of the 2015 Green Bond guidance on corporate ESG ratings with the effects of other policies or events, the study excludes several significant exogenous events that could have impacted enterprise ESG performance.

Specifically, the study excludes the following major events that could have affected corporate ESG ratings: The Green Securities Index launched in 2013, The Green Credit Policy released in 2010 and The COVID-19 pandemic in 2020. These events represent major policy changes in the green finance and green credit sectors at different time points, as well as the global economic shock brought about by the COVID-19 pandemic. All of these could have had a significant impact on corporate ESG ratings.

Firstly, the 2010 Green Credit Policy aimed to guide banks in providing financial support to green projects and may have influenced companies' environmental performance from an early stage, leading to long-term effects on their ESG performance. Therefore, the study excludes samples from 2010. Secondly, the 2013 Green Securities Index was introduced to promote the green transformation of capital markets and could have increased the capital market's focus on ESG principles, thereby influencing the performance of relevant companies. Thus, the study excludes samples from 2013. Lastly, the COVID-19 pandemic in 2020 had profound impacts on global supply chains, environmental policies, and corporate social responsibility, which could have interfered with the independent effect of the Green Bond guidance. Therefore, samples from 2020 are also excluded from the study. By excluding these potential confounding factors, the research can more clearly capture the independent policy effect of the 2015 Green Bond guidance, avoiding the contamination of results by the influences of policies or unexpected events from other periods.

All regression coefficients remain significantly positive after the exclusion of these years, and the absolute values of the coefficients show no significant decline compared to the baseline regression results, confirming the robustness of the conclusions.

5.   Regional Heterogeneity Analysis

In the further robustness check, the study conducted a heterogeneity analysis across different regions, specifically dividing them into North China, Northeast China, Central China, and Western China. The aim of this analysis is to explore whether there are regional differences in the impact of the 2015 Green Bond guidelines on the ESG performance of companies across these regions. The results indicate that, while the Green Bond policy generally has a positive effect on corporate ESG ratings nationwide, companies in Central and Northeast China experience relatively smaller policy impacts.

This regional difference may reflect variations in economic structure, industrial base, and policy implementation strength across the regions. Companies in Central China, although having made significant progress in industrial development and infrastructure construction in recent years, may not have fully experienced the policy effects due to the region's relatively lower level of green finance development or insufficient policy enforcement capacity. Northeast China, on the other hand, faces challenges due to its high reliance on traditional heavy industries and the pressure of economic transformation, leading to a slower response in green transition and ESG practices, thereby weakening the Green Bond policy's effect on corporate ESG performance.

In contrast, companies in North China and Western China show a more significant policy response. This could be attributed to advantages in policy support, financial resource allocation, and increasing environmental awareness in these regions, which may have enhanced the effectiveness of the Green Bond policy. Through this regional heterogeneity analysis, the study further reveals the differentiated impact of the Green Bond policy on corporate ESG performance in different regions, emphasizing the importance of regional economic structure and policy enforcement environments in the effectiveness of green finance policies. This result also provides more targeted insights for policymakers, indicating that when promoting the Green Bond policy, regional differences should be fully considered, and more policy support and implementation should be provided for regions such as Central and Northeast China, in order to more broadly improve the ESG performance of companies nationwide.

Table 6: Regional Heterogeneity Analysis

esg	east	central	west	NE
gb	0.245***	0.091	0.121**	-0.078
	(0.027)	(0.058)	(0.059)	(0.102)
Size	0.140***	0.144***	0.206***	0.205***
	(0.019)	(0.042)	(0.046)	(0.078)
EBIT	2.651**	-3.150	0.944	2.953
	(1.042)	(2.060)	(2.213)	(4.772)
OCF	-0.095***	0.088*	0.074	0.187**
	(0.026)	(0.046)	(0.054)	(0.079)
ROA	-2.009*	4.244*	-0.626	-0.875
	(1.094)	(2.250)	(2.348)	(5.102)
Tangibility	-0.112	-0.642***	-0.293	-0.361
	(0.103)	(0.213)	(0.189)	(0.348)
tobinqA	0.001	-0.012**	0.010***	0.011
	(0.004)	(0.006)	(0.003)	(0.023)
EN1	0.038	0.296***	-0.017	-0.160
	(0.068)	(0.105)	(0.127)	(0.166)
Constant	1.009**	0.823	-0.684	-0.741
	(0.425)	(0.942)	(1.034)	(1.745)
Year Fixed Effects	Controlled	Controlled	Controlled	Controlled
Company-level Fixed Effects	Controlled	Controlled	Controlled	Controlled
Province Fixed Effects	Controlled	Controlled	Controlled	Controlled
Industry Fixed Effects	Controlled	Controlled	Controlled	Controlled
Observations	17,526	3,591	3,510	1,163
R-squared	0.602	0.582	0.609	0.585

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6. Mechanism Analysis

6.1. Indirect Effects of KZ and WW Indices

In the mechanism analysis, this paper explores the role of financing costs as a mediating variable, revealing the potential mechanism through which the 2015 Green Bond guidelines indirectly improve corporate ESG performance by reducing financing costs. Specifically, this study uses the KZ index (Kaplan-Zingales Index) and the WW index (Whited-Wu Index) as measures of financing constraints and examines the indirect impact of the Green Bond policy on ESG performance through mediation effect tests. The regression results show that, after the release of the Green Bond policy, the KZ index significantly decreased, while the change in the WW index was not significant. This suggests that the Green Bond policy primarily alleviates financing constraints through the financing constraint path reflected by the KZ index.

After the release of the Green Bond policy, the KZ index decreased by an average of 0.382. Further analysis reveals that for every 1-point decrease in the KZ index, a company's ESG score increases by an average of 0.039. This indicates that, while reducing corporate financing costs, the Green Bond policy provides companies with greater financial flexibility, enabling them to invest more actively in improving environmental protection, social responsibility, and corporate governance. In contrast, although the WW index reflects the conflict between a company's growth opportunities and its capital access ability, the regression results show that the Green Bond policy has no significant effect on the

WW index. This suggests that the policy's role in alleviating financing constraints is more focused on the conflict between a company's reliance on external financing and insufficient internal funds.

Table 7: Mechanism Analysis of Financing Costs

VARIABLES	(1) kz	(2) ww
gb	-0.382***	-1.007
	(0.038)	(1.109)
Baseline Regression Control Variables	Controlled	Controlled
Baseline Regression Fixed Effects	Controlled	Controlled
Observations	26,929	22,900
R-squared	0.701	0.112

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) esg
kz	-0.039***
	(0.004)
Baseline Regression Control Variables	Controlled
Baseline Regression Fixed Effects	Controlled
Observations	26,312
R-squared	0.580

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6.2. Mediating Effect of the KZ Index

The KZ index primarily measures the conflict between a company's reliance on external financing and its insufficient internal funds. For companies with high KZ values, internal funds are scarce, and they face significant financing constraints and higher financial pressures. The research results indicate that the Green Bond policy significantly reduced the financing costs for these companies, providing them with an important financing channel. By issuing green bonds, these companies were able to obtain cheaper funds, thereby alleviating the problem of funding shortages. This alleviating effect enabled companies to invest more actively in environmental protection, social responsibility, and governance improvements, which in turn significantly enhanced their ESG performance. Therefore, the KZ index, as a mediating variable for financing constraints, plays a particularly significant role in revealing the mechanism through which the Green Bond policy indirectly impacts ESG performance by improving the financing environment.

6.3. Policy Implications

Overall, the mediating effect of the Green Bond policy mainly operates by reducing the financing constraints reflected in the KZ index, thereby indirectly enhancing the company's ESG performance. This suggests that the Green Bond policy not only directly promotes the improvement of companies' ESG ratings but also provides strong financial support for sustainable development by alleviating companies' financial pressures and lowering financing costs. Especially for companies with greater financing constraints, the Green Bond policy significantly reduces their financing barriers, enabling

them to invest more resources in environmental protection, social responsibility, and the optimization of governance structures, thus driving improvements in their ESG performance.

7.   Conclusion

Based on the implementation of China's 2015 Green Bond Policy, this study delves into the impact of green bond issuance on corporate ESG ratings and draws several important conclusions. The research findings indicate that the issuance of green bonds significantly improves a company's ESG score, suggesting that the funds raised through green bonds are allocated to environmental protection projects, thereby enhancing the company's performance in sustainable development. This result validates the effectiveness of green bonds as a green financial tool, providing companies with financial support while strengthening their green image and sense of corporate responsibility in the capital market.

In addition to improvements in the environmental dimension, this study also reveals that green bonds further positively impact overall ESG performance by reducing corporate financing costs. The reduction in financing costs provides companies with greater financial flexibility, enabling them to invest more in environmental protection, social responsibility, and corporate governance. The results of the mechanism analysis suggest that green bonds are not merely an environmental financial tool; their role in the corporate financial structure is also a significant driving force in improving ESG performance.

At the same time, this study reveals through heterogeneity analysis that the impact of green bonds on companies varies significantly across different regions and types of enterprises. Enterprises in economically developed regions and non-state-owned enterprises tend to more effectively utilize green bonds to improve their ESG ratings. In contrast, the impact of green bonds is relatively smaller in economically underdeveloped regions and small and medium-sized enterprises, reflecting the challenges these companies may face when using this financing tool.

Overall, this study not only enriches the theoretical literature on the impact of green bonds on ESG ratings but also provides important empirical support for policymakers and corporate managers. Policymakers should design more targeted and inclusive policies that consider the actual conditions of different regions and industries, to promote the popularization and development of green bonds. Meanwhile, enterprises should actively seize the opportunities brought by green finance, issue green bonds to reduce financing costs, enhance ESG performance, and thus gain a competitive advantage in the global capital market that increasingly emphasizes sustainable development.

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