Greenwashing and Cost of Debt: Analyzing the Impact of ESG Disclosure Quality in Chinese Listed Companies

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Abstract. Environmental, Social, and Governance (ESG) information disclosure serves as a critical benchmark for assessing a company's capacity for sustainable development. High-quality ESG disclosure entails the provision of comprehensive, precise, and timely information, complemented by demonstrable performance and future objectives in the relevant domains. The cost of debt pertains to the interest and associated expenses incurred by companies when sourcing funds through bond issuance, bank loans, or similar financial mechanisms. Enhanced ESG disclosure quality augments the transparency of corporate information, thereby enabling potential creditors to perform a more thorough risk appraisal of the firm. This study leverages data from non-financial firms listed on China's Shanghai, Shenzhen, and Beijing A-share markets from 2012 to 2022. Employing the Greenwashing index as a proxy for ESG disclosure quality, this research investigates the influence of ESG disclosure quality on corporate cost of debt. The findings indicate that entities engaging in greenwashing tend to experience reduced cost of debt. This phenomenon may be attributed to the absence of standardized ESG evaluation criteria, which allows greenwashing practices to achieve market acceptance in the short term. Moreover, the analysis reveals a more pronounced negative impact of the greenwashing index on cost of debt among non-state-owned enterprises. This paper advocates for the enhancement of ESG disclosure standards and regulatory frameworks to improve corporate ESG transparency.

Keywords: ESG Information Disclosure, Greenwashing Index, Cost of Debt, Corporate Nature of Ownership, Panel Regression

1 Introduction

In the context of escalating global environmental challenges, the concept of sustainable development has garnered significant attention from governments, businesses, and the investment community. Environmental, Social Responsibility, and Corporate Governance (ESG) criteria have emerged as critical metrics for evaluating a company's sustainable development capabilities, attracting extensive scholarly and practical attention [1]. In recent years, with the Chinese government's continued implementation of

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environmental protection and social responsibility policies, an increasing number of enterprises have started to emphasize ESG information disclosure. However, the variability in the quality of ESG disclosures not only influences investor decisions but also significantly impacts the cost of debt for companies [2]. The quality of ESG disclosure is intrinsically linked to investors' perceptions of a company's actual environmental and social responsibility performance [3]. The revised <Code of Corporate Governance for Listed Companies> by the China Securities Regulatory Commission in 2018 and the <Guiding Opinions on Promoting the High-Quality Development of the Banking and Insurance Sectors> issued by the China Banking and Insurance Regulatory Commission provide essential guidance for corporate ESG information disclosure [4]. Nevertheless, policy directives alone are insufficient to completely rectify the deficiencies in corporate information disclosure. In the absence of mandatory and uniform standards, some enterprises may engage in greenwashing, which involves exaggerating their environmental achievements through misleading promotion, thereby creating a more environmentally friendly and sustainable image than reality [5]. This behavior not only misleads the market but can also distort financing costs (Ibid). High-quality ESG disclosure should possess credibility and transparency and must accurately reflect a company's environmental, social, and governance performance. However, greenwashing undermines the quality of ESG information disclosure, eroding investor trust in the company [6].

Current research predominantly examines the influence of corporate ESG performance on firm outcomes, often overlooking the potential for greenwashing behaviors — that is, the authenticity and transparency of ESG information disclosure. This paper makes several key contributions to the existing literature. Firstly, it employs the greenwashing index as a proxy measure for ESG disclosure quality, thereby quantifying the quality of corporate ESG disclosures and elucidating their impact on the cost of corporate debt with greater specificity. Secondly, the study investigates the differential dynamics between state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs) with respect to the aforementioned relationship. This analysis provides insights into the behavioral characteristics of different ownership structures within China's unique systemic context regarding ESG information disclosure and associated financing costs. The findings offer valuable references for policymakers, investors, and corporate managers alike.

2 Theoretical Basis and Research Hypotheses

The influence of ESG disclosure quality on corporate financing costs has garnered increasing interest from both scholars and practitioners. Within the framework of Signaling Theory, ESG disclosure is perceived as a crucial indicator through which companies communicate their commitment to social responsibility and governance standards to the market [7]. High-quality ESG disclosure can mitigate information asymmetry, bolster corporate reputation, and consequently reduce financing costs. Conversely, Agency Theory posits that corporate managers might manipulate information for personal gain, with greenwashing serving as a prime example of such practices (Ibid). Greenwashing

can undermine the credibility of ESG signals, leading the market to interpret them as indicators of information manipulation and mistrust. This exacerbates information asymmetry and risk premiums, ultimately escalating the cost of debt for enterprises. Indeed, the prevalence of greenwashing behaviors introduces uncertainty regarding the effectiveness of ESG disclosure quality on cost of debt, as investors struggle to discern genuine ESG efforts from superficial greenwashing activities, thereby resulting in indeterminate economic impacts on corporate financing expenses.

In the context of the Chinese market, the efficacy of ESG information disclosure may differ between SOEs and non-SOEs. Research by Ammar Zahid et al. (2023) indicates that SOEs, owing to their unique policy background and governmental support, typically exhibit higher compliance and transparency in ESG disclosures, face lesser market pressures, and enjoy relatively lower capital costs. In contrast, non-SOEs, which depend more heavily on market financing, may be more susceptible to the quality of ESG information disclosure [8].

Based on the literature review, this study posits the following hypotheses:

Hypothesis 1-a: The quality of ESG disclosure significantly impacts corporate cost of debt.

Hypothesis 1-b: The greenwashing index is significantly positively correlated with cost of debt.

Hypothesis 2: The influence of ESG disclosure quality on cost of debt is more pronounced in non-state-owned enterprises compared to state-owned enterprises.

3 Empirical Test

3.1 Sample Selection and Data Sources

This study utilizes annual data from A-share listed companies in Shanghai, Shenzhen, and Beijing over the period from 2012 to 2022 as the initial sample set. The data were primarily sourced from the East Money Choice Financial Data Terminal, GTA Database, Bloomberg, and Huazheng Database. The industry classification adheres to the 2012 industry classification standards established by the China Securities Regulatory Commission. To ensure the robustness and reliability of the research findings, the initial sample underwent the following screening processes: (1) removal of samples with missing variable data; (2) exclusion of financial listed companies; and (3) exclusion of companies that were categorized as ST and *ST during the sample period due to abnormal operating conditions. Following these screening procedures, a final dataset comprising 4684 company-year observations was obtained for analysis.

3.2 Variable Definition and Measurement

3.2.1 Dependent Variable - Corporate Cost of Debt (CD). This study adopts the methodology of Zheng et al. (2013) to quantify the company's cost of debt by assessing the ratio of a company's financial expenses to its total liabilities at the end of the fiscal period [9]. By examining this ratio, the economic burden borne by the company to sustain its debt level over a specific timeframe is accurately reflected. The precise

calculation formula employed is: the financial expenses of the enterprise for the subsequent year divided by the total liabilities at the end of the current period. This ratio not only encapsulates the costs incurred by the enterprise in the process of debt financing but also elucidates the efficacy of the enterprise's financing structure and financial strategy.

3.2.2 Independent Variable - Greenwashing Index (GWS). This investigation employs the enterprise greenwashing index conceptualized by researchers Hu et al. (2023) to assess corporate greenwashing practices [10]. Initially, the environmental rating, designated as $ERdis$, was extracted from the Bloomberg Database, indicating the efforts and effectiveness of companies in environmental information disclosure as reported in their ESG reports. Subsequently, the environmental performance rating, denoted as $ERper$, was sourced from the Huazheng Database, which evaluates the actual performance of enterprises in environmental protection and sustainable development. The standardized differences between the environmental disclosure scores and the actual performance scores for each enterprise relative to its industry peers were then calculated. This difference is computed using the following formula:

$$GWS_i = \left(\frac{ER_i - \overline{ER_{dis}}}{\sigma_{dis}}\right) - \left(\frac{ER_i - \overline{ER_{per}}}{\sigma_{per}}\right) \tag{1}$$

Here, ER_i represents the environmental rating of a single enterprise; $\overline{ER_{dis}}$ and $\overline{ER_{per}}$ denote the mean scores of environmental disclosure and actual environmental performance, respectively, while σ_{dis} and σ_{per} are the standard deviations of these scores. The resultant calculation facilitates the identification of corporations potentially engaging in exaggerated or deceptive environmental responsibility claims. Positive values indicate the presence of greenwashing behavior, whereas negative values imply that companies may not have fully disclosed their positive environmental practices.

3.3 Empirical Model

To test the research hypothesis proposed in the previous section, a multiple regression model was constructed to examine the impact of the corporate greenwashing index on cost of debt. The regression equation is specified as follows:

$$CD_{i,t} = \beta_0 + \beta_1 GWS_{i,t-1} + \gamma * ControlVar_{i,t-1} + \varepsilon_{i,t} \tag{2}$$

In this model, CD represents enterprise cost of debt, GWS denotes the corporate greenwashing index, and $ControlVar$ encompass a range of control variables, including company size (A), management shareholding ($MANAGER$), leverage ratio (LEV), net cash flow (CF), enterprise innovation (RC, which is the ratio of R&D expenditure to total assets), company growth ($GROWTH$), return on equity (ROE), book to market ratio (BM), and enterprise age (AGE).

4 Research Results and Analysis

4.1 Descriptive Statistics

A descriptive statistical analysis was conducted to elucidate the fundamental characteristics of each variable. The results are presented in Table 1 and reveal the following insights: (1) The corporate greenwashing behavior index (GWS) exhibits a mean of -0.4994 and a standard deviation of 1.3072. These statistics imply substantial variability in the quality of ESG information disclosures among the sampled companies. The observed range, characterized by the maximum and minimum values, indicates a propensity for firms to either exaggerate or conceal their green behaviors. (2) The corporate cost of debt indicator (CD) has a mean of 0.0103 and a standard deviation of 0.0349, suggesting considerable fluctuations across companies. This variability indicates that certain companies incur higher debt financing costs, potentially due to the elevated risks and interest rates they face during the financing process. (3) The distribution of the remaining control variables falls within a reasonable range, underscoring the representativeness and robustness of the sample data.

Table 1. Descriptive statistics results.

VarName	Obs	Mean	SD	Min	Median	Max
GWS	4684	-0.4994	1.3072	-4.7081	-5.5492	5.6910
DC	4684	0.0103	0.0349	-0.8909	0.0141	0.1050
RC	4684	0.0225	0.0237	0.0000	0.0181	0.5712
MANAGER	4684	8.1995	15.1664	0.0000	0.2691	77.9101
CF	4684	6.5769	6.6735	-34.3666	6.0497	66.4138
GROWTH	4684	15.1350	40.2941	-87.4569	10.4832	1128.4802
A	4684	23.3534	1.2855	18.8644	23.2421	28.4160
LEV	4684	46.5295	18.8961	0.7969	47.4558	98.1978
ROE	4684	9.2633	14.2468	-211.6195	9.2262	129.5064
BM	4684	0.4542	0.3108	0.0076	0.3784	2.4562
AGE	4684	20.1738	5.5274	4.0000	20.0000	45.0000

4.2 Correlation Analysis

To preliminarily assess whether significant correlations exist between the variables, a correlation analysis was performed and the Variance Inflation Factor (VIF) was computed. The analysis revealed that all VIF values were below the threshold of 10, indicating the absence of severe multicollinearity. Consequently, all variables were retained for further analysis.

4.3 Panel Regression Analysis

Based on the research hypotheses previously outlined, tests were conducted on the entire sample, as well as on subsets comprising SOEs and non-SOEs. Table 2 presents the primary multiple regression results.

From the regression results of the entire sample, the following observations can be made: (1) Column (a) indicates that the coefficient of the Greenness Index (GWS) is negative and statistically significant at the 1% level. This suggests that corporate greenwashing behavior significantly impacts the cost of debt; specifically, increased greenwashing behavior corresponds to a reduction in the cost of debt. This finding implies that greenwashing effectively misguides investors and creditors into perceiving the company as performing exceptionally in environmental and social responsibility, thereby lowering their risk assessment and making them more willing to provide financing at reduced costs. (2) As shown in Column (b) of the table, even after incorporating control variables, the GWS coefficient remains negative and statistically significant at the 1% level. These results corroborate Hypothesis 1-a while refuting Hypothesis 1-b.

Comparative analysis of the regression results for SOEs and non-SOEs reveals the following insights: (1) In the SOEs Column (a), the GWS coefficient is negative and significant at the 1% level. Likewise, in the non-SOE Column (a), the GWS coefficient is also negative and statistically significant at the 1% level. (2) However, upon adding control variables, Column (b) for SOEs indicates a negative GWS coefficient that is significant only at the 10% level. In contrast, Column (b) for non-SOEs shows that the GWS coefficient remains negative and significant at the 1% level. In statistical analysis, significance levels of 5% or 1% are typically chosen to assert the robustness of findings. Therefore, these results suggest that while greenwashing behavior in SOEs does exert some negative effects on the cost of debt, this effect is more pronounced and significant in non-SOEs, thereby validating Hypothesis 2.

Table 2. Regression results for hypothesis testing.

	Full Sample		State-owned Enterprises		Non-state-owned Enterprises	
	(a)	(b)	(a)	(b)	(a)	(b)
GWS	-0.0020***	-0.0013***	-0.0016***	-0.0009*	-0.0024***	-0.0019***
RC		-0.0577**		-0.0461		-0.0659
A		-0.0020***		-0.0014*		-0.0022*
LEV		0.0008***		0.0005***		0.0010***
ROE		-2.778e-05		-4.715e-05		-1.3e-05
CF		-0.0003***		-0.0004***		-0.0002*
GROWTH		3.638e-05		-2.314e-06		3.764e-06
BM		0.0051***		0.0031		0.0113***
MANAGER		3.91e-05		3.916e-06		4.422e-05
AGE		-0.0002**		-0.0003*		-9.983e-05

year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
F	11.846	23.385	15.453	24.087	6.2198	13.975
R-squared	0.1410	0.2702	0.2866	0.4232	0.1186	0.2614
N	4684	4684	2132	2132	2552	2552

Note: The data in the table are the regression coefficients of the variables, ***, ** and * indicate that they are significant at the 1 per cent, 5 per cent and 10 per cent level of significance, respectively.

4.4 Robustness Test

To ascertain the robustness of the research model, this study employed a variable substitution method. By replacing key variables and verifying the consistency of the results, the robustness, rationality, and universality of the conclusions were effectively validated [11]. Drawing on the methodology of Zheng et al. (2013), this study substituted the company's cost of debt with the ratio of total corporate interest expenses, handling fees, and other financial expenses to total liabilities at the end of the period [9]. The full sample model was then tested using the greenwashing index. The empirical results indicate that, without the inclusion of control variables, the GWS coefficient is -0.0008 with a p-value of 0.0000. When control variables were introduced, the GWS coefficient adjusted to -0.0003 with a p-value of 0.0180. Both scenarios exhibit significant negative effects on the dependent variable CD, thereby affirming the robustness of the proposed model.

5 Conclusion

This study utilizes data from A-share listed companies in Shanghai, Shenzhen, and Beijing from 2012 to 2022, employing the greenwashing index to evaluate the quality of corporate ESG information disclosure. It investigates the relationship between ESG disclosure quality and corporate cost of debt, while also examining the differential impact of greenwashing on debt costs in SOEs versus non-SOEs. The following conclusions have been drawn:

(1) There is a significant relationship between the quality of ESG disclosure and the cost of corporate debt financing. Specifically, increased greenwashing behavior is associated with lower corporate cost of debt. This finding contradicts the anticipated outcome that "greenwashing behavior may elevate the cost of corporate debt." A plausible explanation is the current absence of unified ESG evaluation standards and disclosure requirements, which complicates the ability of investors and creditors to distinguish between authentic green behavior and greenwashing. Consequently, greenwashing behavior may achieve short-term market recognition. Presently, policies and regulations may lack sufficiently stringent review and evaluation mechanisms for ESG information disclosure, allowing firms to secure financing advantages by overstating their environmental and social responsibility achievements [5].

(2) The negative impact of the greenwashing index on cost of debt is more pronounced in non-state-owned enterprises. This phenomenon may be attributable to differences in market sensitivity. State-owned enterprises, due to their unique policy backgrounds and government support, have relatively lower capital costs and are more reliant on state and policy support for financing, resulting in reduced reliance on market financing. Consequently, even in the presence of greenwashing behavior, the market does not significantly influence their financing costs. Conversely, non-state-owned enterprises depend more on market financing and exhibit heightened market sensitivity. Greenwashing behavior significantly impacts their financing costs because the market places greater reliance on ESG information for evaluation. Additionally, SOEs generally demonstrate higher compliance and transparency in ESG information disclosure, leading to potentially lower degrees of greenwashing behavior. Non-SOEs, lacking similarly stringent regulatory and compliance requirements, are more likely to substantially influence financing costs through greenwashing behavior.

Based on the current situation in China and the findings of recent research, this article elucidates the following policy implications:

(1) Enhancement of Standards and Regulatory Mechanisms for ESG Information Disclosure: Addressing the detrimental effects of greenwashing within the market and financing environment necessitates the enhancement of standards and regulatory mechanisms for ESG information disclosure. This involves the development of mandatory and unified ESG information disclosure standards, alongside the introduction of third-party auditing mechanisms to ensure the authenticity and transparency of the disclosed information. Furthermore, there is a need to augment legal supervision and punitive measures for false ESG information disclosure. Establishing a reporting and punitive framework for unlawful disclosures, and imposing economic sanctions and market prohibitions on companies that intentionally exaggerate or fabricate environmental achievements, can serve as a formidable deterrent.

(2) Strengthened Market Constraints and Enhanced Transparency of ESG Information Disclosure for Non-State-Owned Enterprises: Given that non-SOEs are more reliant on market financing and are thus more vulnerable to greenwashing behavior, it is imperative to reinforce supervision and guidance on ESG information disclosure by non-SOEs. This aims to improve the transparency and credibility of their ESG information and to reduce information asymmetry in financing. Local governments and industry associations could collaborate to develop specific policies and guidance tailored to the ESG information disclosure of non-SOEs, offering differentiated disclosure requirements and support measures contingent upon the industry and enterprise size. Additionally, policies should aim to enhance the awareness and capacity of enterprises regarding ESG information disclosure. Policy incentives, such as tax reductions and green finance support, should be extended to non-SOEs that demonstrate exemplary performance in ESG information disclosure, thereby encouraging voluntary improvement in the quality of ESG disclosures through market-driven incentive mechanisms.

Declaration

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

In the process of preparing this paper, the author used ChatGPT to polish the language expression.

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