

Article

Peeking into Corporate Greenwashing through the Readability of ESG Disclosures

Peng Hu , Xuming Li, Nian Li, Yiyang Wang * and Derek D. Wang

School of Business Administration, Capital University of Economics and Business, 121 Zhangjialukou, Beijing 100070, China; hu_peng@cueb.edu.cn (P.H.); lxm199908@163.com (X.L.); linian1227@163.com (N.L.); wangdd@cueb.edu.cn (D.D.W.)

* Correspondence: ying_w@cueb.edu.cn

Abstract: Faced with the widespread issue of greenwashing, there is a pressing need for an effective approach to assess the extent of corporate involvement in such hypocritical practices. This study aims to address this concern by examining the association between corporate ESG disclosures' readability and greenwashing. We gauge the readability using a modified Fog Index and construct a company's peer-relative greenwashing score based on data from third-party databases. The empirical analysis reveals a negative relationship between the level of corporate greenwashing and the readability of its ESG disclosures, suggesting that companies whose ESG disclosures are more readable are less likely to engage in greenwashing. This negative relationship is particularly pronounced in companies characterized by higher levels of information asymmetry. However, the relationship is weaker after 2018, when the "Code of Corporate Governance for Listed Companies" was implemented. In conclusion, our research highlights the significance of ESG disclosure readability in effectively conveying and predicting corporate greenwashing practices. This study provides valuable insights for investors seeking to evaluate corporate performance and make well-informed investment decisions.

Keywords: ESG disclosure; readability; greenwashing; textual analysis



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1. Introduction

The inconsistency between corporate words and deeds has given rise to a new phenomenon known as "greenwashing", in which companies falsely claim to be environmentally and socially responsible. The practice of greenwashing misleads consumers and investors, deterring the trust and actions needed to face global sustainability challenges. A series of corporate scandals such as the greenwashing allegations against Goldman Sachs Asset Management [1] and the greenwashing probe into the Deutsche Bank unit DWS [2] call into question the integrity and authenticity of ESG. In addition, research carried out in Europe reveals that 42% of green claims are exaggerated, false, or deceptive, which indicates greenwashing on an industrial scale [3]. A survey conducted by Quilter has found that investors are becoming increasingly sensitive to greenwashing, and approximately 44% of investors consider greenwashing as their primary concern in relation to ESG investing [4]. While there is growing concern about potential greenwashing practices, there seems to be limited means of identifying or proving their widespread existence, especially due to its vague definition and diverse forms. Therefore, the study of corporate greenwashing is of significant importance.

There is a growing trend among both social responsibility investment funds and mainstream investors of integrating corporate ESG performances into their investment decisions [5,6]. ESG disclosures provide textual and non-quantifiable information about a company's policies, statements, and performance in the environmental, social, and governance domains [7,8], playing a crucial role in the capital markets. The evidence shows that ESG disclosure quality is essential for companies to benefit from ESG practices [9,10]. For instance, the ESG disclosure quality can strengthen the positive relationship between

the innate earnings quality and the ESG disclosure quantity, and mitigate the negative relationship between the discretionary earnings quality and the ESG disclosure quantity [10]. Disclosure overload and missing information are two key factors that impact the quality of company reports. Therefore, ESG disclosure quality issues such as readability, conciseness, and completeness, as well as the relationship between the ESG disclosure quality and ESG performance, have sparked extensive discussions in academia and industry. For instance, Melloni et al. reveal that poor social performers tend to provide reports that are both less concise and less complete [11]. Calabrese et al. find that a higher level of completeness in quantitative information within ESG reports does not necessarily indicate a stronger commitment to environmental sustainability [12]. In addition, Meng et al. demonstrate a non-linear relationship between environmental performance and reporting practices, indicating that both good and poor performers provide more reliable disclosures compared to median performers [13]. However, the measurement of disclosure quality and its attributes remains a topic of controversy in the literature [14]. Some scholars have highlighted the importance of readability as a crucial aspect of disclosure quality [15,16], as it plays a vital role in determining the effectiveness of corporate ESG information and shaping the content of these disclosures [17].

The rise of greenwashing has fostered ESG skepticism [18,19]. Skeptical stakeholders may review ESG disclosures more carefully than ever; thus, the readability of disclosures has increased in importance. However, empirical studies examining the relationship between ESG disclosure readability and ESG performance provide fragmented and inconsistent evidence. Previous research focuses on two competing theoretical hypotheses to explain this relationship. The voluntary disclosure hypothesis, based on stakeholder theory, holds that companies whose ESG disclosures are more readable tend to have a better ESG performance [17,20,21]. This is because good ESG performers are expected to provide stakeholders with less information overload [20]. In contrast, the management confusion hypothesis, based on agency theory, argues that managers may engage in social responsibility activities for their own interests [14,22]. Consequently, companies with a corporate social responsibility orientation are more likely to mislead stakeholders about the company's actual performance through complex narrative disclosures. In light of these competing perspectives, we are interested in exploring whether the readability of corporate ESG disclosures can predict corporate greenwashing.

To shed light on the issue, we use data from listed Chinese A-share companies from 2015 to 2021 to empirically investigate the relationship between ESG disclosure readability and greenwashing. Why do Chinese companies merit attention? First, the Chinese securities market is immature, and the quality of information disclosure is currently a weak aspect, as most companies only disclose information to comply with limited official disclosure requirements or market demands, rather than providing full disclosure. Second, the Chinese securities market is increasingly emphasizing the readability of ESG disclosures. Nevertheless, the readability of company reports has not received much attention among scholars studying companies based in China [23]. Third, there is widespread corporate greenwashing in China, and it is not uncommon for companies to compromise business ethics in pursuit of economic interests [24].

We measure readability using the modified Fog Index and construct a company's peer-relative greenwashing score based on data from third-party databases. First, our Fog Index is derived from the Gunning Fog Index [25]. The Gunning Fog Index originally considered the average length of sentences and the complexity of English word syllables. Considering the differences between Chinese characters and English words, we modify the Gunning Fog Index to better fit the Chinese texts. Second, we construct the companies' peer-relative greenwashing scores by comparing their relative Bloomberg ESG disclosure score with their SINO ESG performance score. When a company has a much better relative position than its peers in its ESG disclosure score than its ESG performance score, the company's greenwashing score will be positive [26]. This indicates that the company is simply disclosing a large amount of ESG data to mask its poor ESG performance. Furthermore,

information asymmetry refers to a condition where one party in a relationship has more information than others (e.g., companies and investors) [27,28]. Although information asymmetry cannot be measured directly, evidence suggests that liquidity is closely related in the capital market [29]. Thus, we create an index using liquidity measures to assess information asymmetry.

Consequently, we find that the readability of listed Chinese A-share companies' ESG disclosures is negatively related with their greenwashing score. And this relationship is particularly significant in companies characterized by high levels of information asymmetry. However, this relationship is weaker after 2018 when the "Code of Corporate Governance for Listed Companies" was implemented. Further analysis demonstrates that the readability of corporate ESG disclosures can also effectively predict the extent of corporate greenwashing in the next two years. These results suggest that increases in the readability of corporate ESG disclosures are indicative of less future greenwashing and a more authentic ESG performance.

This study makes two contributions. First, this study addresses the challenge of identifying and substantiating greenwashing in the capital market. By establishing a link between the readability of corporate ESG disclosures and corporate greenwashing, this study provides a way to understand greenwashing in terms of corporate transparency and accountability. This broadens our understanding of the relationship between the quality of ESG disclosures and ESG performance, and highlights the significance of readability in ESG reports as a signaling mechanism. Second, this study tackles the challenge of creating a reliable method to measure the readability of Chinese texts. By improving the Gunning Fog Index to be more suitable for the Chinese environment, we provide a valuable reference for future research on the readability of Chinese texts. This is significant because the Chinese securities market is placing growing emphasis on the readability of ESG disclosures, and a reliable measurement tool can enhance the effectiveness of this emphasis.

The remainder of our paper is as follows. Following this introduction, Section 2 reviews the literature and develops our hypotheses. Section 3 describes the method and data. Section 4 presents the findings. Section 5 provides our conclusion and discussion.

2. Literature Review and Hypothesis

Our study builds on several inter-related streams of the literature, including stakeholder theory, agency theory, ESG disclosure readability, and greenwashing.

2.1. Theoretical Background

Stakeholder theory emphasizes that companies should consider not only their own interests but also the interests of stakeholders, as stakeholders can have an impact on or be impacted by the company [30]. With the increasing global concerns related to climate, the environment, human rights, and other issues, ESG matters are closely monitored by all stakeholders. Consequently, an increasing number of companies are beginning to disclose ESG information [31]. Stakeholder theory and corporate ESG disclosure readability are closely intertwined, as both prioritize stakeholders and their interests [32]. Companies that prioritize stakeholders are more likely to focus on transparency, engagement, and accountability, thus creating accessible and meaningful ESG reports for stakeholders [32]. Therefore, ESG disclosure readability has a significant impact on a company's communication of its ESG performance and influences the strategies of investors and other stakeholders towards the company [17]. And for investors who lack access to proprietary performance data, the readability of ESG reports plays a crucial role in their initial assessment of a company's sustainability performance [20].

Agency theory provides a theoretical foundation for comprehending the underlying motivations and dynamics of greenwashing [33,34]. Greenwashing should be symptomatic of problems within an agency, given the misalignment of interests between greenwashing companies and investors [35]. Li and Wu discover that agency conflict moderates decoupled ESG actions [36]. From the perspective of agency theory, companies may engage in green

communication to address stakeholders' environmental concerns, thereby showcasing their commitment and business direction towards sustainability [37]. In addition, agency theory is often intertwined with the concept of information asymmetry. And information asymmetry may be caused by corporate greenwashing [24]. Reporting mechanisms that reduce information asymmetry can also mitigate greenwashing behavior [34]. Therefore, it is viable to examine the relationship between the readability of ESG disclosures and corporate greenwashing.

2.2. ESG Disclosure Readability

A high-quality report delivers relevant, accessible information to an interested audience. However, an important aspect that scholars often overlook is the readability of the report [38]. Readability refers to how easily written text can be read and understood [39]. It serves as a fundamental guarantee for the quality of corporate information disclosure [40]. A readable text is essential for fully demonstrating the value of its information [41]. It assists market participants in extracting and understanding relevant facts for decision-making purposes [42]. As direct beneficiaries of corporate reports, investors prioritize the readability of such reports. They perceive harder-to-read corporate documents as a tactic employed by companies to conceal unfavorable information [15,43], which further prompts them to prioritize and invest in companies that demonstrate high text readability.

The impact of corporate report readability on capital markets has been extensively studied in the previous literature. Research has shown that companies whose ESG disclosures are more readable contribute to the stability of capital markets [44]. For instance, companies whose ESG disclosures are more readable tend to exhibit higher profitability [15,45,46] and stock earnings [47], and lower debt costs [48,49] and agency costs [46], as well as a lower stock price crash risk [50]. As a valuable supplement to traditional financial information, the non-financial information provided by ESG disclosures has become crucial for capital markets to understand companies. Studies have demonstrated that ESG report readability can enhance transactions by providing investors with more value-related information or improving the accuracy of information, leading to higher abnormal returns [17]. Abu Bakar and Ameer also find a positive correlation between the readability of corporate ESG communication and corporate profitability, liquidity, and Tobin's Q [51].

However, the existing research on ESG report readability primarily focuses on a few countries such as the United States [21,52], Malaysia [51], and Indonesia [42]. There is limited research on this topic in the Chinese context. This paper aims to make a modest contribution to this literature.

2.3. Corporate Greenwashing

As pressure for corporate environmentalism has grown, the prevalence of corporate greenwashing has also increased. Greenwashing is a term first coined in 1986, and can be defined in different ways given its multi-faceted nature [53]. From the perspective of information disclosure, greenwashing revolves around information transmission and information asymmetry. It is characterized by the deliberate selective disclosure of positive information, the avoidance of negative information, and the use of language to "whitewash" a company's environmental performance [54–56]. This behavior involves speculative exaggeration that deviates from reality, where mere "words" fail to effectively reflect the true actions of the company [57]. From the perspective of institutional theory, greenwashing is primarily grounded in the concepts of decoupling and symbolic management. ESG decoupling or greenwashing can be defined and measured as the discrepancy between the ESG disclosure and actual ESG performance [58,59].

Prior studies have analyzed greenwashing from different aspects, including its drivers such as the characteristics of the company and the management team [60], its consequences such as green trust [61] and equity mispricing [62], and its deterrents including the institutional pressures and company visibility [54]. However, there is a gap in the existing

literature when it comes to investigating the relationship between ESG disclosure readability and greenwashing. This paper aims to fill this gap.

2.4. Hypothesis Development

Unlike financial reports, corporate ESG reports have a broader audience that includes all stakeholders. The behavior of stakeholders, whether reacting positively or negatively to a company's ESG performance [63], gives rise to two motivations for companies to disclose ESG information. One motivation is the voluntary disclosure aspect, driven by the desire to provide positive information, while the other motivation is the legitimacy aspect, driven by the need to mitigate or hinder negative information.

According to the voluntary disclosure theory, companies that perform well are more inclined to disclose more performance information [64] to mitigate adverse selection issues [65]. Consequently, when a company demonstrates a good ESG performance, its disclosure is likely to be more transparent, reducing the likelihood of greenwashing. The perspective of voluntary disclosure theory is supported empirically by previous studies. For instance, Wang et al. [52] and Nazari et al. [21] demonstrate that there is a positive relationship between the readability of ESG reports and ESG performance. Du and Yu suggest that more readable ESG reports and those that use a more optimistic tone are indicative of a better future ESG performance [17]. Furthermore, companies whose ESG disclosures are more readable are shown to have higher credit ratings and lower bank loan costs [66]. These findings indicate that the readability of ESG disclosures conveys a signal of both good non-financial performance and good financial performance. Therefore, companies that actively practice ESG standards and engage in active disclosure through ESG reports are more likely to cultivate a positive public image and foster stronger relationships with stakeholders.

However, the relevant data in corporate ESG reports are often unaudited [26], and managers have discretion in selecting the information to include [17]. According to agency theory, managers may engage in corporate social responsibility for their own benefit [14]. This opportunistic incentive to actively manipulate corporate ESG disclosure, combined with the absence of a mandatory ESG reporting framework, has the potential to exacerbate the information asymmetry between managers and investors regarding corporate ESG activities and their financial performance [22]. Therefore, the management confusion hypothesis holds that CSR-oriented companies are more likely to use intricate narrative disclosures as part of an impression management strategy to mislead stakeholders about their actual performance [14]. According to the selective disclosure view, companies with a poor anticipated ESG performance in the future have an incentive to publish ESG reports that are less readable [17]. For instance, Wang et al. discover that polluting firms may intentionally decrease the readability of their ESG reports to obscure negative information and evade public scrutiny [52]. Melloni et al. find that companies with poor social performance tend to employ impression management strategies, such as manipulating the quantity and syntactical reading ease, as well as thematic content and verbal tone manipulation [11].

Thus, based on the conflicting arguments discussed above, we develop the following hypothesis:

H1: *ESG disclosure readability is negatively correlated with corporate greenwashing.*

Information asymmetry refers to a condition where one party in a relationship possesses more or better information than another [27,28]. Previous studies have emphasized the importance of corporate disclosure in addressing information asymmetry in capital markets [67–70]. For instance, Healy and Palepu argue that mandated and voluntary disclosure by managers can reduce information asymmetry and lead to benefits in the capital market [67]. Cheng and Wu note that the impact of corporate reporting quality is more pronounced for companies with high information asymmetry [69]. Therefore, we hypothesize that, under conditions of asymmetric information, good ESG performers will

truthfully disclose their ESG information, leading to a reduced motivation for greenwashing. Conversely, poor ESG performers may obfuscate negative information by reducing readability, thereby engaging in greenwashing. This perspective gives rise to hypothesis 2:

H2: *The negative relationship between readability and greenwashing is stronger for companies with higher levels of information asymmetry.*

3. Materials and Methods

3.1. Sample and Data

This study explores Chinese A-share listed companies from 2015 to 2021 (before 2015, China's requirements for the disclosure regarding environmental and social responsibilities by listed companies were primarily focused on encouragement. In 2015, the Communist Party of China (CPC) Central Committee and the State Council issued the "Integrated Reform Plan for Promoting Ecological Progress", which proposed the establishment of a mandatory disclosure mechanism for environmental protection information by listed companies.). The selection criteria employed are as follows: (1) Exclusion of ST and ST* companies; (2) exclusion of insolvent listed companies; (3) exclusion of listed companies in the financial industry; and (4) exclusion of samples harboring missing or incomplete data. Consequently, the final sample comprised 698 companies, and a total of 3403 observations.

Readability metrics are calculated from corporate ESG-related reports (include environmental, social, and governance reports, sustainability reports, and corporate social responsibility reports) (refer to Section 3.2.2 for specific calculation details). The annual ESG-related reports are manually downloaded from Juchao Information Network (Juchao Information Network (<http://www.cninfo.com.cn/new/index> accessed on 5 March 2024) is a website designated by the China Securities Regulatory Commission (CSRC) for the disclosure of information on listed companies.), Sina Finance (Sina Finance (<https://finance.sina.com.cn/> accessed on 5 March 2024) is a professional financial portal under Sina.com.), and the official website of each company. In addition, we use the gap between a company's corporate ESG disclosure score and its ESG performance score as a proxy for greenwashing. The ESG disclosure score was from the Bloomberg ESG database. The Bloomberg ESG disclosure score reflects the quantity of ESG data that the company discloses to the public, but does not measure its ESG performance [26]. The ESG performance score was from the SINO ESG database. The SINO ESG rating refers to the mainstream ESG evaluation framework around the world, and considers the reality of China's capital market. The rating ranges from C to AAA, and we reassign values from 1 to 9 with higher values indicating better ESG performance. The data related to other variables are sourced from China Stock Market and Accounting Research database (CSMAR). To mitigate the influence of outliers, continuous variables are curtailed at the 1% and 99% levels.

3.2. Variable Definitions

3.2.1. Dependent Variable: Corporate Greenwashing

Greenwashing refers to the gap between a company's actual ESG performance and its promised ESG performance [71]. Previous studies have employed content analysis, questionnaires, and third-party authentication methods to measure corporate greenwashing. For instance, Zhang [72] and Testa et al. [73] employ content analysis methods to quantify the extent of greenwashing. However, concerns exist regarding the inherent validity of content analysis due to potential human coding errors, and it is also difficult to apply in large-sample studies due to workload. Szabo and Webster utilize questionnaires to examine the motives behind corporate greenwashing [74]. Nonetheless, the limited sample size of the questionnaire data and susceptibility to respondents' subjective intentions require further investigation into the representativeness and authenticity of the findings. In addition, Du explores the role of media in governing greenwashing by focusing on companies listed in the annual greenwashing list published by Southern Weekend [75].

However, the majority of companies listed on the Southern Weekend's greenwashing list pertain to environmental greenwashing aspects, which inadequately represents the extent of greenwashing in ESG [71]. Yu et al. [26] and Zhang [76,77] construct a company's peer-relative greenwashing score based on third-party databases, which benefit from a more substantial sample size and more objective data. Consistent with their work, we gauge corporate greenwashing scores using the gap between a normalized measure representing a company's position relative to its peers in the distribution of the company's ESG disclosure score and a normalized measure representing the company's position relative to its peers in the distribution of its ESG performance score. This peer-relative greenwashing score can be used to quantify the magnitude of a company's greenwashing behavior. The calculation formula is as follows:

$$\text{Greenwashing}_i = \frac{\text{ESG}_{\text{disclosure}_i} - \overline{\text{ESG}_{\text{disclosure}}}}{\sigma_{\text{disclosure}}} - \frac{\text{ESG}_{\text{performance}_i} - \overline{\text{ESG}_{\text{performance}}}}{\sigma_{\text{performance}}} \quad (1)$$

where ESG disclosure is measured by the Bloomberg ESG disclosure score, and ESG performance is measured by the SINO ESG rating score.

3.2.2. Independent Variable: ESG Disclosure Readability

The mainstream literature uses the Gunning Fog Index to measure the readability of the English financial and non-financial reports of a company [15,17,21]. The Gunning Fog Index estimates the number of years of formal education that average readers require to comprehend a text, based on its word and sentence complexity. It considers two factors: the average number of words in each sentence and the proportion of complex words with more than two syllables. However, measuring the readability of ESG reports written in different languages entails fundamental differences. For instance, Yang et al. emphasize substantial differences in format, structure, and content between Petroleum's Chinese ESG report and Shell's English report [78]. Indeed, there is currently no authoritative method to measure the readability of Chinese texts. Most scholars try to use various indicators to make the measurement of readability more reasonable [79,80]. Considering the characteristics of the Chinese language, we incorporate sentence structure and complex vocabulary into the original factors to derive the four calculation equations for a modified Fog Index. These enable a more effective assessment of the complexity of written materials from Chinese listed companies.

First, the calculation steps for the modified Fog Index are as follows.

- (a) Use OCR to convert each downloaded ESG-related report into TXT format and extract relevant information. The TXT format will be read based on the corresponding text information after removing page numbers. Then calculate the total number of words in the report.
- (b) Divide sentences into long or short based on the presence of punctuation, with sentences exceeding 15 characters considered long sentences.
- (c) Concretize the complex words considered in the Gunning Fog Index into Chinese four-character words and idioms, and use downloaded dictionaries to distinguish four-character words and idioms.

Then, we develop the following formula to obtain the result.

$$\text{Fog}_1 = 0.4 \times \left(\text{the number of characters per long sentence} + \frac{\text{long words}}{\text{NCharacters}} \right) \quad (2)$$

$$\text{Fog}_2 = 0.4 \times \left(\text{the number of characters per long sentence} + \frac{\text{long idioms}}{\text{NCharacters}} \right) \quad (3)$$

$$\text{Fog}_3 = 0.4 \times \left(\text{the number of characters per short sentence} + \frac{\text{long words}}{\text{NCharacters}} \right) \quad (4)$$

$$\text{Fog}_4 = 0.4 \times \left(\text{the number of characters per short sentence} + \frac{\text{long idioms}}{\text{NCharacters}} \right) \quad (5)$$

Finally, to facilitate the presentation and interpretation of readability, we calculate the Read score as the modified Fog Index divided by -100 (i.e., $\text{Read}_i = \text{Fog}_i / (-100)$) [17]. This means that higher values of Read_i indicate a greater readability of ESG disclosures.

3.2.3. Control Variables

Following the previous research, for instance, Lin et al. [80] and Pham and Tran [81], we select the following variables for control: board size (BSize), board independence (BIndep), shareholding concentration (Top1), management size (MSize), management shareholding (MHolding), CEO and chair duality (CEOdual), firm size (FSize), Big4 audit firm (BIG4), return on total assets (ROA), growth capacity (Growth), and ownership type (SOE). Table 1 represents the detailed definitions and measurement.

Table 1. Variable definition and measurement.

Type	Variables	Abbreviation	Measurement
Dependent variable	Corporate Greenwashing	GW	A company's peer-relative greenwashing score = (a normalized measure representing a company's relative position to its peers in the distribution of ESG disclosure score) – (a normalized measure representing a company's relative position to its peers in the distribution of ESG performance score)
Independent variables	ESG disclosure readability	Read	A comprehensive readability indicator of ESG disclosure based on the modified Fog Index. Read score is the modified Fog Index divided by -100
Control variables	Board size	BSize	The natural log of the number of board members
	Board independence	BIndep	Number of independent directors/numbers of board members
	Shareholding concentration	Top1	The largest shareholder ownership percentage
	Management size	MSize	The natural log of the total number of senior managers
	Management shareholding	MHolding	Total shareholding ratio of directors, supervisors and senior executives
	CEO and chair duality	CEOdual	If the role of CEO and chair is separated, the value is 0; otherwise, the value is 1
	Firm size	FSize	The natural log of total assets
	Big4 audit firm	BIG4	If the company's reports are audited by a Big4 auditor, the value is 1; otherwise, the value is 0
	Return on total assets	ROA	Net profit/total assets
Growth capacity	Growth	Growth rate of operating income	
Ownership type	SOE	State-owned company is assigned a value of 1, nonstate-owned company is assigned a value of 0	

3.3. Empirical Models

We use the following model to test the effects of ESG disclosure readability on corporate greenwashing.

$$\begin{aligned} \text{GW}_t = & \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 \text{BSize}_t + \beta_3 \text{BIndep}_t + \beta_4 \text{Top1}_t + \beta_5 \text{MSize}_t + \beta_6 \text{MHolding}_t \\ & + \beta_7 \text{CEOdual}_t + \beta_8 \text{FSize}_t + \beta_9 \text{BIG4}_t + \beta_{10} \text{ROA}_t + \beta_{11} \text{Growth}_t \\ & + \beta_{12} \text{SOE}_t + \text{Industry and Year Fixed Effect} + \varepsilon_{i,t} \end{aligned} \quad (6)$$

where GW_t represents the degree of corporate greenwashing in ESG, and $\text{Read}_{i,t}$ represents a readability metric measured by four different measurements. Industry- and year-fixed effects are also incorporated into the regression analysis.

4. Results

4.1. Descriptive Statistics

Table 2 shows the descriptive statistics of variables used in the main model. As can be seen, the mean greenwashing score of the studied companies is 0.211, significantly higher than in previous studies [71,77]. For instance, Zhang [77] reports an average greenwashing score of 0.111 (based on the ESG Reports of 1859 Chinese companies from 2013–2015), and Liao et al. [71] report an average greenwashing score of -0.003 (based on the ESG reports of 9231 Chinese companies from 2015–2021). A standard deviation of 1.145 indicates significant differences in the greenwashing of the sampled companies. The mean (median) Fog₁ and Fog₂ are 16.680 (15.910) and 16.650 (15.890), which fall into the “difficult to read” category. The modified Fog index values are slightly higher than those for the mean Gunning Fog Index (15.80) for the CSR reports of Fortune 500 companies reported in Du and Yu [17], and significantly higher than the mean Gunning Fog Index (11.74) for the sustainability reports of the S&P 300 and S&P Global 300 companies reported in Uddin and Chakraborty [82]. However, the values are not obviously different from the mean of readability (16.81) for the sustainability reports of the top 100 A-share-listed companies in China reported in Sun et al. [23]. These findings indicate that the readability of Chinese A-share-listed companies’ ESG disclosures is relatively poor.

Table 2. Descriptive statistics.

Variable	Number	Mean	Median	SD	Min	Max
GW	3403	0.211	0.109	1.145	−1.962	3.476
Fog ₁	3403	16.680	15.910	3.724	8.843	48.13
Fog ₂	3403	16.650	15.890	3.726	8.819	48.12
Fog ₃	3403	3.847	3.655	0.921	2.525	19.55
Fog ₄	3403	3.825	3.630	0.923	2.507	19.52
Read ₁	3403	−0.166	−0.159	0.0350	−0.303	−0.113
Read ₂	3403	−0.166	−0.159	0.0350	−0.303	−0.113
Read ₃	3403	−0.038	−0.037	0.007	−0.069	−0.029
Read ₄	3403	−0.038	−0.036	0.007	−0.069	−0.029
BSize	3403	2.175	2.197	0.206	1.609	2.708
BIndep	3403	0.378	0.364	0.0550	0.333	0.571
Top1	3403	0.349	0.335	0.150	0.075	0.722
CEOdual	3403	0.201	0	0.401	0	1
MSize	3403	1.906	1.946	0.377	1.099	2.833
Mholding	3403	2.231	2.676	1.071	0	3.077
FSize	3403	0.236	0.235	0.013	0.207	0.270
BIG4	3403	0.145	0	0.352	0	1
ROA	3403	0.043	0.036	0.054	−0.158	0.213
Growth	3403	0.321	0.131	0.743	−0.662	4.705
SOE	3403	0.540	1	0.499	0	1

Notes: GW represents the corporate greenwashing and is calculated as a peer relative score. Fog_i is calculated as the modified Fog Index mentioned above. Read_i is the modified Fog Index for ESG disclosures divided by -100 . Higher values of Read_i indicate better disclosure readability.

4.2. Effect of ESG Disclosure Readability and Corporate Greenwashing

Table 3 reports the results of statistical analyses examining the relationship between ESG disclosure readability and corporate greenwashing. The independent variable in columns (1)–(4) represents the readability metrics for four different modified Fog Index measurements. Recall that the Read_i variable is the modified Fog Index divided by -100 . Hence, higher values of Read_i indicate a higher readability of ESG disclosures. The results show a significant and negative relationship between the readability of ESG disclosures and corporate greenwashing at a 1% level of significance. The coefficients on Read_i are -2.120 , -2.119 , -13.322 , and -13.286 , respectively. Therefore, it can be inferred that companies whose ESG disclosures are more readable have less greenwashing behavior. This finding is

consistent with the voluntary disclosure hypothesis, suggesting that companies use more readable ESG disclosures to convey credible information regarding their ESG performance.

Table 3. The effect of ESG disclosure readability on corporate greenwashing.

Variables	(1)	(2)	(3)	(4)
	GW	GW	GW	GW
Read ₁	−2.120 *** (0.491)			
Read ₂		−2.119 *** (0.491)		
Read ₃			−13.322 *** (2.565)	
Read ₄				−13.286 *** (2.559)
BSize	−0.031 (0.128)	−0.031 (0.128)	−0.035 (0.128)	−0.035 (0.128)
BIndep	−1.245 *** (0.416)	−1.245 *** (0.416)	−1.241 *** (0.415)	−1.241 *** (0.415)
Top1	−0.384 * (0.197)	−0.384 * (0.197)	−0.377 * (0.197)	−0.377 * (0.197)
MSize	−0.125 ** (0.056)	−0.125 ** (0.056)	−0.120 ** (0.056)	−0.120 ** (0.056)
MHolding	−0.043 ** (0.020)	−0.043 ** (0.020)	−0.044 ** (0.020)	−0.044 ** (0.020)
CEOdual	0.034 (0.045)	0.034 (0.045)	0.034 (0.045)	0.034 (0.045)
FSize	15.531 *** (2.687)	15.530 *** (2.687)	15.099 *** (2.685)	15.090 *** (2.685)
BIG4	0.223 *** (0.079)	0.223 *** (0.079)	0.220 *** (0.079)	0.220 *** (0.079)
ROA	−0.321 (0.305)	−0.321 (0.305)	−0.316 (0.305)	−0.316 (0.305)
Growth	−0.018 (0.021)	−0.018 (0.021)	−0.020 (0.021)	−0.020 (0.021)
SOE	−0.181 *** (0.065)	−0.181 *** (0.065)	−0.175 *** (0.065)	−0.175 *** (0.065)
Constant	−3.169 *** (0.721)	−3.168 *** (0.721)	−3.215 *** (0.719)	−3.209 *** (0.719)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	3403	3403	3403	3403
R-squared	0.266	0.266	0.271	0.271

Notes: Year FE and Industry FE represent fixed year and industry effects. “YES” indicates that the variable is controlled. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.3. Conditioning Effect of Information Asymmetry

Information asymmetry occurs when there are information differences across companies and investors. In the following, we further investigate the impact of ESG disclosure readability on corporate greenwashing in the presence of varying degrees of information asymmetry. Based on the median level of information asymmetry, the sample is divided into two groups: companies with a higher degree of information asymmetry and companies with a lower degree of information asymmetry. The estimation is then conducted separately for each subgroup.

Evidence suggests that liquidity is closely related to information asymmetry in the capital market [29]. Therefore, based on the daily frequency transaction data, we represent the information asymmetry index by measuring stock market liquidity. Following the works of Amihud et al. [83], Amihud [84], and Pastor and Stambaugh [85], we construct

the liquidity ratio index, illiquidity ratio index, and yield reversal index to measure stock market liquidity. Both the liquidity ratio index [83] and the illiquidity ratio index [84] employ the interaction between the order flow and stock price to identify liquidity. Pastor and Stambaugh argue that stocks with poor liquidity will exhibit an overshoot in response to order flow [85]. They propose using the yield reversal index as a measure of liquidity. However, considering that each of the aforementioned indicators may fail to fully capture all the characteristics of asymmetric information [86], we conduct principal component analysis on these original indices (i.e., the liquidity ratio index, illiquidity ratio index, and yield reversal index) and use the first principal component to construct the information asymmetry index, ASY. A higher value of the ASY indicates a more severe degree of information asymmetry.

From the estimation coefficients of the variable $Read_1$ in Table 4, it is evident that the ESG disclosure readability exhibits a significant negative correlation with corporate greenwashing when the degree of information asymmetry is used as the grouping basis. Notably, the low information asymmetry group displays a lower $Read_1$ coefficient compared to the high information asymmetry group, with the values being -2.217 and -2.076 , respectively. Furthermore, the statistical significance of these differences is confirmed by the empirical p -value obtained through the Bootstrap method, with a corresponding value of 0.008, indicating significance at the 1% level. The remaining results are interpreted in a similar manner to the previous analysis and, therefore, will not be reiterated here. These findings indicate that the readability of ESG disclosures matters more for companies with high information asymmetry.

Table 4. Correlations of ESG disclosure readability scores with corporate greenwashing scores at high and low levels of information asymmetry.

	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low	(7) High	(8) Low
$Read_1$	-2.217^{***} (0.729)	-2.076^{***} (0.687)						
$Read_2$			-2.217^{***} (0.729)	-2.075^{***} (0.686)				
$Read_3$					-14.258^{***} (3.991)	-13.746^{***} (3.503)		
$Read_4$							-14.224^{***} (3.981)	-13.713^{***} (3.494)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-2.592^{**} (1.008)	-3.173^{***} (0.945)	-2.591^{**} (1.008)	-3.172^{***} (0.945)	-2.745^{***} (1.008)	-3.245^{***} (0.946)	-2.739^{***} (1.008)	-3.238^{***} (0.945)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1702	1701	1702	1701	1702	1701	1702	1701
R-squared	0.233	0.309	0.233	0.309	0.237	0.314	0.237	0.314
Empirical p -values	0.008 ^{***}		0.008 ^{***}		0.099 [*]		0.099 [*]	

Notes: Year FE and Industry FE represent fixed year and industry effects. "YES" indicates that the variable is controlled. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Ruiz-Blanco et al. state that lower levels of information asymmetry are associated with reduced greenwashing [34]. Higher levels of information asymmetry make greenwashing more tempting for companies [87], as engaging in greenwashing allows them to conceal their negative performance. Research indicates that comprehensive ESG disclosure policies can enhance corporate transparency [88]. Companies with more readable ESG disclosures effectively signal their positive non-financial attributes to all stakeholders, thereby reducing information asymmetry [7]. Furthermore, Hesarzadeh and Rajabalizadeh confirm a positive correlation between readability and information efficiency [89] (information efficiency refers to the extent that market prices reflect all relevant information, and it is an important aspect of the quality of capital markets [90]). Evidence shows that corporate greenwashing has a negative impact on stock market efficiency [62]). And this correlation is

stronger for companies facing higher information asymmetry. Consequently, for companies experiencing higher levels of information asymmetry, ESG disclosure readability becomes even more crucial (as the correlation between readability and greenwashing is weaker in companies with lower levels of information asymmetry). Improving the readability of ESG disclosures enables companies to effectively demonstrate their ESG performance to stakeholders and distinguish themselves from those engaged in greenwashing practices.

4.4. Effect of “Code of Corporate Governance for Listed Companies”

In September 2018, the China Securities Regulatory Commission issued the “Code of Corporate Governance for Listed Companies”, which established the fundamental framework for the disclosure of ESG information by listed companies. The Code mandates that listed companies disclose environmental information and fulfill social responsibilities, such as poverty alleviation, in accordance with laws, regulations, and the relevant department requirements. Furthermore, they are expected to disclose information related to corporate governance, regularly analyze the status of their corporate governance, and implement plans and measures to enhance their corporate governance effectively. Therefore, we hypothesize that the correlation between ESG disclosure readability and corporate greenwashing will be weaker after the implementation of the code. To examine the effect of the code, this study uses 2018 as the benchmark and divides the sample into two periods: the pre-implementation period (2015–2017) and the post-implementation period (2019–2021). The grouping outcomes are presented in Table 5.

Table 5. Correlations of ESG disclosure readability scores with corporate greenwashing scores before and after code implementation.

	(1) After	(2) Before	(3) After	(4) Before	(5) After	(6) Before	(7) After	(8) Before
Read ₁	−1.737 *** (0.603)	−3.437 *** (0.913)						
Read ₂			−1.737 *** (0.603)	−3.437 *** (0.913)				
Read ₃					−6.243 ** (2.787)	−28.03 *** (5.834)		
Read ₄							−6.232 ** (2.780)	−27.94 *** (5.820)
Control variables	Yes							
Constant	−3.361 *** (1.009)	−3.042 *** (0.854)	−3.360 *** (1.009)	−3.040 *** (0.854)	−3.318 *** (1.008)	−3.434 *** (0.850)	−3.315 *** (1.008)	−3.436 *** (0.850)
Year FE	Yes							
Industry FE	Yes							
Observations	1580	1350	1580	1350	1580	1350	1580	1350
R-squared	0.256	0.279	0.256	0.279	0.255	0.296	0.243	0.296
Empirical <i>p</i> -values	0.007 ***		0.007 ***		0.000 ***		0.000 ***	

Notes: Considering the heterogeneity of years and the potential collinearity issues resulting from the direct generation of dummy variables, particularly when reducing the year samples, this study manually creates the year dummy variables. In each set of regression analysis, the earliest year dummy variables in the group are intentionally excluded as a reference benchmark to avoid complete collinearity issues and ensure the reliability and validity of the results. Year FE and Industry FE represent fixed year and industry effects. “YES” indicates that the variable is controlled. Standard errors in parentheses. ** $p < 0.05$, *** $p < 0.01$.

Our analysis reveals that the coefficients on Read_{*i*} in the post-implementation period are lower than those in the pre-implementation period (i.e., the absolute value of the coefficients on Read_{*i*} in the post-implementation period are greater). The empirical *p*-values obtained through the Bootstrap method are all below 0.01, thus confirming the statistical significance of these differences. These findings suggest that, after implementation of the code, which standardized the framework for corporate ESG disclosure, disclosures are more readable. Consequently, the relationship between report readability and greenwashing is weaker.

As highlighted in Chapters 8 and 9 of the code, strengthening communication with stakeholders is important. The voluntary disclosure of information should be fair, continuous, and consistent, and should not be selective. Moreover, the information disclosed by the information disclosure obligors should be concise, clear, and easy to understand. Therefore, the implementation of this code has undoubtedly guided companies in improving the quality of ESG disclosure (including readability and completeness).

4.5. Robustness Test

4.5.1. Alternative Measures of Readability

One of the crucial factors impacting the conclusion of this study is the measurement of readability. Indeed, several scholars argue that using the number of words in a document as a quantitative measure of reading has limitations, as it encompasses factors other than readability [82]. Loughran and McDonald [44] also criticize the notion that words with a large number of letters are necessarily complex, as some lengthy words have become widely used in society and are no longer considered complex (e.g., jargon). Therefore, we reassess the readability indicators to demonstrate the robustness of the main results. We consider two measures of Chinese readability. The first approach refers to the Chinese readability index developed by Xu et al. [79]. The specific formula is as follows:

$$\text{Readability} = (\text{words per clause} + \text{percent of adverbs and conjunctions in each sentence}) \times 0.5 \quad (7)$$

The words per clause and the percentage of adverbs and conjunctions in each sentence are adjusted using annual industry averages. Another approach is to utilize UCDensity as a measure of readability. UCDensity refers to the frequency of subcommon words based on the “List of Subcommon Words in Modern Chinese”. In the revised model, the greenwashing score continues to serve as the dependent variable. The results are shown in Table 6, and the Xu et al. readability index and UCDensity coefficients are significantly negative at the 5% and 10% level, which is consistent with the main analysis results.

Table 6. The effect of ESG disclosure readability on corporate greenwashing using alternative readability measures.

Variables	(1)	(2)
	GW	GW
Xu et al. [79] readability index	−0.0001 ** (0.000)	
UCDensity		−0.092 * (0.054)
BSize	−0.106 (0.136)	−0.096 (0.136)
BIndep	−1.567 *** (0.443)	−1.606 *** (0.443)
Top1	−0.278 (0.209)	−0.270 (0.209)
MSize	−0.104 * (0.060)	−0.107 * (0.060)
Mholding	−0.042 * (0.021)	−0.043 ** (0.021)
CEOdual	0.044 (0.048)	0.049 (0.048)
FSize	17.488 *** (2.821)	17.933 *** (2.822)
BIG4	0.203 ** (0.086)	0.188 ** (0.086)
ROA	−0.415 (0.320)	−0.408 (0.320)

Table 6. Cont.

Variables	(1)	(2)
	GW	GW
Growth	−0.011 (0.023)	−0.009 (0.023)
SOE	−0.153 ** (0.069)	−0.156 ** (0.069)
Constant	−3.154 *** (0.757)	−3.050 *** (0.762)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	2942	2942
R-squared	0.149	0.148

Notes: Year FE and Industry FE represent fixed year and industry effects. “YES” indicates that the variable is controlled. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.5.2. Instrumental Variable (IV) Regression

This study explores the possibility of reverse causality, wherein companies with higher levels of greenwashing may be more inclined to release ESG disclosures with poorer readability. To address this issue, we perform a two-stage regression using the number of shares held by “broad ESG investment funds” (ESGQ) and the firm market value held by these funds (ESGFV) as instrumental variables. The regression results for the IV analysis can be found in Table 7. The first-stage regression results are presented in columns (1) and (3). The coefficients for ESGQ and ESGFV are statistically significant at the 1% level, indicating a strong correlation between a company being held by “broad ESG investment funds” and its ESG disclosure readability. This aligns with our initial expectations. The second-stage regression results are presented in columns (2) and (4). The estimated coefficients are significantly negative, indicating that, even after controlling for potential endogeneity issues through instrumental variables, the findings remain strong. The results based on the other two variables, $Read_3$ and $Read_4$, also exhibit robustness but are not reported to save space.

Table 7. Instrumental variable regression results.

Variables	First Stage	Second Stage	First Stage	Second Stage
	$Read_1$	GW	$Read_2$	GW
ESGQ	0.004 *** (0.001)		0.004 *** (0.001)	
ESGFV	−0.003 *** (0.001)		−0.003 *** (0.001)	
Read		−26.110 *** (9.527)		−26.034 *** (9.527)
Contra variables	Yes	Yes	Yes	Yes
Constant	−0.048 *** (0.015)	−4.383 *** (0.741)	−0.048 *** (0.015)	−4.367 *** (0.737)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	3397	3397	3397	3397
R-squared	0.210	0.210	0.210	0.210
Durbin (score) chi2		✓		✓
Wu-Hausman F		✓		✓

Table 7. Cont.

Variables	First Stage	Second Stage	First Stage	Second Stage
	Read ₁	GW	Read ₂	GW
Weak instrument test		✓		✓
Estate overid		✓		✓

Notes: ESGQ represents the number of shares held by “broad ESG investment funds”, while ESGFV represents the market value of shares held by these funds. The Durbin–Wu–Hausmann test indicates the presence of endogeneity. The weak instrument test indicates that the instrumental variables used in an analysis have a strong correlation with the endogenous variable. The overidentifying test is conducted on all instrumental variables in the model and suggests that both instrumental variables are strictly exogenous. “✓” represents passing the test. Year FE and Industry FE represent fixed year and industry effects. “YES” indicates that the variable is controlled. Standard errors in parentheses. *** $p < 0.01$.

4.5.3. Heckman’s (1979) Two-Stage Model

Since our sample only includes companies that issue stand-alone ESG-related reports, there may be potential sample selection bias. We perform Heckman’s two-stage technique to account for this endogeneity [91]. Specifically, we estimate the following Probit model in the first stage. This model is used to predict the probability of a company voluntarily publishing an ESG report.

$$\begin{aligned}
 MD_t = & \beta_0 + \beta_1 CEC_t + \beta_2 BSize_t + \beta_3 BIndep_t + \beta_4 Top1_t + \beta_5 MSize_t + \beta_6 M Holding_t \\
 & + \beta_7 CEOdual_t + \beta_8 FSize_t + \beta_9 BIG4_t + \beta_{10} ROA_t + \beta_{11} Growth_t \\
 & + \beta_{12} SOE_t + \text{Industry and Year Fixed Effect} + \varepsilon_{i,t}
 \end{aligned}
 \tag{8}$$

MD_t is a dummy variable representing the company’s willingness to disclose its ESG report. It takes a value of 1 if the company follows regulatory disclosure requirements, and 0 if it engages in voluntary disclosure. The independent variable is the cost of equity capital (calculated using the Ohlson and Juettner-Nauroth model [92]), which has been demonstrated to be a determinant of ESG disclosure [7]. The Ohlson and Juettner-Nauroth model is as follows: $R_e = A + \sqrt{A^2 + \frac{EPS_{t+1}}{P_t} [g - (\gamma - 1)]}$, $g = \frac{EPS_{t+2} - EPS_{t+1}}{EPS_{t+1}}$, $A = \frac{[(\gamma - 1) + \frac{DPS_{t+1}}{P_t}]}{2}$, where R_e is the cost of equity capital, P_t is the per share price of t period, EPS_{t+m} stands for the expected earnings per share for the period $t + m$. DPS_{t+m} stands for the expected dividend per share for the period $t + m$, calculated by $EPS_{t+m} \times K$. K is the average dividend payout ratio for the past three years of the target year. Long-term growth rate $(\gamma - 1)$ refers to the average growth rate of the overall economy over a significant period of time. For specific derivation details, please refer to Ohlson and Juettner-Nauroth [92]. The control variables are the same as those in model (6).

The results are reported in Table 8, where we can see that the ESG disclosure readability exhibits a significant and negative correlation with greenwashing at the 5% level. The no-significant-Imr coefficient also indicates that there is no serious sample selection bias in the original model ($p = 0.101 > 0.1$). These results reinforce the findings of our study.

Table 8. Heckman test used to correct for self-selection bias.

Panel A: Determinants of Issuance of ESG Disclosures			
	Dependent Var = MD		
	Coefficient		p -value
CEC	−2.307		0.020
BSize	−0.008		0.957
BIndep	2.364		0.000
Top1	−0.338		0.098
MSize	0.262		0.000
Mholding	−0.011		0.721
CEOdual	0.022		0.754
FSize	40.124		0.000

Table 8. Cont.

Panel A: Determinants of Issuance of ESG Disclosures			
Dependent Var = MD			
	Coefficient	p-value	
BIG4	0.142	0.085	
ROA	3.598	0.000	
Growth	−0.005	0.193	
SOE	0.289	0.000	
Industry and year dummies	Yes		
Pseudo R2	0.150		
Likelihood ratio	−1556.974		
No. of observations with dep. var. = 1	2649		
No. of observations	3403		
Panel B: The Second Stage Estimation Results			
Dependent Var = GW			
	Coefficient	p-value	
Read _i	−1.295134	0.026	
Imr	−0.137021	0.101	
Control variables	Yes		
Fixed industry and year effects	Yes		
R-squared	0.045		
No. of observations	2649		

Notes: Panel A shows the determinants of companies' willingness to issue ESG disclosures in the first stage. Panel B shows the results in the second stage. MD is a dummy variable, equal to one if the company follows regulatory disclosure requirements, and zero otherwise. CEC is the cost of equity capital, which is calculated using the Ohlson and Juettner-Nauroth model [92]. $p < 0.1$, $p < 0.05$, $p < 0.01$ denote significance at the 10%, 5%, and 1% levels, respectively.

4.6. Effect of ESG Disclosure Readability on Future Corporate Greenwashing

The preceding findings demonstrate that there is a negative correlation between ESG disclosure readability and corporate greenwashing. Given the long-term orientation of ESG disclosures, can readability also be used as a predictive indicator for the probability of future corporate greenwashing? We answer this question by investigating the association between ESG disclosure readability and the level of future corporate greenwashing. We employ the following model to examine the effects of the ESG disclosure readability score on 1-year-ahead and 2-year-ahead greenwashing scores.

$$\begin{aligned}
 GW_{t+1} = & \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 GW_t + \beta_3 GW_{t-1} + \beta_4 B\text{Size}_t + \beta_5 B\text{Indep}_t + \beta_6 \text{Top}1_t + \beta_7 M\text{Size}_t + \beta_8 M\text{Holding}_t \\
 & + \beta_9 \text{CEO}dual_t + \beta_{10} F\text{Size}_t + \beta_{11} \text{BIG}4_t + \beta_{12} \text{ROA}_t + \beta_{13} \text{Growth}_t \\
 & + \beta_{14} \text{SOE}_t + \text{Industry and Year Fixed Effect} + \varepsilon_{i,t}
 \end{aligned} \quad (9)$$

Model (9) tests the effect of readability on the 1-year-ahead greenwashing score, where GW_{t+1} , GW_t , and GW_{t-1} are companies' greenwashing scores for year $t + 1$, t , and $t - 1$, respectively. To test the effect of readability on the 2-year-ahead greenwashing score, simply change the GW_{t+1} to GW_{t+2} on the left side of model (9).

Table 9, Panel A, presents the impact of ESG disclosure readability on the 1-year-ahead corporate greenwashing level. The coefficient on Read_i is negative, suggesting that a higher readability of ESG disclosures is indicative of a lower corporate greenwashing level in the future. We also test whether ESG disclosure readability has implications for 2-year-ahead corporate greenwashing in Table 9, Panel B. The results indicate that a higher readability of ESG disclosures is also associated with a lower 2-year-ahead greenwashing level.

Table 9. The effect of ESG disclosure readability on future corporate greenwashing.

Panel A: 1-Year-Ahead Corporate Greenwashing				
	Dependent Var = GW_{t+1}			
	(1)	(2)	(3)	(4)
Read ₁	−1.066 ** (0.414)			
Read ₂		−1.067 ** (0.414)		
Read ₃			−4.854 ** (2.344)	
Read ₄				−4.897 ** (2.339)
GW _t	0.725 *** (0.019)	0.725 *** (0.019)	0.726 *** (0.019)	0.726 *** (0.019)
GW _{t−1}	−0.021 (0.019)	−0.021 (0.019)	−0.022 (0.019)	−0.022 (0.019)
BSize	0.107 (0.081)	0.107 (0.081)	0.099 (0.081)	0.099 (0.081)
BIndep	−0.310 (0.285)	−0.310 (0.285)	−0.325 (0.285)	−0.325 (0.285)
Top1	−0.186 * (0.105)	−0.186 * (0.105)	−0.173 (0.105)	−0.173 (0.105)
MSize	−0.054 (0.038)	−0.054 (0.038)	−0.051 (0.038)	−0.051 (0.038)
Mholding	−0.004 (0.014)	−0.004 (0.014)	−0.004 (0.014)	−0.004 (0.014)
CEOdual	0.024 (0.036)	0.024 (0.036)	0.025 (0.036)	0.025 (0.036)
BIG4	0.167 *** (0.045)	0.167 *** (0.045)	0.165 *** (0.045)	0.165 *** (0.045)
ROA	−1.726 *** (0.260)	−1.726 *** (0.260)	−1.708 *** (0.260)	−1.709 *** (0.260)
FSize	4.927 *** (1.435)	4.925 *** (1.435)	5.075 *** (1.431)	5.067 *** (1.431)
Growth	−0.014 (0.019)	−0.014 (0.019)	−0.014 (0.019)	−0.014 (0.019)
SOE	−0.071 ** (0.034)	−0.071 ** (0.034)	−0.074 ** (0.034)	−0.074 ** (0.034)
Constant	−1.035 *** (0.378)	−1.035 *** (0.378)	−1.066 *** (0.379)	−1.065 *** (0.379)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	2703	2703	2703	2703
R-squared	0.704	0.704	0.704	0.704
Panel B: 2-Year-Ahead Corporate Greenwashing				
	Dependent Var = GW_{t+2}			
	(1)	(2)	(3)	(4)
Read ₁	−1.523 ** (0.695)			
Read ₂		−1.526 ** (0.695)		
Read ₃			−12.647 *** (4.598)	
Read ₄				−12.700 *** (4.589)
GW _t	0.309 *** (0.025)	0.309 *** (0.025)	0.306 *** (0.025)	0.306 *** (0.025)

Table 9. Cont.

Panel B: 2-Year-Ahead Corporate Greenwashing				
	Dependent Var = GW_{t+2}			
	(1)	(2)	(3)	(4)
GW_{t-1}	0.016 (0.026)	0.016 (0.026)	0.013 (0.026)	0.013 (0.026)
BSize	0.232 * (0.133)	0.232 * (0.133)	0.218 (0.133)	0.218 (0.133)
BIndep	0.082 (0.456)	0.082 (0.456)	0.061 (0.456)	0.061 (0.456)
Top1	−0.413 ** (0.186)	−0.413 ** (0.186)	−0.402 ** (0.186)	−0.402 ** (0.186)
MSize	0.000 (0.062)	0.000 (0.062)	0.003 (0.062)	0.003 (0.062)
Mholding	−0.017 (0.022)	−0.017 (0.022)	−0.019 (0.022)	−0.019 (0.022)
CEOdual	−0.018 (0.056)	−0.018 (0.056)	−0.018 (0.056)	−0.018 (0.056)
FSize	10.179 *** (2.544)	10.177 *** (2.544)	10.138 *** (2.542)	10.122 *** (2.543)
BIG4	0.334 *** (0.079)	0.334 *** (0.079)	0.328 *** (0.079)	0.328 *** (0.079)
ROA	−2.377 *** (0.377)	−2.377 *** (0.377)	−2.381 *** (0.376)	−2.382 *** (0.376)
Growth	−0.034 (0.026)	−0.034 (0.026)	−0.035 (0.026)	−0.035 (0.026)
SOE	−0.200 *** (0.060)	−0.200 *** (0.060)	−0.205 *** (0.060)	−0.205 *** (0.060)
Constant	−2.366 *** (0.668)	−2.365 *** (0.668)	−2.534 *** (0.673)	−2.529 *** (0.673)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	2175	2175	2175	2175
R-squared	0.488	0.488	0.488	0.489

Notes: Panel A and B show the effects of ESG disclosure readability on 1-year-ahead and 2-year-ahead corporate greenwashing, respectively. Panel A uses data for 6 years, while Panel B uses data for 5 years. GW_{t+2} , GW_{t+1} , GW_t , and GW_{t-1} are companies' greenwashing scores for year $t + 2$, $t + 1$, t , and $t - 1$, respectively. Year FE and Industry FE represent fixed year and industry effects. "YES" indicates that the variable is controlled. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The empirical results suggest that corporate ESG disclosure readability serves as a reliable indicator of the future level of corporate greenwashing. Specifically, higher readability corresponds to lower future levels of corporate greenwashing.

5. Discussion and Conclusions

This paper aims to provide assistance to investors in making well-informed investment decisions by establishing a connection between ESG disclosure readability and corporate greenwashing. Using a dataset of Chinese A-share-listed companies that have published stand-alone ESG reports from 2015 to 2021, we find that a higher readability of ESG disclosures is indicative of a lower level of corporate greenwashing. In addition, this negative relationship is particularly pronounced in companies with high levels of information asymmetry. However, the relationship is weaker after 2018, when the "Code of Corporate Governance for Listed Companies" was implemented. And the results have passed a series of robustness tests. Further analysis indicates a significant negative relationship between ESG disclosure readability and future greenwashing scores. This result also implies that investors can use the readability of corporate ESG disclosures as a preliminary assess-

ment tool to gauge the extent of greenwashing and the authenticity of a company's ESG performance.

Our study supports both stakeholder theory and voluntary disclosure theory, indicating that corporate ESG disclosure serves as a positive signal to demonstrate good financial and non-financial performance to stakeholders, particularly investors. High-quality ESG disclosures are essential to investors in evaluating risks, identifying opportunities, and making well-informed investment decisions. If the information presented in ESG disclosures is difficult to comprehend, investors relying on these low-readability disclosures may feel uneasy when assessing companies [93]. Previous studies have demonstrated that institutional investors prefer to hold shares in companies with a better ESG performance [94,95]. Particularly during market downturns, institutional investors respond more positively to the quality of corporate disclosures compared to normal market periods [96]. Therefore, in order to effectively communicate corporate ESG information to stakeholders and convey positive signals from companies, it is imperative that ESG reports are presented in a more readable manner.

Our study has several practical implications. First, this study reveals that the readability of disclosures in Chinese companies is significantly lower than that of globally excellent companies. Regulatory agencies and policy makers must urgently address the issue of improving the quality of Chinese companies' ESG disclosures. Second, the issue of corporate greenwashing has long been a concern in the capital market. However, the diversity of concepts and means of greenwashing make it challenging for stakeholders to determine whether a company is involved in greenwashing. The evidence presented in this study provides a preliminary method to identify greenwashing.

This study also suffers from limitations. First, the research sample is limited to the Chinese market, which may restrict the generalizability of the findings. Therefore, these results should be interpreted with caution in countries with different institutional contexts. To enhance the validity and generalizability of these conclusions, future research could expand this study to include a broader geographical region or specific types of companies. Second, this study only provides a preliminary exploration of the relationship between ESG disclosure readability and the level of corporate greenwashing. Further research can delve deeper into the underlying mechanisms of this relationship. At the same time, the relationship between readability and greenwashing needs to be dynamically monitored. If there are more recent data, further research can be conducted as the data accumulate. Finally, this study employs the modified Fog Index as a measure of readability for Chinese texts, which may not be sufficient to fully capture the complexity of Chinese ESG disclosures. Indeed, readability is fundamentally subjective, and the modified Fog Index does not provide an absolute measure of how difficult a text is to understand. Our Fog Index may overlook other important aspects of ESG disclosure readability, such as jargon usage. Previous research has employed various other methods, including analyzing the vocabulary, sentence, text, length, table of contents, and charts within reports [80]. The most appropriate method to measure the readability of Chinese text remains to be considered.

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