Heliyon 9 (2023) e20974

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Review article

ESG performance, investor attention, and company reputation: Threshold model analysis based on panel data from listed companies in China

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ARTICLE INFO

Keywords:
ESG performance
Company reputation
Investor attention
Threshold effect
Chinese listed companies

ABSTRACT

Amid heightened inter-company competition and the global drive towards ESG reforms, this study investigates whether enhancing the ESG performance of listed companies in China assists in elevating their reputation. It also examines the mediating role of investor attention in the relationship between ESG performance and company reputation, and further delves into whether there's a threshold effect of investor attention on the ESG-performance relationship. Utilizing sample data from Chinese listed companies spanning 2011 to 2021, and employing methods such as the panel two-way fixed-effects regression model, mediation effect testing, and threshold effect models, the study reveals that there is a significant positive relationship between ESG performance and the reputation of these companies. Moreover, a unique threshold effect is observed in the relationship between ESG performance and reputation. Innovatively, our research confirms the mediating role of investor attention in the relationship between ESG performance and company reputation, noting a more pronounced mediation effect in non-state-owned companies as opposed to state-owned ones. This study builds upon the existing literature on the relationship between CSR and company reputation, as well as between investor attention and reputation. By elucidating the mediating role of investor attention and its dual threshold effect, we provide a nuanced perspective on how ESG performance influences company reputation. Practically speaking, this research offers strategic recommendations for companies, investors, and regulators in the Chinese market on reputation management aligned with ESG principles. For instance, companies should prioritize their ESG performance, striving to maintain it above the market average, thus optimizing its effect on their reputation. Furthermore, companies should nurture their relationships with investors, aiming to elevate investor attention above the market mean. Policymakers should encourage companies to bolster their ESG performance, even contemplating more rewards and incentives for those with notable ESG achievements. Lastly, auditors should intensify their focus on non-financial information during audits, especially ensuring the accuracy and completeness of a company's ESG reports.

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https://doi.org/10.1016/j.heliyon.2023.e20974
Received 8 July 2023; Received in revised form 11 October 2023; Accepted 12 October 2023
Available online 14 October 2023
2405-8440/

1. Introduction

Since the introduction of the ESG (Environmental, Social, and Governance) concept by the United Nations Principles for Responsible Investment (UN-PRI) in 2006, the global enthusiasm for ESG has long surpassed the phase of mere conceptual popularization, and the idea of sustainable development is gaining widespread agreement and is progressively being integrated into the economic realm [1]. According to Bloomberg, the global scale of ESG assets reached $37.8 trillion in 2021 and is expected to exceed $53 trillion by 2025. The ESG philosophy advocates that companies should aim to achieve long-term sustainable development and create value for shareholders and society. In recent decades, publicly traded companies have increasingly adopted environmental, social, and governance (ESG) disclosures [2]. For investors, ESG emphasizes corporate social performance and shareholder returns, helping investors quantitatively measure the sustainability of corporate development, making it a crucial focus for them. In China, although ESG investment started relatively late, it has become a hot topic in the Chinese market. In China's capital market, the China Securities Regulatory Commission (CSRC) is gradually strengthening the ESG information disclosure requirements for listed companies. Although there are some guidelines and recommendations encouraging listed companies to disclose ESG information, it has not yet become a mandatory legal requirement. However, as the Chinese government is gradually increasing its emphasis on corporate environmental and social responsibilities, and with [1]the ongoing implementation of the "dual carbon" targets,[1] the scenario where ESG information becomes mandatory for listed companies and where they actively fulfill ESG practices may soon arrive. However, despite the annual growth of ESG investment in China,[2] There are still many challenges and problems, such as the lack of transparency in ESG information, few companies participating in disclosure, low investor attention, and inconsistency in the quality of companies' ESG reports. These issues have significant implications for investors' decisions, companies' reputations, and the sustainable development of the entire market.

ESG has evolved from the broader concept of Corporate Social Responsibility (CSR). From a corporate finance perspective, scholars have extensively researched the economic ramifications of ESG. For instance, studies have examined ESG's effects on a company's value [3–5], profitability [6], financial constraints [7], financing capability [8], innovation capacity [9], and risk management competency [10]. The majority of these studies yield positive outcomes. In general, companies actively participating in ESG initiatives have the capacity to sustain a competitive edge, demonstrate multifaceted sustainability, and enhance their long-term value. A robust reputation is a pivotal asset for a company to attain and sustain a competitive advantage [11], A company's reputation refers to the perception, evaluation, and expectations of the public, customers, investors, employees, stakeholders, and other parties regarding the company. Put simply, it represents the company's image or standing in the external environment. This reputation is invaluable due to its potential to create value, and its intangible nature makes it challenging for competitors to replicate [12]. Hence, refining reputation management is crucial for a company's survival and progression. Previous research indicates that corporate citizenship behaviors and the adoption of social responsibility strategies can bolster a company's reputation [13]. The attention from investors is a potential significant source of corporate reputation [14]. If a company garners substantial investor attention, it might be perceived as a positive indicator of promising prospects, thereby enhancing its reputation [15]. Moreover, attracting vast investor attention can mitigate information asymmetry [16], as more investors would scrutinize the company [17], elevating its reputation.

Existing research has elucidated the relationship between CSR and corporate reputation [18,19] and between investor attention and reputation [20]. However, as ESG encapsulates a novel philosophy for achieving sustainable growth and broadly signifies an extension of CSR, how might it influence corporate reputation? If such an influence exists, does the factor of investor attention play a mediating role? There's scant literature on these questions currently. Thus, this study seeks to investigate if and how ESG performance impacts company reputation, and the role of external investor attention in this relationship. In China's capital market, external investors play a vital role. Given the policy guidelines by the China Securities Regulatory Commission emphasizing ESG investment, the majority of listed Chinese companies prioritize ESG information in their communications with target firms. Hence, exploring the interplay between ESG performance, investor attention, and company reputation holds significant theoretical and practical implications for investors, companies, policymakers, and the advancement of social responsibility and sustainability.

This study uses balanced panel data from listed companies on the China A-share market from 2011 to 2021. It first employs the fixed effects model to examine the correlation between companies' ESG performance and their reputations and further tests the robustness and endogeneity of this conclusion. Additionally, the research uses ESG performance as a threshold variable to explore whether there's a threshold effect in the impact of ESG performance on a company's reputation. The study then applies stepwise regression, Sobel tests, and Bootstrap methods to further verify the mediating role of investor attention in the process of ESG performance enhancing company reputation. Finally, taking investor attention as the threshold variable, the research probes into whether a threshold effect exists in the influence of ESG performance on a company's reputation. Potential contributions of this paper include the following: Firstly, there is limited research in academia discussing the impact of ESG performance on company reputation, and

[1] China has pledged to reach peak carbon emissions before 2030, meaning that by 2030, the total amount of carbon emissions in China will no longer increase but will instead start to gradually decrease. Additionally, China has committed to achieving carbon neutrality by 2060, meaning that by 2060, China will achieve net-zero carbon emissions, i.e., the amount of carbon emitted by China will be balanced by the amount of carbon that can be absorbed.

[2] Annual ESG Action Report released in Beijing on 13 June at the "China ESG (Corporate Social Responsibility) Launch" event reported that by 2025, the scale of ESG assets in China will reach $53 trillion, accounting for one-third of the global asset management scale.

[3] Companies marked as ST (Special Treatment) and ST in the Chinese stock market are usually in financial distress or have lost money for two consecutive years. These companies may have abnormal financial data and may be at risk of delisting themselves.

even fewer exploring the underlying mechanisms. This paper reveals the influence of ESG performance on company reputation and the mediating effect of investor attention in the relationship between ESG performance and company reputation. Such findings enrich and extend the theoretical system of ESG, holding certain theoretical significance. Secondly, this study adopts the threshold effect model to further explore the threshold effect between ESG performance and company reputation, adding depth to the research and providing innovative methodologies. Lastly the findings of this study offer policy recommendations for various stakeholders. Specifically, listed companies in China should prioritize their ESG performance and focus on cultivating relationships with investors, aiming to elevate both their ESG performance level and the attention they receive from investors above the market average, to maximize their reputation enhancement. Investors are advised to place increasing reliance on ESG information when valuing companies, especially those who place a premium on corporate social responsibility and reputation. For policymakers, there's a call to encourage firms to enhance their ESG performance, complemented by appropriate rewards and incentives. As for auditors, there's an emphasis on the importance of verifying non-financial data, particularly ensuring the accuracy and completeness of a company's ESG reports during audit processes. These policy suggestions carry significant practical implications for the promotion and standardization of ESG investment development.

The arrangement for the remaining sections is as follows: Section Two encompasses literature review and theoretical analysis, Section Three details the research data and variables, Section Four presents empirical analysis results, and the final section concludes the entire paper.

2. Literature review and theoretical analysis

2.1. ESG and reputation

Scholars globally have extensively studied ESG at the corporate level, with the majority focusing on its economic consequences. Although the direct link between ESG and corporate reputation hasn't been deeply explored in academia, CSR, which can be considered a precursor to ESG, offers valuable insights into this matter. Both CSR and ESG relate to a company's social and environmental performance. The latter, however, places more emphasis on assessing a company's performance in environmental, social, and governance aspects and its long-term value. Some academic research suggests that the two concepts have overlapping meanings [21]. For instance, a study within Indonesia's cement industry discovered that a company's perception of CSR significantly influences its reputation, organizational commitment, and consumers' purchase intentions [22]. Similarly, research from Serbia also validated the positive correlation between CSR and corporate reputation [23]. Additionally, a study in China's restaurant industry delved into how a company's CSR efforts shape its standing within the community [24]. These studies collectively indicate that CSR is a pivotal predictor of a firm's reputation. From an external driver perspective, consumers' awareness of CSR can shape their trust in a company's brand, subsequently influencing their overall attitude towards the company [25]. From the specific dimensions of ESG: environmental, social, and governance, it has been demonstrated that for companies listed on the Tehran Stock Exchange, Environmental Sustainability Reporting (ESR), Social Sustainability Reporting (SSR), and Governance Sustainability Reporting (GSR) all positively influence the company's reputation [26]. Moreover, a study focused on companies in Malaysia discovered a positive correlation between a company's sustainability practices and its reputation [27]. Moreover, while the academic community has not directly discussed the connection between ESG and reputation, studies have already demonstrated that a company's reputation plays a mediating role in the relationship between ESG performance and debt costs [28]. Additionally, corporate reputation has been shown to mediate the significant positive impact of ESG on investment decisions [29]. These findings provide evidence for the significant relationship between ESG performance and company reputation that this article urgently seeks to explore.

Stakeholder theory emphasizes that the sustainable development of a company is intricately linked to its high-quality response to the demands and expectations of various stakeholders, such as shareholders, employees, consumers, and the natural environment [30]. Corporate reputation is not only a valuable and irreplaceable unique asset but also reflects stakeholders' comprehensive evaluation of a company's past actions and future prospects. This assessment mirrors the stakeholders' intuitive perception of how the company addresses their expectations, which in turn influences their future interactions with the company [31]. From this perspective, when a company meets the expectations of its stakeholders and protects their interests, its reputation is enhanced. ESG, as a manifestation of a company's social responsibility and legitimacy to stakeholders, underscores the company's efforts and focus on environmental, social, and governance aspects. Through these contributions, a company not only meets the expectations of various stakeholder groups but also accumulates reputational capital for itself, attracting and encouraging stakeholders to contribute their resources for the company's long-term success [32]. Thus, a company's exemplary performance in ESG can help boost its reputation, whereas poor ESG performance might tarnish it [33]. Based on the aforementioned analysis, this article proposes its first research hypothesis.

H1a. There is a positive correlation between a company's ESG performance and its reputation.

Existing research has indicated that not all social responsibility investments yield positive outcomes. It's only when firms achieve an optimal performance level that such investments prove beneficial for the company [34]. Additionally, literature associated with reputation often delves into the dual nature of reputation, considering both the opportunities and risks it presents [35]. In line with the stakeholder theory, a company's reputation is predicated upon its capacity to cater to the needs and expectations of its myriad stakeholders. Yet, within the context of ESG, diverse stakeholders such as investors, consumers, and employees might harbor distinct needs and expectations. Certain studies underscore that these stakeholder expectations can evolve over time and vary across cultures [36]. As such, a company's ESG performance might have to adapt to these shifts, attaining a particular threshold to meet the majority of stakeholder needs and expectations, thereby bolstering its reputation. However, falling below this threshold could potentially tarnish the company's reputation. Consequently, this paper aims to explore the potential threshold effect between ESG performance and company reputation, a domain yet to be exhaustively researched.

H1b. The impact of ESG performance on company reputation exhibits a threshold effect at different levels of ESG performance.

2.2. ESG, investor attention and company reputation

Currently in the academic community, there is no direct research exploring the relationship between ESG performance, investor attention, and company reputation. Investor attention has become a focal point in behavioral finance, with existing research extensively demonstrating its influence across various aspects of the financial market. For instance, studies have shed light on the role of investor attention in predicting fluctuations in global asset prices [37]. In the Bitcoin market, investor attention has been identified as a Granger cause for returns and realized volatility shifts [38]. Furthermore, research on multinational corporations revealed that due to regional variances among investors, identical multinational companies can have significantly divergent ESG evaluations across different regions [39]. A study focused on the Thailand Stock Exchange asserted that heightened investor attention enhances the market performance of ESG stocks [40]. However, research regarding the impact of investor attention on a company's ESG performance remains sparse, but it's suggested that investor attention can augment ESG performance by bolstering information transparency and alleviating financing constraints [41]. All these studies collectively substantiate the existence of a relationship between ESG activities and investor attention.

The potential role of investor attention can be elucidated through the lens of information transmission and signal theory [42], stakeholder theory [43], and social identity theory [44]. According to signal theory, companies emit particular signals via specific behaviors to differentiate themselves and gain a competitive edge in the market [15]. Through ESG initiatives, companies convey their commitment and attention to environmental, social, and governance issues to the external world. This transmission of information can be interpreted as a signal, asserting the company's responsibility and trustworthiness. Here, the focus of investors acts as a conduit, magnifying and relaying this signal. When there is heightened investor attention, this signal is proliferated more broadly, subsequently bolstering the company's reputation. Concurrently, investors, being significant stakeholders of the company, mirror their assessments and anticipations of the company. Witnessing the active participation of a company in ESG initiatives, they may elevate their appraisal of the company, considering the ESG performance as a pivotal factor in assessing future risks and returns, thus enhancing the company's reputation [14]. In this context, the focus of investors plays a pivotal role in echoing and conveying stakeholder evaluations. Additionally, the reputation of a company is, to some extent, contingent upon societal acknowledgment and acceptance. Being an integral part of society, the attention from investors exemplifies the degree of societal approval bestowed upon the company. Therefore, when investor attention surges, it signifies heightened societal endorsement of the company, augmenting its reputation [45]. In essence, investor attention might serve as a mediating factor in the relationship between ESG and a company's reputation. It can both amplify and relay the positive signals disseminated by the company through ESG initiatives and mirror and convey the degree of societal acknowledgment the company receives, thereby influencing its reputation. Based on the foregoing discussion, this paper posits the second hypothesis.

H2. Investor attention has a mediating effect in the relationship between company ESG performance and company reputation.

Additionally, based on the stakeholder theory, this study posits that a company's ESG performance can bolster its reputation. However, a company's reputation is derived from stakeholders' perceptions of its past behaviors [46]. The strength of these perceptions can be influenced by various factors, such as the frequency of company information disclosures, the transparency of the information [47], market and economic conditions, the regulatory environment, and the factor of investor attention that this paper aims to explore. Drawing upon theories of information asymmetry, signaling, cognitive salience, and stakeholder theory, it is argued that in the presence of information asymmetry, companies may send signals through their ESG reports to showcase their commitment to social responsibility and environmental sustainability. When investor attention rises, these signals could become more potent [15]. Moreover, when a topic or company garners more attention, its associated information may be more readily accepted and understood by the public and investors [48]. Furthermore, in a bid to meet stakeholders' expectations, heightened investor attention may prompt companies to place greater emphasis on their duties to these stakeholders, leading them to prioritize their ESG performance [30]. Thus, it can be inferred that there might be a non-linear relationship between ESG performance and reputation. The impact of ESG performance on reputation could differ depending on the levels of investor attention. Consequently, this paper proposes the third hypothesis.

H3. Under the influence of investor attention, the positive correlation between company ESG performance and company reputation shows a non-linear change, and there is a threshold effect.

3. Data and variables

3.1. Sample and data

The sample for this study consists of companies listed on the Main Boards of the Shanghai and Shenzhen Stock Exchanges in the Chinese A-share market from 2011 to 2021. The data was processed as follows: (1) companies labeled as "ST" or "ST" class were excluded[3]; (2) financial sector listed companies were excluded[4]; (3) samples with missing variable observations were excluded. Ultimately, we obtained a balanced panel data set with 3,3990 sample observations from 3090 listed companies. The research data was sourced from the China Stock Market and Accounting Research (CSMAR) database, the WIND database, and the Chinese Research Data Services Platform (CNRDS) database.

3.2. Variables

(1) Dependent Variable: Company Reputation (Reputation). Following the methodology proposed existing research [49], the company reputation assessment index system was established based on the image factor, competitiveness factor, value pursuit factor, and cross-boundary factor. To ensure the reasonability of performing a principal component analysis on the index, we selected company size, market share, advertising expenditure level, sustainable development ability, listing years, beta coefficient, nature of the enterprise, net asset liability ratio, long-term debt ratio, total asset return rate, price-to-book ratio, book-to-market ratio, and Tobin's Q value to construct the index system. The cumulative variance contribution rate of the six factors extracted from the principal component analysis, after rotation, was used as weights to calculate the composite score for company reputation.

(2) Independent Variable: ESG ratings of companies listed on the Chinese A-share market (ESG), with data sourced from the Hua Zheng ESG rating system of Sino Securities Index Information Service (Shanghai) Co.[5] Compared to other ESG rating systems in mainland China, such as Syn Tao Green Finance ESG and China Alliance of Social Value Investment ESG, the Hua Zheng ESG rating system stands out due to its comprehensive rating dimensions, extensive sample coverage, and unique adaptability to China's national conditions. It has become the preferred indicator for scholars conducting ESG-related research on Chinese listed companies. The Hua Zheng ESG rating system grades companies into nine levels based on their ESG performance namely: AAA, AA, A, BBB, BB, B, CCC, CC, C, denoting these levels from high to low as "9∼1," in accordance with the practices of most researchers [1,9].

(3) Mediated (threshold) Variable: Investor attention (Attention). Initial scholarly research utilized stock trading data such as trading volume and liquidity [50]. Nowadays the focus has shifted towards using metrics like social media attention and search engine query volume to gauge investor interest. Inspired by the methodology of Da et al. (2011), who adopted Google's search volume as a proxy for investor attention [51], this study has opted for a similar measure using Baidu, the largest search engine in China. Specifically, we use the summation of the search volume for a company's stock code, its short name, and its full name on Baidu. To address heteroscedasticity and manage the effect of outliers, we add one to the sum and then apply a natural logarithmic transformation.

(4) Control Variables: Based on existing research and established practices, we selected several variables at both the macro and company levels [47,52]. These specifically include company agglomeration, free cash flow per share, price-to-earnings ratio, dividend payout ratio, company value multiple, and asset structure (see Table 1).

See Table 2 for all variables names and definitions.

4. Empirical results and analysis

4.1. Descriptive analysis

To mitigate the impact of extreme values on the regression results, all variables have been winsorized at the 1 % and 99 % percentiles. The descriptive statistics of the primary variables are shown in Table 2.

The results from Table 2 indicate a wide range of reputation (Reputation) scores for the sample companies, stretching from a low of 1.000 to a high of 10.000, suggesting a broad coverage of company reputation within the sample. The average Reputation score stands at 6.907, with a median of 7.000, ensuring an equal number of observations both below and above this median value. The ESG (ESG) score has an average close to 4.392, and with its mean near its median, it slightly exhibits a positive skewness. The average score for investor attention (Attention) is relatively high at 6.887. The closeness of its mean to its median indicates a symmetric distribution, suggesting that the sample companies are likely well-known or frequently discussed in the media. Additionally, the PE ratio (PE) averages at 3.454, with its data range being relatively narrow, spanning from 2.907 to 3.866. This implies that the majority of company

[4] The operating models, financial structures, and risk exposures of companies in the financial industry, such as banks and insurance companies, are significantly different from those of non-financial companies. Therefore, directly analyzing financial companies together with non-financial companies may lead to biased results.

[5] Official website：https://chindices.com/.

Table 1
Definitions of variables.

Name	Symbols	Measurements
Dependent Variable		
Company reputation	Reputation	Combined value of the factors obtained from the company reputation evaluation system
Independent Variable		
ESG performance	ESG	Scores from Hua Zheng ESG system, with values assigned based on ratings
Control Variables		
Company aggregation	Clustering	Industry Herfindahl Index
Free cash flow per share	Cashflow	(Net profit + non-cash expenses - dividends and capital expenditure)/Total number of shares in issue
P/E ratio	PE	Share price per share/Net income per share * 100 %
Dividend payment rate	Dividend	Dividend per share/share price per share * 100 %
Asset structure	Structure	Intangible assets/total assets
Company value multiplier	Multipliers	Total market value/income before interest, tax, depreciation and amortization*100 %
Mediated (threshold) Variable		
Investor attention	Attention	Sum of Baidu search results add 1 then take the logarithm

Table 2
Results of descriptive analysis of primary variables.

Variable	Mean	p25	p50	p75	Max	Min	SD
Reputation	6.907	5.000	7.000	9.000	10.000	1.000	2.560
ESG	4.392	4.000	4.000	5.000	7.000	1.000	0.981
Clustering	0.166	0.074	0.135	0.221	1.000	0.040	0.125
Cashflow	0.075	−0.351	0.074	0.494	3.409	−3.090	0.973
PE	3.454	2.907	3.330	3.866	6.360	1.836	0.847
Dividend	0.015	0.005	0.010	0.019	0.244	0.000	0.016
Multipliers	2.948	2.561	2.883	3.266	4.695	1.827	0.569
Structure	0.046	0.025	0.039	0.058	0.364	0.000	0.032
Attention	6.887	6.410	6.816	7.313	8.667	5.565	0.633

PE ratios are concentrated around the mean and median, suggesting that the sample companies predominantly belong to financially stable sectors, including industries like Food & Beverages, Consumer Goods, Pharmaceuticals, and Utilities. The average cash flow (Cashflow) for companies is 0.075, with its median at 0.074, mirroring the mean very closely. This symmetry around the mean shows significant volatility in cash flow, indicating diverse financial practices across the sample companies. Dividend payment rate (Dividend) have a low average value of 0.015 with a median of 0.010, suggesting that most companies distribute dividends close to this average. Overall, aside from "Reputation", all other variables have a standard deviation less than 1, and their means consistently exceed their medians. After undergoing winsorization, this indicates relative stability in the sample data.

Table 3 presents the results of the Pearson correlation test among the variables, with all correlation coefficients being less than 0.5. In addition, the variance inflation factor (VIF) for the variables lies between 1.01 and 3.46, with an average VIF of 1.68. This is significantly lower than the empirical threshold of 10, indicating no multicollinearity issue in the research model of this study.

4.2. Baseline regression results and robustness test

To test hypothesis H_{1a}, following the approach of existing research, this study chooses to analyze using a two-way fixed effects model [47]. The baseline regression model (1) is constructed as follows:

$$Reputation_{it} = \beta_0 + \beta_1 ESG_{it} + \sum Controls_{it} + \sum Industry + \sum Year + \varepsilon_{it} \tag{1}$$

Table 3
Results of correlation analysis of primary variables.

	Reputation	ESG	Clustering	Cashflow	PE	Dividend	Multipliers	Structure	Attention
Reputation	1								
ESG	0.190***	1							
Clustering	−0.048***	−0.039**	1						
Cashflow	0.162***	0.017	−0.018	1					
PE	−0.421***	−0.172***	−0.016	−0.186***	1				
Dividend	0.186***	0.104***	0.027	0.213***	−0.487***	1			
Multipliers	−0.326***	−0.154***	−0.027	−0.166***	0.380***	−0.471***	1		
Structure	−0.022	−0.002	−0.035**	−0.017	0.030*	−0.001	−0.064***	1	
Attention	0.494***	0.118***	0.028*	0.147***	0.007	−0.002	0.068***	0.016	1

Notes: ***, **and* represent significance at 1 %,5 % and 10 % levels, respectively.

Table 4
Baseline regression and robustness test results.

	Model (1)	Model A	Model B	Model C	Model D
	Reputation	Reputation	Reputation	Reputation	Reputation Rating
ESG	0.298***	0.319***	0.287***		0.126***
	(0.084)	(0.077)	(0.080)		(0.035)
Clustering	−1.008*	−0.945	−0.995*	−1.003*	−0.196
	(0.551)	(0.609)	(0.520)	(0.552)	(0.180)
Cashflow	0.175**	0.243***	0.167**	0.174**	0.136**
	(0.065)	(0.061)	(0.063)	(0.065)	(0.056)
PE	−1.250***	−1.388***	−1.182***	−1.246***	−0.476***
	(0.265)	(0.198)	(0.258)	(0.265)	(0.098)
Dividend	−6.206	−5.674	−5.933	−6.278*	−1.693
	(3.683)	(4.528)	(4.087)	(3.671)	(1.356)
Multipliers	−0.427	0.319	−0.506	−0.426	−0.0850
	(0.455)	(0.327)	(0.446)	(0.454)	(0.165)
Structure	−1.256	−0.253	−1.332	−1.239	−0.915
	(3.506)	(3.657)	(3.472)	(3.468)	(1.362)
ESG Syn Tao				0.330***	
				(0.090)	
Constant	11.16***	9.591***	11.55***	11.01***	1.859***
	(0.891)	(0.592)	(0.989)	(0.911)	(0.360)
Year FE	YES	NO	YES	YES	YES
Industry FE	YES	NO	YES	YES	YES
Province FE	NO	NO	YES	NO	NO
N	33990	33990	33990	33990	33990
Adjusted R^2	0.263	0.202	0.294	0.265	0.277

Notes: The standard errors for clustering at the provincial level are in parentheses. The Year, Industry and Province indicators are included in the corresponding models, but their coefficients are not in this table. ***, **and* represent significance at 1 %,5 % and 10 % levels, respectively.

In model (1), $Reputation_{it}$ denotes the reputation of company i in year t, ESG_{it} denotes the level of company i's ESG score in year t, and the control variables $Controls_{it} = \{Clustering\ ,\ Cashflow\ ,\ PE\ ,\ Dividend\ ,\ Structure\ ,\ Multipliers\ \}^t$, $\sum Industry$ denotes industry fixed effects, $\sum Year$ denotes year fixed effects, and ε_{it} denotes the disturbance term. After the baseline regression, we also attempted to conduct robustness tests by changing the model, replacing the variables and switching the sample. Table 4 demonstrates the results of baseline regression and robustness test.

Column 2 of Table 4 reports the baseline regression results (Model 1) of the impact of company ESG performance on reputation. The results show that the regression coefficient of ESG is 0.298 and passes the test at the 1 % significance level. This implies that a company's ESG performance has a significant positive impact on the company's reputation.

Table 5
Median regression results for model (1).

	ESG ≥ ESG median	ESG < ESG median
	Reputation	Reputation
ESG	0.529***	0.160*
	(0.104)	(0.133)
Clustering	−1.466**	−0.029**
	(0.588)	(1.143)
Cashflow	0.147*	0.100
	(0.080)	(0.125)
PE	−1.082***	−1.611***
	(0.253)	(0.271)
Dividend	−6.949	−4.122
	(4.953)	(5.424)
Multipliers	−0.661	−0.226
	(0.446)	(0.521)
Structure	0.297	−0.669
	(3.620)	(5.508)
Constant	10.620***	12.110***
	(1.071)	(1.258)
Year FE	YES	YES
Industry FE	YES	YES
Province FE	NO	NO
N	28030	5960
Adjusted R^2	0.298	0.404

Notes: The standard errors for clustering at the provincial level are in parentheses. The Year, Industry and Province indicators are included in the corresponding models, but their coefficients are not in this table. ***, **and* represent significance at 1 %,5 % and 10 % levels, respectively.

To verify the robustness of the baseline regression model, we first continue to test the sign and significance level of the ESG regression coefficient by changing the regression model (See Table 4, columns 2–5.). Model A uses a mixed regression model, and Model B adds provincial fixed effects based on Model 1. Models C and D replace the key variables in Model 1 for regression. Specifically, Model C replaces the core independent variable ESG in Model 1, using Syn Tao ESG instead of the Hua Zheng ESG rating level in the original model. Model D replaces the dependent variable, using the company reputation rating level (Reputation Rating) from the stock exchange instead of the Reputation level we constructed in the original model.

Additionally, this study also implemented the system GMM approach, regressing on the first lag of Reputation as an independent variable. The result shows that the coefficient of L.Reputation is 0.790, significant at the 1 % level, and the coefficient for ESG is 0.015. The model passed both the autocorrelation test for disturbance terms and the Hansen over-identification test. These findings largely align with those from the static panel fixed-effects model.

Next, we performed a median regression on the samples from Model 1 (see Table 5). The results of Table 5 indicate that in samples where the ESG rating exceeds the median, there is a positive correlation between ESG and corporate reputation, significant at the 1 % level. In samples where the ESG rating is below the median, the regression coefficient of ESG is still significantly positive, but a smaller coefficient. The results of all robustness tests support the robustness of the conclusions of the baseline regression.

The empirical results indicate a significant positive correlation between ESG ratings and company reputation, suggesting that higher ESG ratings typically correspond to a better company reputation. This finding validates the hypothesis H_{1a} and further extends the conclusions of existing similar research [28,53,54]. As mentioned in Section 2.1, a company's reputation is influenced not only by shareholders but also by various stakeholders, including customers, suppliers, communities, and the government. A strong ESG performance indicates that a company is paying attention to and meeting the needs and expectations of all its stakeholders, thereby enhancing its overall reputation [55]. Further median regression reveals that this positive relation is stronger in companies with higher ESG ratings. Overall, these findings suggest that the impact of ESG on company reputation may not be a simple linear relationship but may instead exhibit threshold effects. In other words, only when a company's ESG rating reaches a certain level does an increase in ESG rating significantly enhance its reputation. Conversely, for companies with ESG ratings below this threshold, further increases in ESG rating may not yield significant improvements in company reputation. Section 4.4 will elaborate on the empirical research results concerning the threshold effect of ESG performance on company reputation.

4.3. Test for the mediating role of investor attention

This paper attempts to explain the channel through which ESG performance enhances company reputation from the perspective of external investor attention. First, the stepwise regression method is used to test H_2 [56]. The first step of the stepwise regression model is as shown in Model (1), and the second and third steps are as follows:

$$Attention_{it} = \beta_0 + \beta_1 ESG_{it} + \sum Controls_{it} + \sum Industry + \sum Year + \varepsilon_{it} \tag{2}$$

$$Reputation_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Attention_{it} + \sum Controls_{it} + \sum Industry + \sum Year + \varepsilon_{it} \tag{3}$$

In models (2) and (3), $Attention_{it}$ denotes the level of investor attention towards company i in year t. The interpretation of other variables remains the same as in model (1).

Table 6 presents the results of the stepwise testing method. In the regression results of model (2), the coefficient of ESG on Attention is significantly positive, demonstrating that a strong ESG performance contributes to enhancing investor attention. In model (3), the coefficients of both ESG and Attention are significantly positive, indicating that investor attention partially mediates the relationship between a company's ESG performance and its reputation. To ensure the reliability of the conclusions, we also conducted the Sobel-Goodman mediation test and implemented a bootstrapping method. The Sobel test yields a Z value of 7.509, significant at the 1 % level. The results from the bootstrap method indicate that both the direct and indirect effects do not encompass 0 within their confidence intervals, supporting our findings. Consequently, Hypothesis 2 is validated: by elevating the attention of external investors, improved

Table 6
Testing results for mediating effects of investor attention.

	Model (1)	Model (2)	Model (3)
	Reputation	Attention	Reputation
ESG	0.452***	0.085***	0.248**
	(5.02)	(3.96)	(2.73)
Attention			2.401***
			(17.27)
Constant	4.731***	6.339***	−10.49***
	(5.17)	(48.14)	(-8.30)
Controls/Year/Industry	YES	YES	YES
N	33990	33990	33990
Adjusted R^2	0.122	0.283	0.374

Notes: The standard errors for clustering at the provincial level are in parentheses. The Year, Industry and Province indicators are included in the corresponding models, but their coefficients are not in this table. ***, ** and* represent significance at 1 %,5 % and 10 % levels, respectively.

ESG performance can enhance a company's reputation. This paper supplements existing literature on the relationships between ESG and investor relations, investor relations and company reputation, and other mediating variables between ESG and reputation [30–33].

Considering the unique context of China's stock market, we can understand the role of investor attention as a mediating variable between ESG performance and company reputation from the following perspectives: Market participants in China's stock market have a strong demand for quality information [57]. In such an environment, ESG performance reports provide investors with a clear perspective on a company's management quality, governance structure, and social responsibility. Therefore, companies with good ESG performance attract more investor attention. Additionally, with the growing public attention to environmental and social issues in China [58], along with the government's push for green and sustainable development, ESG performance becomes closely tied to a company's public image and reputation. When a company excels in ESG performance, it draws more investor attention, which in turn enhances its market reputation. Finally, given the intense competition in the Chinese market, companies need to find distinctive ways to appeal to investors [59]. Strong ESG performance serves as a way for companies to demonstrate their long-term competitiveness and market leadership. Such performance attracts more long-term and strategic investors, thereby elevating the company's market reputation. In summary, against the backdrop of China's unique stock market, ESG performance has emerged as a vital tool for companies to attract investor attention and bolster market reputation. When companies effectively improve their ESG performance and communicate this information, they will attract more investor attention and, consequently, enjoy a higher market reputation.

Then this study delves deeper into the heterogeneous influence of investor attention, acting as a mediator in the relationship between ESG performance and company reputation. The sample is bifurcated into state-owned and non-state-owned companies, based on distinctions in ownership. A stepwise regression method is employed once again to scrutinize the mediating effect, with the outcomes presented in Table 7. The results indicate that the mediating role of investor attention is not statistically significant within the subset of state-owned companies. Conversely, within the subset of non-state-owned companies, the mediating influence of investor attention maintains a significant positive effect. This nuanced analysis elucidates the differential roles of investor attention in mediating the impact of ESG performance on company reputation across diverse ownership structures.

This finding potentially unveils the fundamental differences between state-owned and non-state-owned companies in China, specifically in terms of the operating environment, market expectations, and ownership structures they encounter. For instance, in terms of ownership structure, state-owned companies have a different structure compared to non-state-owned ones, with the decision-making process of the former likely being more influenced by government intervention [60]. This could lead to a less intense reaction from investors to the ESG performance of state-owned companies compared to non-state-owned ones, as investors might perceive that the ESG performance of these companies is more influenced by policy factors rather than market forces [61]. In terms of market expectations, investors' expectations for state-owned companies might differ from those for non-state-owned companies. For example, they might expect state-owned companies to perform better in environmental, social, and governance aspects [62], as these companies typically have more substantial resources and higher social responsibilities [63]. Such expectations could diminish the impact of ESG performance on investor attention. Lastly, from the perspective of the operating environment, state-owned companies in China typically operate in a more stable market environment, while non-state-owned companies need to operate in a more competitive environment. This difference could influence investor attention towards these two types of companies. Taking these factors into account, it can explain why in state-owned companies, the impact of ESG performance on company reputation is not significantly manifested through the mediating pathway of investor attention, while a significant mediating effect exists in non-state-owned companies.

4.4. Threshold effects test

Following the end of Section 4.2, this paper first tests the threshold effect of ESG. Drawing on the threshold regression model [64], Model (4) is constructed as follows:

Table 7
Property rights heterogeneity analysis in investor attention mediation.

	Stated-owned			Non-state-owned		
	Model (1) Reputation	Model (2) Attention	Model (3) Reputation	Model (1) Reputation	Model (2) Attention	Model (3) Reputation
ESG	0.198	0.085***	0.080	0.429***	0.085***	0.283**
	(1.10)	(3.96)	(0.59)	(3.28)	(3.96)	(2.07)
Attention			2.121***			2.403***
			(11.84)			(10.02)
Constant	6.878***	6.339***	−7.434***	4.833***	6.339***	−10.720***
	(4.20)	(48.14)	(-4.43)	(4.03)	(48.14)	(-4.92)
Controls	YES	YES	YES	YES	YES	YES
Fixed Effect	YES	YES	YES	YES	YES	YES
N	1302	3399	1302	2097	3399	2097
Adjusted R^2	0.332	0.283	0.538	0.180	0.283	0.389

Notes: The standard errors for clustering at the provincial level are in parentheses. The Year, Industry and Province indicators are included in the corresponding models, but their coefficients are not in this table. ***, **and* represent significance at 1 %,5 % and 10 % levels, respectively.

$$Reputation_{it} = \mu_i + \beta_0 Controls_{it} + \beta_1 ESG_{it} * D(ESG_{it} \le \theta_1) + \beta_2 ESG_{it} * D(\theta_1 < ESG_{it} \le \theta_2) + \ldots + \beta_n ESG_{it} * D(\theta_{n-1} < ESG_{it} \le \theta_n) + \beta_{n+1} ESG_{it} * D(ESG_{it} > \theta_n) + \mu_{it} \quad (4)$$

In Model (4), i and t represent listed company i in year t, $\theta_1, \theta_2 \ldots \theta_n$ are the values of n different levels of threshold variables, $D(.)$ is a dummy variable, where $(.)$ represents the indicator function, and μ_{it} is the random error term. $Controls_{it}$ represent the control variables, consistent with Model (1).

Next, to test H_3, we construct Model (5) to examine the threshold effect of investor attention.

$$Reputation_{it} = \mu_i + \beta_0 Controls_{it} + \beta_1 Attention_{it} * D(ESG_{it} \le \eta_1) + \beta_2 Attention_{it} * D(\eta_1 < ESG_{it} \le \eta_2) + \ldots + \beta_n Attention_{it} * D(\eta_{n-1} < ESG_{it} \le \eta_n) + \beta_{n+1} Attention_{it} * D(ESG_{it} > \eta_n) + \mu_{it} \quad (5)$$

In Model (5) , $\eta_1, \eta_2 \ldots \eta_n$ are the values of n different levels of threshold variables. The definitions of other variables are the same as in Model (4).

We obtain the asymptotic values of the F-statistics and the corresponding p-values through the empirical method of threshold effect bootstrap sampling. The threshold values are tested with 300 grid searches and 300 bootstrap samples. The test results of Models (4) and (5) are shown in Table 8, Table 9, Table 10, Figs. 1 and 2.

As evidenced by the results in the first column of Table 10, When ESG is treated as a threshold variable, its impact on reputation exhibits a single threshold effect with a value of 5.000 (see Table 2, surpassing the mean value of ESG and consistent with the 75th percentile level). when the ESG performance is below the threshold value of 5, Its positive influence on the company's reputation is not statistically significant. Conversely, when the ESG performance surpasses the threshold value of 5, the facilitative role of ESG on the company's reputation markedly intensifies, with the coefficient escalating to 0.079. These empirical findings suggest that the progressive impact of ESG on the company's reputation demonstrates a threshold effect, embodying a nonlinear positive relationship, thereby substantiating Hypothesis H_{1b}. In essence, superior ESG performance corresponds to a more substantial enhancement effect on the company's reputation.

The findings outlined in the second and third columns of Table 10 elucidate that ESG performance exerts a dual threshold effect on a company's reputation when investor attention is considered as a moderating variable. The initial threshold value is found to be 6.708 (refer to Table 2, closely aligning with the median of Attention), while the secondary threshold is determined at 7.404 (surpassing the 75th percentile level of Attention). When the degree of investor attention falls beneath the primary threshold of 6.708, the impact of ESG performance on the company's reputation does not hold statistical significance. However, within the range of investor attention bracketed by the initial threshold (6.708) and the secondary threshold (7.404), the influence of ESG performance on the company's reputation exhibits a marked positive effect. Moreover, as the level of investor attention transcends the secondary threshold, the facilitative role of ESG performance on the company's reputation notably intensifies. These empirical findings substantiate Hypothesis H3, positing that the positive correlation between a company's ESG performance and its reputation demonstrates a nonlinear transformation under the sway of investor attention, indicative of a threshold effect. In the academic field, the role of investor attention as a moderating factor, as well as the threshold effect under the specific background of China's stock market, has not been deeply explored. This study fills this gap. Moreover, this research findings also resonate with studies on topics like CSR and financial performance, and reputation [22–25], further revealing the pivotal role of investor attention in this relationship. This provides more detailed insights for market participants and decision-makers.

Within the distinct landscape of the Chinese stock market, t the greater the attention from external investors, the stronger the positive impact of ESG performance on a company's reputation. This phenomenon can be explained from the following perspectives: Firstly, China's stock market is relatively young and suffers from significant issues of information asymmetry [65]. Due to this asymmetry, ESG reports have become a pivotal way for companies to signal their performance and responsibility. As external investor attention heightens, this signaling effect becomes more pronounced, thereby strengthening the link between ESG performance and company reputation. With an increasing number of institutional and foreign investors entering the Chinese market, who typically place a higher emphasis on a company's social responsibility and ESG performance, elevating external investor attention means not only more capital inflow but also a greater spotlight on a company's ESG achievements. Additionally, the Chinese government has been proactive in advancing green finance and corporate social responsibility. In such an environment, companies with strong ESG performance are likely to receive greater governmental support and incentives [66]. Simultaneously, increased external investor attention can also present more market opportunities and partnerships. With the growing prominence of environmental, social, and governance issues in Chinese society, public attention to a company's ESG performance is on the rise. A company's reputation is intertwined not

Table 8
Results of threshold effect bootstrap sampling test.

Independent Variable	Threshold Variable	Threshold	RSS	MSE	F-stat	Prob
ESG	ESG	Single	3259.569	0.962	30.270***	0.000
		Double	3256.140	0.961	3.570	0.543
ESG	Attention	Single	3210.599	0.948	82.410***	0.000
		Double	3162.905	0.937	51.090***	0.000
		Triple	3141.546	0.927	23.030	0.507

Notes: ***, **and* represent significance at 1 %,5 % and 10 % levels, respectively.

Table 9
Threshold estimate and confidence interval.

Independent Variable	Threshold Variable	Threshold	Threshold Estimate	Confidence Interval	
ESG	ESG	Single	5.000	4.500	5.500
ESG	Attention	Single	6.708	6.689	6.711
		Double	7.404	7.390	7.409

Table 10
Regression results of threshold model.

	(3)	(4)	(5)
	Reputation	Reputation	Reputation
Independent Variable	ESG	ESG	ESG
Threshold Variable	ESG	Attention	Attention
Clustering	−1.480***	−1.560***	−1.599***
	(0.273)	(0.271)	(0.269)
Cashflow	0.0624***	0.059***	0.058***
	(0.022)	(0.022)	(0.021)
PE	−0.781***	−0.786***	−0.790***
	(0.054)	(0.054)	(0.053)
Dividend	1.623	2.779*	2.679*
	(1.592)	(1.584)	(1.570)
Multipliers	0.584***	0.488***	0.446***
	(0.088)	(0.088)	(0.088)
Structure	−0.121	−0.527	−0.492
	(1.014)	(1.007)	(0.999)
ESG(ESG≤5.000)	0.008		
	(0.030)		
ESG(ESG > 5.000)	0.079***		
	(0.026)		
ESG(Attention≤6.708)		0.036	0.022
		(0.027)	(0.027)
ESG(6.708 < Attention≤7.404)		0.136***	0.115***
		(0.027)	(0.027)
ESG(Attention > 7.404)			0.210***
			(0.028)
Constant	8.019***	8.009***	8.131***
	(0.223)	(0.217)	(0.216)
F	56.590	62.800	62.160
N	33990	33990	33990
Adjusted R^2	0.039	0.052	0.067

Notes: ***, **and* represent significance at 1 %,5 % and 10 % levels, respectively.

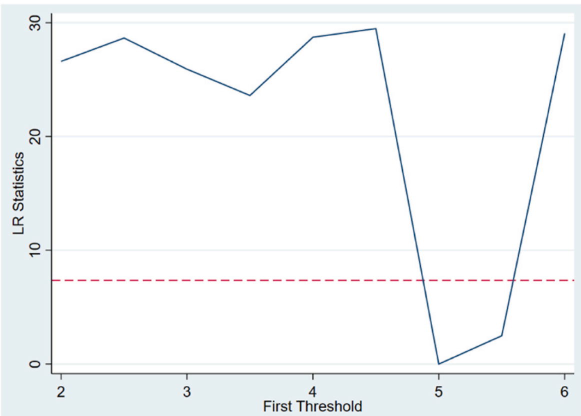

Fig. 1. Esg threshold estimate and confidence interval.

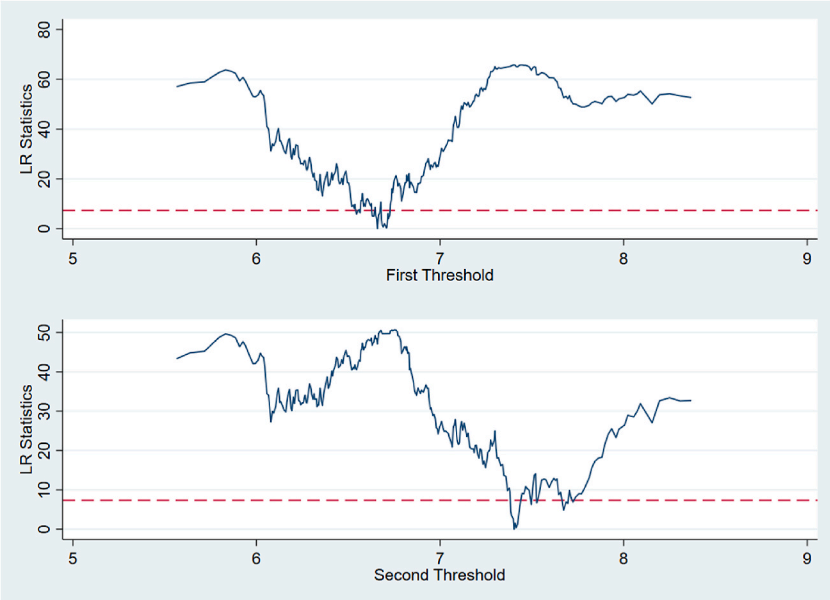

Fig. 2. Attention threshold estimate and confidence interval.

just with its financial performance but also its endeavors in social responsibility [67]. Elevated attention from external investors can amplify this relationship, pushing companies to prioritize their ESG performance even further.

5. Conclusion

Amid the intensifying competition between companies and the global wave of ESG reform, this study aims to explore whether enhancing the ESG performance of listed companies in China can elevate their reputation. Additionally, it examines if investor attention can serve as a mediator in the relationship between enhanced ESG performance and reputation, as well as the threshold effect of investor attention on this relationship. To this end, we have selected sample data from Chinese listed companies from 2011 to 2021. Through the use of panel two-way fixed-effects regression, mediation effect testing, and threshold effect models, the main findings are as follows: Firstly, there's a significant positive relationship between the ESG performance and the reputation of listed companies in China. Furthermore, ESG performance itself has a singular threshold effect on its relationship with reputation, with the threshold close to the median of the sample. Specifically, as the level of ESG performance increases, its positive impact on reputation grows. Moreover, this study innovatively confirms that investor attention mediates the relationship between ESG performance and company reputation. This mediating effect is more pronounced in non-state-owned companies compared to state-owned companies. Lastly, our research further establishes a dual threshold effect of investor attention on the enhancement of reputation through ESG performance, with the first and second thresholds approximating the sample median and the 75th percentile, respectively. This suggests that as investor attention rises, the positive effect of improved ESG performance on company reputation becomes increasingly evident.

This study contributes to the literature on the relationship between CSR and company reputation, as well as between investor attention and reputation, especially in the context of Chinese listed companies. By elucidating the mediating role and the dual threshold effect of investor attention, our research offers a more intricate perspective on how ESG performance influences company reputation. The findings also shed light on the distinctions between state-owned and non-state-owned companies in the Chinese market, offering theoretical insights into China's corporate governance structure and its response to ESG performance. From a practical standpoint, the study offers recommendations for various stakeholders. Listed companies in China should prioritize their ESG performance [68]. They should aim to maintain their ESG performance level above the market average, as it can maximize the enhancement of their reputation. Moreover, companies should focus on fostering investor relations and elevating the level of investor attention, striving to keep it above the market average, thus optimizing the effect of ESG performance on reputation. For investors, they should increasingly rely on ESG information for company valuation, especially those particularly concerned with corporate social responsibility and reputation [14]. Institutional investors with a keen interest in a company's ESG performance can use our findings as a foundation for discussions with listed companies, especially concerning improving ESG performance to bolster reputation [69]. For policymakers, there should be more encouragement for companies to enhance their ESG performance, even considering offering more rewards and incentives for those with commendable ESG achievements. This aligns with recent proactive measures by the Chinese government. For instance, starting from January 2022, both the Shanghai and Shenzhen stock exchanges updated their listing regulations, mandating issuers to disclose CSR or ESG reports. Furthermore, the Chinese government is contemplating imposing mandatory ESG disclosure requirements for domestically listed companies. Notably, in 2022, 89 out of China's top 100 companies released ESG reports, a significant increase from the 78 % in 2020. Given our findings that the mediating effect of investor attention is less pronounced in state-owned companies compared to non-state-owned ones, regulatory bodies should intensify supervision of state-owned entities, ensuring they fulfill their social responsibilities and enhance their ESG performance [70]. Finally, for auditors, they should also focus on verifying non-financial information [71], particularly emphasizing the accuracy and completeness of a company's ESG reports during audits. This study may have its limitations due to the overly concentrated selection of data samples, focusing mainly on publicly listed companies in China, which inevitably restricts the universal applicability of the research results. In other countries and regions, the ESG performance of companies may vary significantly due to differences in market environment, cultural background, and policy environment. Moreover, there might exist other mediating variables influencing corporate reputation that have not been sufficiently considered and addressed in this study. To enhance the broad applicability and accuracy of the research, future studies could expand and deepen in areas such as sample selection, diversity of research methods, and variable selection. This would help us to understand more accurately and comprehensively how ESG performance impacts corporate reputation.

This study presents several limitations that warrant attention. Firstly, due to data accessibility constraints, our sample primarily focuses on publicly listed companies in China. This focus may restrict the general applicability of our findings to broader contexts. Furthermore, given the diverse market conditions, cultural backgrounds, and policy landscapes across different countries and regions, the ESG performance of companies might differ significantly; aspects our study might not have comprehensively captured. Additionally, potential mediating variables influencing corporate reputation could exist that this research has not adequately considered. Factors such as organizational culture, leadership styles, or specific policy changes might also play pivotal roles, but they may not have been encompassed in our current scope. Moving forward, for more encompassing insights, researchers should contemplate expanding their sample to include firms from varied geographical locales. Such an expansion would enhance the universality of study outcomes. There's also merit in further exploring other potential mediating variables, like employee satisfaction, customer satisfaction, or supply chain management, as they might offer deeper insights into their bearing on corporate reputation. A deeper dive into understanding how cultural and policy contexts shape a firm's ESG performance and reputation is also essential. Future endeavors might benefit from considering longitudinal studies spanning extended periods or merging qualitative and quantitative research methodologies, such as in-depth interviews or case studies, to provide a richer and more detailed perspective.

Funding

This research received no funding.

Data availability statement

Data will be made available on request.

CRediT authorship contribution statement

Tiantian Meng: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Mohamed Hisham Dato Haji Yahya:** Supervision. **Zariyawati Mohd Ashhari:** Supervision. **Danni Yu:** Software, Validation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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