The Consequences of Relaxing Short-Selling Restrictions on Corporate Greenwashing

Chenyi Zhou
School of Economics and Business Administration, Chongqing University, Chongqing, China
**Corresponding Author*

Abstract: In the context of the global green transition, the widespread practice of 'greenwashing'-where companies exaggerate their ESG disclosures to substitute for actual compliance-has severely undermined the resource allocation efficiency of capital markets. Identifying and penalising such behaviour to ensure corporate honesty and diligence is a pressing concern demanding immediate scholarly attention.Drawing on data from A-share listed companies between 2014 and 2023, this paper evaluates the consequences of relaxing short-selling restrictions on corporate greenwashing. The findings indicate that relaxing short-selling restrictions significantly curbs greenwashing behaviour in listed companies in the subsequent period. The empirical analysis passed the parallel trends test and a series of robustness tests.Mechanism tests reveal that short-selling regulations exert a inhibitory effect through information extraction and risk deterrence. Heterogeneity analysis reveals that this relationship is more substantial in environments with weaker rule of law, in industries with higher pollution intensity, and for firms located in western China. The findings of this study enrich the oversight regimes of short-selling regulations in China, providing a basis and reference for regulating corporate behaviour and correcting mispricing in the capital market.

Keywords: Relaxation of Short-Selling Restrictions; Corporate Greenwashing; Information Extraction; Risk Deterrence

1. Introduction

With the advancement of China's 'dual carbon' goals and mandatory ESG disclosure requirements, non-financial information has become central to assessing corporate sustainability.However, driven by both policy pressures and valuation premiums, and based on information asymmetry and principal-agent theory, management possesses both the incentive and the capacity to engage in greenwashing. Specifically, this denotes the practice in which corporations and financial institutions inflate their environmental initiatives and accomplishments, issuing exaggerated pledges and disclosures pertaining to environmental conservation and resource utilization in their ESG or sustainability statements (Huang Shizhong, 2022) [1]. Particularly within China's administratively-led governance system and retail-dominated market structure, greenwashing not only severely impedes the transmission of signals in capital markets but also undermines investor rights and triggers stock market volatility. Against the backdrop of frequent greenwashing scandals both domestically and internationally, establishing a high-quality ESG disclosure framework to standardise the accurate reporting of corporate performance is of paramount importance for optimising market signals and purifying the market environment.

As the cornerstone of price discovery, the short-selling system is hailed as the 'immune cells' of the capital market. Investors execute short sales by selling shares borrowed from securities firms and repurchasing the same shares to return them before the contract expires (Zhang Zhang and Wang Meng, 2021) [2]. By virtue of the direct exposure of negative news by short sellers, diverse market information can be more comprehensively incorporated into capital markets, thereby alleviating the level of information asymmetry among market participants.Since China launched its margin lending pilot scheme in 2010, the system has been gradually liberalised.This current situation provides an excellent opportunity for us to observe its governance efficacy.As administrative supervision may face obstacles such as professional barriers and capacity constraints, it inevitably fails to comprehensively cover the capital market.

Copyright @ STEMM Institute Press

However, even in an environment where securities for short selling are scarce, the short selling system has already demonstrated significant governance capabilities across multiple sectors in China. Therefore, exploring whether the short selling system can intervene in corporate ESG fraud not only re-examines the governance boundaries of the short selling system but also contributes to the further refinement of China's market mechanisms.

Derived from a selected sample of mainland China's A-share corporations, covering the ten-year window from 2014 to 2023, and taking into account the phased expansion of eligible securities for short selling, the present study adopts a multi-period difference-in-differences model to assess the impacts of relaxing short-selling restrictions on corporate greenwashing practices. The research findings have passed tests for parallel trends, placebo effects, and interactions between industry fixed effects and time effects, as well as period lags,bolstering the reliability of the pape's claim.This study finds that the relaxation of short-selling restrictions can curb firms' greenwashing behaviour in the subsequent period through the channels of information extraction and risk deterrence, and this relationship is more pronounced in samples characterised by lower levels of rule of law, higher industry pollution levels, and those located in western China.

The incremental scholarly value of this paper are resided in the following core facets.: (1) At the theoretical level, this paper expands the scope of the short-selling regime's impact on ESG governance, shifting the focus from overall disclosure levels to examining the underlying authenticity of disclosures. It is the first study to combine the short-selling regime with corporate greenwashing, exploring the mediating mechanisms and heterogeneous effects through which it exerts its governance role, thereby enriching the understanding of how the short-selling regime governs the quality level of non-financial data.(2) At the practical level, this study helps companies recognise the high standards imposed by short-selling pressure on ESG behaviour, thereby encouraging them to fulfil their environmental responsibilities conscientiously and truthfully.Simultaneously, it assists investors in identifying companies that maintain robust ESG performance under the short-selling regime, enabling genuinely meaningful green value investing.

2. Literature Review

2.1 The Economic Consequences of Short-Selling Mechanisms

As a key external mechanism in capital markets, the introduction of short selling has far-reaching implications across multiple domains. A synthesis of domestic and international research indicates that its economic consequences encompass dimensions such as corporate internal controls, managerial decision-making and market behaviour. From the perspective of corporate governance, the reduction in the cost of short selling increases the probability of detecting corporate misconduct (Xu Xixiong et al., 2021) [3], increases the likelihood of financial fraud being detected, and forces management to weigh up the trade-off between asset misappropriation and falling share prices (Hou Qingchuan et al., 2016) [4], effectively curbing opportunistic behaviour (Wang Ping and Du Songhua, 2023) [5] and alleviating agency problems (Lu et al., 2024) [6]. With regard to financial decision-making, some scholars argue that short-selling regulations can curb management's tendency towards overconfidence and reduce the probability of corporate overinvestment (Liu Yanxia and Qi Huajin, 2019; Kang Wen and Liu Lizhen, 2022) [7-8];However, other studies have pointed out that the market pressure it generates may force firms into a liquidity mismatch dilemma of 'short-term borrowing for long-term investment' (Jian Lei and Wang Xiaojia, 2024) [9], exacerbating management's short-sightedness and reducing the rate of fulfilment of corporate performance commitments (Luo Yuxin et al., 2024) [10]. In terms of non-financial decision-making, short-selling mechanisms have significantly improved the ESG performance of listed companies (Chen Qian et al., 2024; Sun Zeyu and Qi Baolei, 2020) [11-12]. More importantly, short sellers possess the ability to anticipate and identify ESG risks: Christophe et al. (2024) [13] note that short sellers exhibit a high degree of sensitivity to recent negative ESG news; in particular, when companies with a long-standing reputation for good conduct are suddenly hit by negative news, the intervention of short sellers often foreshadows significant negative abnormal returns in the future. In terms of market behaviour, the short-selling regime enhances the

 Copyright @ STEMM Institute Press

efficiency of stock price discovery (Fang Libing and Liu Ye, 2014;Bushman and Pinto, 2020) [14-15], and plays a role in mitigating overvaluation on the first day of listing and alleviating the decline in the subsequent performance of new shares, particularly in the IPO market (Song Shunlin and Cao Aocheng, 2024) [16] .

2.2 Factors Influencing Greenwashing

Corporate greenwashing has sparked widespread academic debate, with discussions on its causes focusing on both internal and external factors. Zheng Li et al. (2024) [17] note that the discrepancy between 'historical performance surplus and industry performance gap' may induce management to lower disclosure quality to accommodate demands; particularly in environments where ESG disclosure frameworks are underdeveloped, such strategic compliance behaviour exhibits a pronounced 'herd effect' within the industry (He Xingxing et al., 2024) [18] .Specific external environments may also trigger greenwashing; for instance, the impact of policies such as carbon trading (Cao Xiang et al., 2025) [19] may induce firms to adopt strategic responses rather than making substantive investments. Xi Mingming et al. (2025) [20] found that, in the absence of complementary external government regulation, supervision by online media alone can sometimes compel firms to engage in greenwashing, in an attempt to alleviate the negative pressure arising from external scrutiny. In response to these drivers, academia has explored effective mitigation pathways from multiple dimensions: regarding formal institutions, the strengthening of environmental justice plays a catalytic role in corporate sustainability (Liu Hewang et al., 2024) [21]; in terms of informal institutions, social trust (Wang Yichen and Zhou Zejiang, 2025) [22] and supply chain credibility (Han Jie et al., 2025) [23] can curb greenwashing through reputational mechanisms. Furthermore, micro-level corporate behavioural choices, such as implementing digital transformation strategies (Li Tao et al., 2025) [24] and 'patient capital' focused on long-term value creation (Qiang Guoling et al., 2025) [25] can also effectively curb greenwashing.

Taking the above literature into account, existing research still has the following gaps: Firstly, there is insufficient attention paid to the governance-related impact of short-selling regimes on firms' substantive ESG performance; as the heterogeneity of rating standards reduces comparability, and given that firms possess subjective, strategic compliance motives, a simple increase in scores cannot be equated entirely with substantive governance optimisation;secondly, there is insufficient research into the inherent advantages of capital markets stemming from their transactional nature, failing to reveal the unique constraining effects of external market mechanisms on corporate greenwashing behaviour.

3. Theoretical Analysis and Research Hypotheses

3.1 The Penetration Effect Based on 'Information Mining'

The reason why companies are susceptible to greenwashing is that management possesses greater access to private information; in particular, as ESG indicators carry policy implications and promote environmental friendliness, management may engage in token compliance for the sake of 'image management' (Shen Hongtao, 2014) [26] in order to secure a green valuation premium.Against a backdrop of inadequate external oversight, short sellers possess a strong incentive, stemming from the profit-driven nature of their activities, to uncover negative information in the capital markets and correct overvalued share prices (Fang Libing and Liu Ye, 2014) [14] , thereby alleviating information asymmetry. At the same time, owing to their greater expertise, short sellers can identify management's manipulative rhetoric, forcing firms to disclose more substantive negative information (Zhang Zhang and Wang Meng, 2021) [2] , enhancing the transparency of the information environment and, consequently, exposing the firm's greenwashing.

3.2 The Constraining Effect based on 'Risk Deterrence'

Apart from direct exposes by short sellers, if a firm's greenwashing is targeted by short-selling forces, the ensuing large-scale short selling will not only trigger the risk of a stock price collapse (You Wanhai, 2025) [27] but also severely damage the company's reputation and threaten the job security of managers. At the same time, short sellers are highly sensitive to corporate misconduct, which further serves as a warning to companies to reduce their complacency. The

Copyright @ STEMM Institute Press

short-selling mechanism reshapes the cost-benefit framework underlying corporate management's incentives for greenwashing, thereby ensuring that the costs incurred from non-compliance substantially exceed the corresponding gains. Therefore, in order to avoid the high costs of non-compliance resulting from being targeted by short sellers (Wang Fei, 2022) [28], management will adopt a more defensive stance in decision-making, allocating resources to substantive ESG compliance to stabilise share prices and reputation through genuine compliance.

Building upon the above-mentioned analysis, this paper advances its core research hypothesis as follows.

H1: All other things being equal, relaxing short-selling restrictions can significantly curb corporate greenwashing behaviour.

4. Research Design

4.1 Model Construction

For the purpose of identifying the causal link between the easing of short-selling constraints and enterprises' greenwashing behaviors, this paper draws on the approach of Chen Qian et al. (2024) [11] and sets up the following multi-period difference-in-differences model to test hypothesis H1:

$$GW_{i,t+1}=\alpha+\beta_1 POSTLIST_{i,t}+\sum \gamma Controls_{i,t}+\sum IND+\sum YEAR+\varepsilon_{i,t} \quad (1)$$

Where GW represents the degree of greenwashing by listed companies. In this study, the dependent variable is treated as one period ahead (t+1) (Sun Zeyu and Qi Baolei, 2020) [12]. Time lags are inherent to the governance processes brought about by short-selling regulations, making it hard to promptly alter firms' greenwashing activities when the relevant policies are put into practice; meanwhile, taking the one-period lag of the dependent variable efficiently alleviates the problem of reverse causality within the concurrent period. POSTLIST equals 1 if the target firm permits short selling in year t, otherwise it equals 0; Controls represents control variables; i represents the sample firm; t represents the observation period; ε is the stochastic disturbance term; α is the constant term; β_1 is the coefficient of the explanatory variable POSTLIST; γ is the coefficient of the control variable. In addition, the model includes industry fixed effects (IND) and year fixed effects (YEAR) to avoid interference from firm-specific and industry-specific characteristics that do not vary over time.

4.2 Variable Selection

4.2.1 Dependent Variable: Corporate Greenwashing (GW)

Leveraging the methodology developed by Long Li et al. (2025) [29], this paper calculates the degree of greenwashing (GW) for firms using Bloomberg ESG scores and Huazheng ESG scores. Specifically: Bloomberg ESG scores directly reflect the extent and quality of a firm's disclosure of ESG information in documents such as annual reports and corporate social responsibility reports, reflecting the firm's "words";Huazheng ESG scores, on the other hand, are constructed by synthesising a company's actual ESG practices and possesses a high degree of scientific rigour and reliability (Sun Junxiu et al., 2024) [30], reflecting the company's "actions".The detailed calculation approach is presented in the following formula, where $GW_{i,t}$ represents the greenwashing degree of firm i in year t, ESGdisi,t is the Bloomberg ESG score of firm i in year t, and $ESGper_{i,t}$ denotes the Huazheng ESG score for firm i in year t, $\overline{ESGdis}$ and $\overline{ESGper}$ represent the industry averages of the Bloomberg ESG score and the Huazheng ESG score respectively, and σdis and σper denote the industry standard deviations of the Bloomberg ESG score and the Huazheng ESG score respectively.

$$GW_{i,t}=\left(\frac{ESGdis_{i,t}-\overline{ESGdis}}{\sigma dis}\right)-\left(\frac{ESGper_{i,t}-\overline{ESGper}}{\sigma per}\right) \quad (2)$$

4.2.2 Explanatory Variable: Relaxation of Short-Selling Restrictions (POSTLIST)

The POSTLIST variable used in this paper is constructed by multiplying an event dummy variable by a time dummy variable. The event dummy variable is defined as follows: A value of 1 is assigned to a firm if it is incorporated into the short-selling list within the observation window; otherwise, the value is set to 0;The time dummy variable is defined as follows: Beginning in the year when a company becomes eligible for short selling and extending to all following years, the variable is set to 1; otherwise, it assumes a value of 0.Under this definition, POSTLIST takes the value 1 only when the sample company officially becomes eligible for short selling and has entered the short-selling phase in the relevant year and subsequent years; it takes the value 0 at all other

 Copyright @ STEMM Institute Press

observation points. Should a sample company fail to enter the short-selling eligible list throughout the entire duration of the observation period, the corresponding variable retains a value of 0.

4.2.3 Control variables

With reference to prior research outcomes, this study identifies the following control variables: firm size (Size), debt-to-asset ratio (Lev), return on assets (ROA), firm growth (Growth), years since listing (Age), concentration of shareholding (Top1), dual role (Double), and board size (Board). The definitions and measurement methods of these variables are shown in Table 1.

4.3 Data Sources and Descriptive Statistics

Drawing on Chinese A-share listed enterprises from 2014 to 2023 as the initial sample, this study carries out data processing by means of the following approaches: (1) Exclude financial listed companies;(2) Remove ST and *ST enterprises;(3) Omit samples with incomplete core variables;(4) In order to minimize the potential distortion arising from extreme observations, this paper truncated all granular-level numerical indicators at the 1st and 99th percentiles.The corporate financial data and short-selling regime data used in this paper are sourced from the CSMAR database, whilst the ESG rating data are sourced from the Wind database.

Table 2 presents the descriptive statistics for the key variables in the full sample.

Table 1. Variable Definitions

Variable Type	Variable Name	Variable Symbol	Specific meaning
Dependent variable	Degree of corporate greenwashing	GW	The difference between the Bloomberg ESG score and the the Huazheng ESG score, normalised
Explanatory variable	Relaxation of short-selling restrictions	POSTLIST	Constructed by multiplying the event dummy variable by the time dummy variable. The event dummy variable is set to 1 if the company is listed as a short-selling eligible target, and 0 otherwise; the time dummy variable is coded as 1 in the year the target company enters the short-selling list and thereafter, and 0 otherwise
Control variables	Company size	Size	The natural log transformation of a firm's end-of-period total assets
	Debt-to-Assets Ratio	Lev	Total Liabilities / Total Assets
	Corporate profitability	ROA	Net Profit / Total Assets
	Company Growth	Growth	Change in revenue / Revenue for the year
	Years listed	Age	The natural logarithm of the number of years from the year of listing to the year of the sample survey
	Shareholding Concentration	Top 1	Shareholding proportion of the largest shareholder
	Dual role	Double	1 if the same person holds the positions of Chairman and Chief Executive Officer; otherwise, 0
	Board size	Board	The natural log transformation of the number of board members
	Industry	IND	Industry classification based on the CSRC's 2012 version, controlling for industry fixed effects
	Year	YEAR	Controlling for fixed effects by year

Table 2. Descriptive Statistics

Variable	Sample size	Mean	25th percentile	Median	75th percentile	Standard deviation	Minimum	Maximum
GW	11657	-0.258	-1.067	-0.283	0.501	1.200	-4.408	5.083
POSTLIST	37299	0.377	0	0	1	0.485	0	1
Size	37299	22.11	21.19	21.96	22.91	1.440	14.94	28.70
Lev	37299	0.417	0.245	0.397	0.557	0.435	0.00600	63.97
ROA	37299	0.0410	0.0140	0.0420	0.0790	0.131	-14.59	7.249
Growth	37299	0.377	-0.0380	0.0900	0.248	12.22	-1.445	1878
Age	34403	2.039	1.386	2.197	2.890	0.978	0	3.526

Copyright @ STEMM Institute Press

Top1	35681	33.44	22.04	31.08	43.02	14.83	0.286	89.99
Double	34164	0.320	0	0	1	0.466	0	1
Board	35158	2.103	1.946	2.197	2.197	0.199	1.099	2.890

5. Analysis of Empirical Results

5.1 Test for Parallel Trends

The dynamic evolution of the parallel trend assumption is visualized in Figure 1. Specifically, the abscissa tracks the timeline relative to the reform (Year 0), where the intervals -4 to -1 and 1 to 7 represent the pre- and post-treatment windows, respectively. The point estimates regarding the policy's impact are plotted along the ertical dimension, with vertical whiskers denoting confidence levels at the 95% threshold.It can be seen that prior to policy implementation, all estimated coefficients fluctuated around 0, and the confidence intervals all included 0, indicating that there was no distinct discrepancy in trends across the treatment and control groups prior to the policy shock; the parallel trends assumption is thus satisfied.In all years subsequent to the enforcement of the short-selling policy, however, all estimated coefficients were significantly negative, and the absolute values of the coefficients showed a gradual increase over time. This demonstrates that the easing of short-selling restrictions has a material inhibitory impact on corporate greenwashing, and that this effect is a dynamically strengthening process.

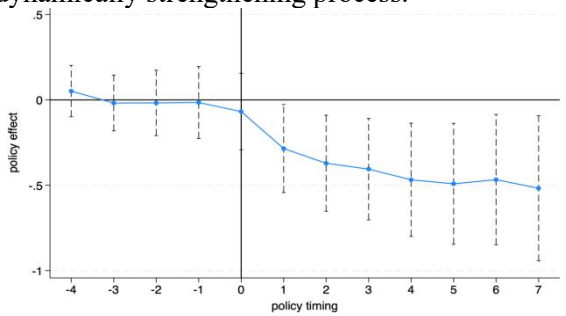

Figure 1. Results of the Parallel Trend Test

5.2 Baseline Regression

Table 3 reports the baseline regression outcomes that examine the association between the relaxation of short-selling restrictions and corporate greenwashing. The dependent variable is the firm's greenwashing level (GW) in the preceding period, with the key independent variable being the easing of short-selling limitations (POSTLIST). Firm-specific, industry-wide, and time-invariant heterogeneities are systematically controlled within regression framework. To address issues of serial correlation, firm-level clustering is implemented for all estimated robust standard errors..The regression results show that in Column (1), the coefficient of POSTLIST is −0.168 and is significant at the 1% level, indicating that when a firm is added to the designated list and short selling commences, its level of greenwashing in the following year is significantly suppressed.In Column (3), after further incorporating control variables, the coefficient of POSTLIST is −0.143, which remains significant at the 1% level. This conclusion is consistent with that of Column (1), indicating that the findings of this study remain robust even after controlling for firm-specific heterogeneity.

Table 3. Baseline Regression Results.

	(1)	(2)	(3)
	GW	GW	GW
POSTLIST	-0.168***		-0.143***
	(0.047)		(0.047)
Size		0.016	0.034
		(0.041)	(0.041)
Lev		0.539***	0.526***
		(0.161)	(0.160)
ROA		-1.375***	-1.372***
		(0.266)	(0.266)
Growth		-0.079***	-0.087***
		(0.028)	(0.028)
Age		-0.329***	-0.290***
		(0.073)	(0.073)
Top1		0.002	0.001
		(0.003)	(0.003)
Board		0.148	0.145
		(0.123)	(0.122)
Double		-0.005	-0.003
		(0.049)	(0.049)
Individual	Control	Control	Control
Industry	Control	Control	Control
Year	Control	Control	Control
Sample size	9379	9379	9379
R-squared	0.288	0.300	0.301

Note: Figures in brackets represent cluster-robust standard errors at the firm level; *, **, *** denote significance levels of 10%, 5% and 1% respectively; the same applies throughout.

5.3 Robust Tests

5.3.1 Placebo test

 Copyright @ STEMM Institute Press

To eliminate the interference effects of stochastic factors, this study adopts a placebo test to validate its core research hypothesis. The treatment group is comprised of 1,000 corporate entities, which were integrated into the study via a random selection mechanism from the original dataset, and the baseline regression was repeated 1,000 times to obtain the pseudo-estimated coefficients and their p-values for the core explanatory variables, as shown in Figure 2 of the kernel density plot.The test results show that the kernel density distribution of the pseudo-estimated coefficients is symmetrical with a centre at 0, and the p-values corresponding to the vast majority of pseudo-coefficients are all higher than 0.1, indicating that the random simulation did not produce any significant pseudo-effects; the true coefficient of POSTLIST in the baseline regression, -0.143 (dotted line), lies to the left of the distribution of pseudo-coefficients and is significantly separated from the results of the random simulation. The above results confirm that the conclusions of this paper possess good robustness.

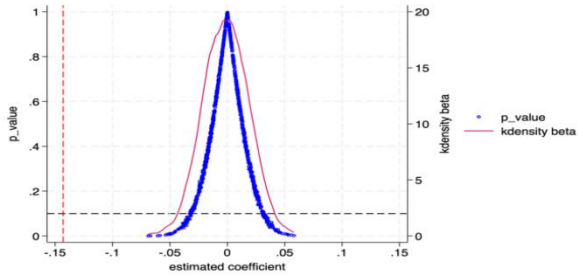

Figure 2. Results of the Placebo Test

5.3.2 Interactive fixed effects

To mitigate omitted variable bias caused by unobservable factors that vary jointly across industries and over time, this paper follows the approach of Duan Sha (2025) [31] by introducing an interaction term between industry fixed effects and year fixed effects; following testing, the conclusions of this paper remain robust.

5.3.3 Use of a multi-period lagged dependent variable

Drawing on the methodology of Qiang Guo-ling and Li Hao (2025) [25], this paper applies a two-period lag treatment to the degree of corporate greenwashing. The empirical evidence presented in Table 5 indicates tha the coefficient of the core explanatory variable (POSTLIST) is –0.397, which is significant at the 1% level and passes robustness tests. Furthermore, this coefficient's absolute value exceeds that of the baseline regression coefficient, suggesting that the governance effects of the short-selling regime exhibit a degree of persistence and reach their optimal level within the following two years.

Table 5. Results of Multi-Period Regression.

	(1)
	GW two periods ahead
POSTLIST	-0.397***
	(0.072)
Size	0.245***
	(0.045)
Lev	0.194
	(0.180)
ROA	-1.146***
	(0.267)
Growth	-0.057*
	(0.030)
Age	-0.336***
	(0.080)
Top 1	0.000
	(0.003)
Board	0.177
	(0.127)
Double	-0.020
	(0.051)
Individual	Control
Industry	Control
Year	Control
Sample size	7956
Within R^2	0.313

Parallel trend test for the two pre-GW phases:

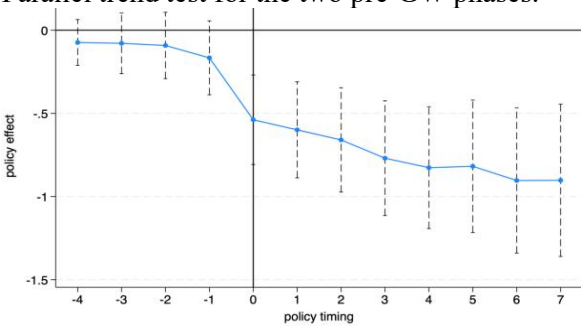

Figure 3. Results of the Parallel Trend Test

Placebo test for the two pre-GW phases:

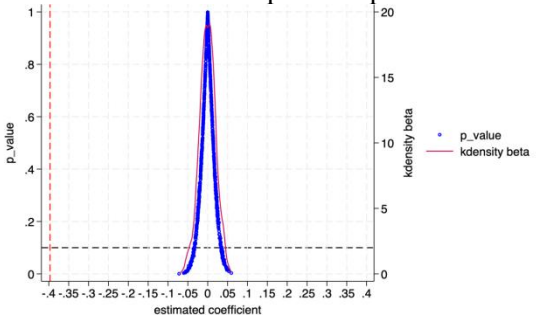

Figure 4. Results of the Placebo Test

6. Further Analysis

6.1 Mechanism Testing

Rooted in the analytical insights concerning the relaxation of short-selling constraints and corporate greenwashing presented earlier, short-selling governance primarily relies on two pathways: information mining and risk deterrence. To test its transmission mechanism, this paper draws on the two-step approach to mediating mechanism testing proposed by Jiang Ting (2022) [32] proposed two-step approach for testing mediating mechanisms, and constructed the following model for analysis. Here, $M_{i,t}$ is the mediating variable, and the selection of control variables remains consistent with the preceding discussion.

$$M_{i,t}=\alpha+\beta_1 POSTLIST_{i,t}+\sum \gamma Controls_{i,t} + \sum IND + \sum YEAR+\varepsilon_{i,t} \quad (3)$$

6.1.1 Mechanism testing based on information uncovering

As mentioned earlier, the short-selling system can enhance market transparency, thereby counteracting companies' abuse of private information for profit. As information intermediaries in the capital market, analysts can delve deeply into companies' hidden non-financial information (Li Wenqi et al., 2025) [33]. Furthermore, the information they gather is rapidly disseminated through analyst channels and is readily trusted by investors. Consequently, analyst attention not only enriches market information but also enhances the efficiency of information transmission. Based on this, this paper uses analyst attention as a proxy for the level of information transparency-specifically, the number of analysts (or teams) that have tracked and analysed the company within a year-to verify the governance impacts of the short-selling regime based on information mining.The regression results are shown in Table 10: the coefficient of the core explanatory variable (POSTLIST) in column (2) is significantly positive, indicating that relaxing short-selling restrictions can attract analyst attention to a firm. Drawing on existing literature, this paper examines the impact of analyst attention on corporate greenwashing: analyst coverage and attention can reduce information asymmetry and play a supervisory role, effectively reducing the extent of a firm's 'greenwashing' (Wang et al., 2024;Liu et al., 2023) [34][35]. On this basis, it can be concluded that the implementation of short-selling regulations restricts the scope for management to defraud investors using false information, compelling firms to fulfil their responsibilities in good faith rather than merely engaging in elaborate disclosure and public relations.

6.1.2 Testing the mechanism based on risk deterrence

As discussed earlier, the relaxation of short-selling restrictions can also exert supervisory pressure on management, curbing opportunistic and self-serving behaviour. Institutional investors possess deeper professional expertise and investigative capabilities compared to retail investors; amongst them, pressure-resistant investors, characterised by their social responsibilities and long-term investment horizons, have particularly strong incentives to exercise rigorous oversight over firms. In addition to actively applying pressure, the threat of institutional investors withdrawing their investments is sufficient to further deter firms.Consequently, this paper uses the shareholding proportion of pressure-resistant institutional investors to represent the degree of oversight and constraint-specifically, the combined shareholding ratio of three types of institutional investors: Qualified Foreign Institutional Investors, insurance companies, and social security funds-to investigate the governance effects of short-selling regulations based on risk deterrence. The corresponding regression outcomes are presented in Table 10: in column (2), the coefficient of the core explanatory variable (POSTLIST) is significantly positive, indicating that relaxing short-selling restrictions increases the shareholding proportion of pressure-resistant investors.Drawing on existing literature, this paper examines the impact of holdings by pressure-resistant institutional investors on corporate greenwashing: Cepêda et al (2025) [36] note that long-term institutional investors can mitigate the disconnect in corporate ESG performance, whilst also weakening the role of management's short-termism in promoting greenwashing (Gao and Yin, 2025) [37]. On this basis, it can be concluded that the implementation of short-selling regulations enhances external oversight of firms, regulating corporate ESG performance by exerting risk pressure on management, thereby reducing greenwashing behaviour.

 Copyright @ STEMM Institute Press

Table 10. Regression Results of the Mechanism Test.

	GW	Analyst	Institution
POSTLIST	-0.143***	0.955**	0.160**
	(0.047)	(0.433)	(0.070)
Size	0.034	4.656***	-0.022
	(0.041)	(0.390)	(0.037)
Lev	0.526***	0.122	-0.145
	(0.160)	(1.588)	(0.176)
ROA	-1.372***	46.959***	1.018***
	(0.266)	(2.838)	(0.390)
Growth	-0.087***	-0.255	0.025
	(0.028)	(0.247)	(0.049)
Age	-0.290***	4.649***	0.335***
	(0.073)	(0.625)	(0.087)
Top 1	0.001	-0.024	0.000
	(0.003)	(0.022)	(0.002)
Board	0.145	-1.020	-0.116
	(0.122)	(1.070)	(0.143)
Double	-0.003	0.317	0.068
	(0.049)	(0.442)	(0.051)
Individual	Control	Control	Control
Industry	Control	Control	Control
Year	Control	Control	Control
Sample size	9,379	9079	3,894
R-squared	0.301	0.207	0.910

6.2 Heterogeneity Test

6.2.1 Heterogeneity in the rule of law environment

As the external formal institutional environment faced by firms, the rule of law environment imposes rigid constraints on corporate behaviour. To examine whether the governance effects of short-selling regulations vary across regions depending on the local rule of law environment, this paper employs the indicator system measuring market intermediary development and legal institutional environment, which was constructed by Fan Gang. Taking the median value of the rule of law level across the full sample as the cut-off point, the sample is divided into a low-rule-of-law subgroup and a high-rule-of-law subgroup, and heterogeneity group regression is conducted.Table 6 reports the corresponding regression results: in the low-rule-of-law group, the coefficient of the core explanatory variable (POSTLIST) is –0.159, which is significant at the 5% level; in the high-rule-of-law group, it is not significant.This empirical finding demonstrates that a notable substitution effect exists between short-selling regulations and the rule-of-law institutional environment: in regions with a weaker rule of law environment, short-selling regulations can effectively fill gaps in external governance and exert a restraining effect on corporate misconduct; whereas in regions with a stronger rule of law environment, a well-established legal system has already established norms for corporate ESG behaviour, significantly weakening the marginal governance effect of short-selling regulations.

6.2.2 Heterogeneity in industry pollution attributes

For firms themselves, greenwashing behaviour is influenced by the pollution characteristics of their industry (Li Sumui and Tian Zhuzhu, 2024) [38]. To further verify whether the governance effects of short-selling regulations also vary with the degree of industry pollution, this study utilises the heavy-pollution grouping index developed by Li Jinglin et al. (2021) [39] to classify the sample into high-pollution and low-pollution categories to facilitate a heterogeneity analysis. The regression results are shown in Table 6: in the lightly polluting group, the coefficient of the core explanatory variable (POSTLIST) is -0.130, which is significant at the 5% level; in the heavily polluting group, the coefficient is -0.169, which is also significant at the 5% level and has a larger absolute value.The empirical results reveal that the short-selling regime exerts a notable inhibitory effect on greenwashing behavior among enterprises both in lightly and heavily polluting industries,with this influence being more substantial in the high-pollution group. Enterprises in heavily polluting industries face stricter environmental regulation and public scrutiny, resulting in a higher probability of greenwashing being exposed and greater reputational costs following short-selling attacks. In contrast, the lightly polluting group faces relatively less pressure regarding ESG disclosure, and the marginal regulatory effect of short-selling restrictions is correspondingly weaker.

6.2.3 Regional heterogeneity

To investigate whether the governance pathways unique to the short-selling regime also exhibit regional variations, this study categorises the sample firms according to their registered locations into western, central and eastern regions, and conducts a heterogeneity analysis. The regression results are shown in Table 6: the deterrent effect of the short-selling regime generally exhibits a gradient pattern, with the

Copyright @ STEMM Institute Press

strongest effect in the west, followed by the east, and no significant effect in the central region.This heterogeneity may stem from regional environmental differences: the western region lags behind in economic development, with weaker normative constraints on corporate ESG disclosure and a lack of strict external supervision; the introduction of short-selling regulations can thus fill governance gaps, more thoroughly uncover greenwashing and alleviate information asymmetry. In the eastern region, external supervision has already imposed effective constraints on enterprises, significantly reducing the scope for greenwashing, thereby diminishing the governance value of short-selling regulations.The central region, however, may lie at the intersection of these two areas, possessing neither obvious governance gaps nor a mature supervisory system, making it unclear whether the short-selling regime can be effective there.

Table 6. Regression Results of Heterogeneous Grouping.

	Low Rule of Law Group	High Rule of Law Group	Low Pollution Group	Heavily Polluted Group	Western	Central	East
	GW	GW	GW	GW	GW	GW	GW
POSTLIST	-0.159**	-0.067	-0.130**	-0.169**	-0.315**	-0.109	-0.113**
	(0.072)	(0.064)	(0.057)	(0.084)	(0.125)	(0.121)	(0.054)
Size	0.021	0.101	0.052	0.047	0.106	-0.102	0.038
	(0.058)	(0.064)	(0.053)	(0.071)	(0.118)	(0.097)	(0.051)
Lev	0.415*	0.362*	0.516***	0.585**	0.469	-0.108	0.581***
	(0.247)	(0.216)	(0.188)	(0.287)	(0.391)	(0.444)	(0.185)
ROA	-1.655***	-1.267***	-1.642***	-1.065**	-2.024***	-1.576**	-1.164***
	(0.398)	(0.364)	(0.350)	(0.414)	(0.620)	(0.772)	(0.325)
Growth	-0.124***	-0.087**	-0.104***	-0.044	-0.083	-0.167**	-0.067*
	(0.040)	(0.041)	(0.035)	(0.047)	(0.072)	(0.075)	(0.034)
Age	-0.253**	-0.316***	-0.306***	-0.253*	-0.951***	0.056	-0.286***
	(0.127)	(0.097)	(0.084)	(0.147)	(0.206)	(0.222)	(0.079)
Top 1	0.003	0.002	0.003	-0.000	-0.012	0.018**	-0.000
	(0.004)	(0.004)	(0.004)	(0.005)	(0.007)	(0.007)	(0.004)
Board	0.123	0.316*	0.082	0.142	0.658**	-0.292	0.118
	(0.170)	(0.179)	(0.143)	(0.227)	(0.317)	(0.319)	(0.150)
Double	0.025	-0.035	0.011	-0.031	0.074	0.029	-0.052
	(0.068)	(0.076)	(0.056)	(0.097)	(0.150)	(0.114)	(0.059)
Individual	Control	Control	Control	Control	Control	Control	Control
Industry	Control	Control	Control	Control	Control	Control	Control
Year	Control	Control	Control	Control	Control	Control	Control
Sample size	4649	4730	6219	3160	1228	1564	6526
R-squared	0.283	0.287	0.287	0.333	0.355	0.241	0.324

7. Research Conclusions and Recommendations

This paper examines the impact of short-selling regulations on corporate greenwashing behaviour, using Chinese A-share listed companies from 2014 to 2023 as the research sample. The findings reveal that: (1) Regression results indicate that relaxing short-selling restrictions significantly reduces the extent of greenwashing in the subsequent period. (2) Mechanism tests suggest that the regulatory mechanism of relaxing short-selling restrictions works by enhancing market transparency through information discovery and curbing managerial opportunism via risk deterrence, thereby ultimately mitigating corporate greenwashing. (3) Heterogeneity analysis reveals that the short-selling regime's mitigating effect on corporate greenwashing is most pronounced in firms operating in environments with weaker rule of law, within heavily polluting industries, and located in western China.

On the basis of the research conclusions summarized above, this study advances the corresponding policy suggestions as follows.

First, the results of the benchmark regression analysis in this paper indicate that relaxing short-selling restrictions can curb greenwashing behaviour among listed companies. Therefore,

 Copyright @ STEMM Institute Press

taking into account the specific context of China's capital market, the implementation of short-selling regulations should be appropriately advanced, with emphasis placed on their corrective role in non-financial domains. This will serve to ensure that companies comply with disclosure requirements and act in good faith, thereby genuinely responding to the national call to assume environmental responsibilities.

Second, As evidenced by the findings regarding the rule of law environment, industry pollution characteristics and regional heterogeneity, the implementation of the system should not be applied indiscriminately. Instead, policies should be tailored to local conditions, with a focus on the governance effectiveness of the short-selling system in regions with weak rule of law, heavily polluting industries and western China, as it is expected to act as a market force to compensate, to some extent, for governance deficiencies in these areas.

Third, Based on the findings of the mechanism evaluation, the short-selling regime curbs corporate greenwashing by enhancing information transparency and imposing constraints on management. Should the short-selling regime fail to fully realise its potential, the aforementioned two governance approaches can be strengthened to regulate market order, improve information quality, and protect investor rights.

References

[1] Huang Shizhong. 'Greenwashing' and Anti-Greenwashing in ESG Reporting [J]. Accounting Monthly, 2022, (01): 3–11.

[2] Zhang Zhang, Wang Meng. Can Short Selling Improve the Quality of Disclosure in Management's Discussion and Analysis? [J]. Accounting Monthly, 2021, (06): 85–93.

[3] Xu Xixiong, Zhan Heng, Li Wanli. Short-selling Mechanisms, Dual Governance and Corporate Non-compliance: An Empirical Test from a Market-oriented Governance Perspective [J]. Financial Research, 2021, (10): 190-206.

[4] Hou Qingchuan, Jin Qinglu, Liu Yang. Deregulation of Short Selling and Corporate Cash Value: A Quasi-Experimental Study Based on the Chinese Capital Market [J]. Financial Research, 2016, (11): 112–127.

[5] Wang Ping, Du Songhua. The Effect of Short Selling Mechanisms on Earnings Information Quality: An Analysis Based on 'Truthful Reflection' and 'Decision Relevance' [J]. Journal of Henan Normal University (Philosophy and Social Sciences Edition), 2023, 50(01): 65–71.

[6] Lu P, Wang Y, Li B. Short selling and corporate financial fraud: Empirical evidence from China[J]. International Review of Economics & Finance, 2024, 89: 1569–1582.

[7] Liu Yanxia, Qi Huajin. Does Managerial Confidence Affect On-the-Job Consumption? - With a Discussion on the External Governance Effects of the Margin Trading System [J]. Management Review, 2019, 31(04): 187–205.

[8] Kang Wen, Liu Lizhen. Relaxation of Short-Selling Restrictions, Internal Governance and Corporate Overinvestment: Empirical Evidence from the Margin Trading System [J]. Taxation and Economy, 2022, (03): 89–98.

[9] Jian Lei, Wang Xiaojia. Has the Relaxation of Short-Selling Restrictions Exacerbated Corporate Short-Term Borrowing for Long-Term Investment? [J]. Accounting Research, 2024, (07): 118–130.

[10] Luo Yuxin, Dou Chao, Zhai Jinbu. Can Margin Trading Improve the Fulfilment Rate of Earnings Commitments? [J]. Accounting Research, 2024, (03): 80–93.

[11] Chen Qian, Zhang Shuai, Qu Rui, et al. A Study on the Impact of Relaxing Short Selling Restrictions on the ESG Performance of Listed Companies [J]. Journal of Xi'an University of Technology, 2024, 40(03): 338–349.

[12] Sun, Zeyu; Qi, Baolei. 'The Relaxation of Short-Selling Restrictions and Corporate Social Responsibility: A Quasi-Natural Experiment Based on the Margin Trading System' [J]. Contemporary Finance and Economics, 2020, (02): 125–137. D

[13] Christophe S E, Hsieh J, Lee H. Reputation and recency: How do aggressive short sellers assess ESG-related information? [J]. Journal of Business Research, 2024, 180: 114718.

[14] Fang Libing, Liu Ye. The Major Expansion of Margin Trading: Has the Pricing Efficiency of Underlying Stocks Improved? [J]. Securities Market Bulletin, 2014, (10): 56–61+68.

[15] Bushman, R. M., & Pinto, J. (2020). The influence of short selling on the production

Copyright @ STEMM Institute Press

and market consequences of negative press coverage [J]. Management Science, Accepted.

[16] Song Shunlin, Cao Aocheng. Short Selling and the Efficiency of Initial Public Offering Pricing [J]. Accounting Research, 2024, (10): 123–135.

[17] Zheng Li, Fang Kang, Wang Yuanyuan. A Study on the Relationship between Dual Performance Feedback Inconsistency and the Quality of Corporate ESG Disclosure [J]. Research and Development Management, 2024, 36(01): 53–65.

[18] He Xingxing, Zhang Fenghui, Qin Lanli. Testing the Herd Effect of Corporate ESG 'Say-Do Discrepancies' [J]. Accounting Monthly, 2024, 45(07): 63–71.

[19] Cao Xiang, Qiu Li. 'Substantive Adjustment' or 'Strategic Response': Carbon Emission Trading Policies and Corporate Strategic Transformation [J/OL]. Financial and Economic Forum, 1–16 [15 March 2026].

[20] Xi Mingming, Li Ting, Zhang Luqianyi. Online Media Oversight and Corporate Environmental Responsibility: 'Much Talk, Little Action'-A Classification Measurement Using AI Technology Based on Large Language Models [J]. Journal of Lanzhou University (Social Sciences Edition), 2025, 53(03): 159–176.

[21] Liu Hewang, Luo Yong, Zheng Shilin. Strengthening Environmental Justice and Corporate ESG Performance: Evidence from the Establishment of Environmental Courts [J]. Inner Mongolia Social Sciences, 2024, 45(05): 161–171+213.

[22] Wang Yichen, Zhou Zejiang. Social Trust and Corporate ESG 'Greenwashing' [J]. Journal of Finance and Economics, 2025, (11): 76–85.

[23] Han Jie, Xiong Yongchao. Customer ESG Performance and Investment in Supplier Relationship Specificity [J]. Business Research, 2025, (02): 141–152.

[24] Li Tao, Wang Zidong, Yiliqi. Can Digital Transformation Curb Corporate 'Greenwashing'? - Empirical Evidence from ESG Reports of Chinese Listed Companies [J]. Accounting & Finance Bulletin, 2025, (17): 56–60.

[25] Qiang Guoling, Li Hao. Can Patient Capital Curb Corporate Greenwashing? [J]. Accounting Monthly, 2025, 46(22): 47–52.

[26] Shen Hongtao, Huang Zhen, Guo Fangru. Confession or Defence? - A Study on the Relationship between Corporate Environmental Performance and Environmental Disclosure [J]. Nankai Management Review, 2014, 17(02): 56–63+73.

[27] You Wanhai, Chen Senjie, Chen Jianyong, et al. The Impact of 'Talking the Talk but Not Walking the Walk' Environmental Responsibility Performance on the Risk of Stock Price Crashes: A Mediation Effect Based on Investor Sentiment [J]. Chinese Journal of Management Science, 2025, 33(10): 12–23.

[28] Wang Fei, Wen Zhen. A Study on the Impact of the Margin Trading System on Corporate Governance of Listed Companies: An Analysis from the Perspective of Promoting Corporate Social Responsibility [J]. Price Theory and Practice, 2022, (08): 106–109.

[29] Long Li, Wang Hanhuan, Zhang Min. "Fanning the Flames" or "Separating the Wheat from the Chaff": Investor Perception of Environmental Risk and Corporate ESG Greenwashing [J]. Accounting Research, 2025, (08): 120–132.

[30] Sun Junxiu, Tan Weijie, Guo Feng. A Re-evaluation of Mainstream ESG Ratings in China [J]. Financial Research, 2024, 50(05): 4–18+78.

[31] Duan Sha. Corporate ESG Behaviour under the Short Selling Mechanism: An Analysis of Effects, Mechanisms and Motivations [J]. Finance and Accounting Bulletin, 2025, (24): 51–55.

[32] Jiang Ting. Mediating and Moderating Effects in Empirical Studies of Causal Inference [J]. Chinese Journal of Industrial Economics, 2022(5): 100–120.

[33] Li Wenqi, Li Yuxuan, Zhao Jiawei. A Study on the Impact of External Attention on the Quality of Corporate Green Innovation: A Perspective Based on Analyst Attention [J]. Accounting Friend, 2025, (21): 136–144.

[34] Wang Y, Hu F, Wang Y. Analyst coverage and greenwashing: Evidence from Chinese A-share listed companies[J]. International Review of Economics & Finance, 2024, 94: 103423.

[35] Liu Y, Zhang J, Dai Y. Analyst following and greenwashing decisions[J]. Finance Research Letters, 2023, 58: 104510.

 Copyright @ STEMM Institute Press

[36]Cepêda C, Monteiro A P, Aibar-Guzmán B. Bridging the ESG credibility gap: The role of institutional investors in mitigating ESG decoupling[J]. Business Strategy and the Environment, 2025, 34(6): 7139–7160.

[37]Gao L, Yin H. Managerial myopia and greenwashing: A machine learning and text analysis approach[J]. International Review of Financial Analysis, 2025, 105: 104452.

[38] Li, S. M., & Tian, Z. Z. Can digital transformation improve corporate greenwashing behaviour? [J]. Finance and Economics, 2024, (04): 39–50+65.

[39] Li Jinglin, Yang Zhen, Chen Jin, et al. A Study on the Mechanisms by Which ESG Enhances Corporate Performance: A Perspective Based on Corporate Innovation [J]. Science of Science and Technology Management, 2021, 42(09): 71–89.

Copyright @ STEMM Institute Press