

Monitoring Sustainability: Can Social Security Fund Ownership Curb ESG Greenwashing?

Dehua Xia

Institute of Finance, Corvinus University of Budapest,
dehua.xia@stud.uni-corvinus.hu

Jiawen Cui

Budapest Metropolitan University
cuijiawen72@gmail.com

Thanh Thuy Trang Nguyen

Doctoral School of Entrepreneurship and Business, Budapest University of
Economics and Business
trang.thanh.thuy.nguyen.28@unibge.hu

Abstract: This study investigates whether ownership by China's National Social Security Fund (NSSF) reduces ESG greenwashing among listed firms over the period 2011–2022. Against the backdrop of growing concerns about the credibility of ESG disclosures, we examine the governance role of a large public institutional investor in constraining opportunistic reporting. Using a panel dataset of Chinese A-share firms, we find that higher NSSF shareholdings are significantly associated with lower levels of ESG greenwashing, indicating that firms with greater NSSF ownership are less likely to overstate their sustainability performance. Further analysis shows that this effect operates through enhanced monitoring and stronger incentives for credible disclosure, and is amplified in firms with greater analyst attention, highlighting the complementary role of external information intermediaries. In addition, the effect is more pronounced in state-owned enterprises, where alignment between institutional oversight and state governance structures strengthens monitoring effectiveness. The findings provide new evidence on the governance role of public institutional investors in improving the credibility of ESG disclosures and offer important implications for promoting more transparent and sustainable capital markets.

Keywords: Social security fund; ESG greenwashing; Analyst attention; Corporate governance

1 Introduction

In recent years, environmental, social, and governance (ESG) practices have become increasingly central to corporate strategy, driven by growing pressure from investors, regulators, and other stakeholders. A large body of evidence suggests that sustainable and responsible business conduct is associated with improved long-term financial performance [1]. Moreover, recent studies show that climate risk disclosure can significantly affect stock market outcomes such as liquidity, highlighting the economic consequences of credible ESG information [2]. As a result, firms are increasingly motivated to disclose ESG-related information to signal their commitment to sustainability. However, the rapid expansion of ESG disclosure has also raised concerns about its credibility. In particular, firms may engage in “greenwashing,” selectively disclosing favorable information while concealing poor ESG performance, thereby misleading investors and undermining market transparency [3], [4].

Existing research highlights the important role of external monitoring mechanisms in mitigating greenwashing behavior. Institutional and regulatory environments, such as China’s Social Credit System and environmental audits, have been shown to reduce greenwashing and enhance disclosure credibility [5]. Corporate governance factors, including board characteristics and ownership structure, also play a significant role in constraining opportunistic ESG reporting [6]. In addition, external information intermediaries, such as media and financial analysts, can improve transparency and exert reputational pressure on firms, thereby discouraging greenwashing [7]. In particular, recent studies show that investor attention and online information environments can significantly enhance corporate environmental disclosure and transparency [8]. More recently, studies have emphasized the monitoring role of institutional investors, showing that higher institutional ownership and active engagement can reduce information asymmetry and curb greenwashing behavior [9]. Moreover, the presence of green-oriented investors has been shown to influence corporate behavior and improve market outcomes, further underscoring the governance role of sustainability-focused capital [10].

Despite these advances, the existing literature has largely focused on private institutional investors, while the role of public institutional investors remains underexplored. In particular, state-level investors, such as sovereign or national funds, possess unique characteristics that may distinguish their governance effects. These investors often combine governmental objectives with market-oriented investment strategies, potentially leading to stronger monitoring incentives and greater influence on corporate behavior. However, empirical evidence on how such public institutional investors affect ESG disclosure credibility, especially in emerging markets, remains limited.

This study addresses this gap by examining the role of China's National Social Security Fund (NSSF) in curbing corporate ESG greenwashing. As one of the largest public institutional investors in China, the NSSF holds significant stakes in listed firms and operates with a long-term investment horizon. Its dual identity, balancing state objectives with market-based investment rationality, positions it as a potentially effective monitor of corporate behavior. Using a panel dataset of Chinese A-share listed firms from 2011 to 2022, this study investigates whether NSSF ownership reduces ESG greenwashing and explores the underlying mechanisms.

The empirical results show that higher NSSF ownership is associated with significantly lower levels of ESG greenwashing, suggesting that the NSSF plays an important governance role in enhancing disclosure credibility. Furthermore, the monitoring effect is stronger in firms with greater analyst attention, highlighting the complementary role of external information intermediaries. The effect is also more pronounced in state-owned enterprises, where institutional oversight is more closely aligned with state governance structures.

This study contributes to the literature in several ways. First, it extends research on ESG greenwashing by providing new evidence on the role of public institutional investors in improving disclosure credibility. Second, it enriches the literature on institutional investors by highlighting the unique governance function of state capital in emerging markets. Third, it offers important policy implications for strengthening ESG regulation and promoting high-quality capital market development in China.

The remainder of the paper is organized as follows. Section 2 describes the data, variables, and empirical methodology. Section 3 presents the empirical results. Section 4 provides robustness checks and additional analyses. Section 5 concludes.

2 Methodology

2.1 Sample selection and data source

This study uses a panel dataset of Chinese A-share listed firms from 2011 to 2022. The sample is constructed from multiple databases to ensure comprehensive coverage of financial and ESG-related information. Specifically, firm-level financial and accounting data are obtained from the China Securities Market and Accounting Research (CSMAR) database. ESG performance data are collected from the Wind Database, while ESG disclosure data are sourced from Bloomberg.

Following standard practice in the literature, several screening procedures are applied. First, financial firms are excluded due to their distinct regulatory

environment and financial structure. Second, firms designated as ST or *ST are removed to avoid the influence of financial distress. Third, observations with missing key variables are excluded. The final sample consists of 2,529 firm-year observations.

2.2 Dependent variable

The dependent variable in this study is ESG greenwashing (Greenwashing), which captures the extent to which firms overstate their sustainability performance. Following prior literature, greenwashing is measured as the standardized difference between ESG disclosure and ESG performance:

$$\text{Greenwashing} = \left(\frac{ESG_{dis,i,t} - \text{mean}(ESG_{dis})}{\text{std}(ESG_{dis})} \right) - \left(\frac{ESG_{per,i,t} - \text{mean}(ESG_{per})}{\text{std}(ESG_{per})} \right)$$

where $ESG_{dis,i,t}$ denotes the ESG disclosure score of firm i in year t , and $ESG_{per,i,t}$ represents the firm's actual ESG performance. The terms $\text{mean}(ESG_{dis})$ and $\text{std}(ESG_{dis})$ refer to the sample mean and standard deviation of ESG disclosure, while $\text{mean}(ESG_{per})$ and $\text{std}(ESG_{per})$ denote those of ESG performance.

2.3 Independent variable

The key independent variable is the shareholding of China's National Social Security Fund (NSSF). It is measured as the percentage of shares held by the NSSF in a given firm-year.

As a large public institutional investor with long-term investment horizons, the NSSF has both the incentive and capacity to monitor corporate behavior. Its ownership is expected to mitigate managerial opportunism and enhance the credibility of ESG disclosures through improved governance and oversight.

2.4 Control variables

To mitigate potential omitted variable bias, this study controls for a set of firm-level characteristics that may influence ESG greenwashing behavior. Specifically, leverage (Leverage) is measured as the ratio of total liabilities' book value to total assets to capture firms' reliance on external financing; firm size (Firm_size) is included as an indicator of firm scale. Return on assets (ROA) is a measure of profitability. In addition, a state-owned enterprise indicator (SOE) is included to account for state ownership. Corporate governance factors are further controlled for by including CEO-board chair duality (CEO_Duality) to assess the separation of managerial roles, the shareholding ratio of the top 10 shareholders (Top10) to measure ownership concentration, and board size (Boardsize) as an indicator of

internal governance. Finally, industry and year fixed effects are included to control for unobservable heterogeneity across industries and time.

2.5 Model specification

To examine the impact of NSSF ownership on ESG greenwashing, the following baseline regression model is estimated:

$$\text{Greenwashing}_{i,t+1} = \beta_0 + \beta_1 \text{NSSF}_{i,t} + \text{Controls}_{i,t} + \text{IndustryFE} + \text{YearFE} + \varepsilon_{i,t+1}$$

where $\text{Greenwash}_{i,t+1}$ represents the level of ESG greenwashing for firm i in year $t+1$, and $\text{NSSF}_{i,t}$ is the NSSF's shareholding in year t . Control variables account for firm-specific characteristics, while industry and year fixed effects capture systematic differences across sectors and time periods.

The coefficient of interest, β_1 , measures the effect of NSSF ownership on ESG greenwashing. A negative and significant coefficient would support the hypothesis that NSSF shareholding reduces firms' greenwashing behavior by strengthening monitoring and improving disclosure credibility.

3 Results

3.1 Descriptive statistics

Table 1 reports the descriptive statistics of the main variables used in this study. The results show that the mean ESG greenwashing score is relatively low, suggesting that, on average, Chinese listed firms do not exhibit severe discrepancies between ESG performance and disclosure. However, the variation across firms is considerable, indicating substantial heterogeneity in greenwashing behavior.

The average shareholding of the National Social Security Fund is relatively small, but the standard deviation suggests meaningful variation across firms. This implies that although the NSSF typically holds a modest equity stake, its presence differs significantly across firms, providing sufficient variation for empirical analysis.

Regarding control variables, firm size, leverage, and profitability display reasonable distributions consistent with prior literature. Therefore, the descriptive statistics indicate that the sample is well-balanced and suitable for subsequent regression analysis.

Variable	N	Mean	Std. Dev.	Min	Median	Max
Greenwashing	2529	-0.463	1.261	-3.250	-0.481	2.850
NSSF	2529	1.622	1.354	0.006	1.190	12.360
Leverage	2529	0.469	0.189	0.0504	0.483	0.962
Firm_size	2529	23.397	1.242	20.202	23.320	26.159
ROA	2529	0.0618	0.0531	-0.320	0.0535	0.217
CEO_Duality	2529	0.213	0.410	0	0	1
SOE	2529	0.548	0.498	0.000	1.000	1.000
Top10	2529	62.963	14.860	22.435	63.350	94.655
Boardsize	2529	9.066	1.763	5.000	9.000	14.000

Table 1.
Descriptive statistics.

3.2 The relationship between NSSF and ESG greenwashing

Table 2 presents the baseline regression results examining the relationship between NSSF ownership and ESG greenwashing. The coefficient on NSSF is negative and statistically significant, indicating that higher NSSF shareholding is associated with lower levels of ESG greenwashing.

This finding supports the hypothesis that the NSSF, as a large public institutional investor, plays an effective monitoring role in corporate governance. Its long-term investment horizon and alignment with state objectives enable it to curb managerial opportunism and promote more credible ESG disclosure. The economic magnitude of the effect is also meaningful, suggesting that even relatively small ownership stakes by the NSSF can significantly reduce firms' tendency to overstate sustainability performance.

Variables	Greenwashing _{t+1} (1)	Greenwashing _{t+1} (2)
<i>NSSF</i>	-0.0491*** (0.0182)	-0.0413** (0.0182)
<i>Leverage</i>		-0.6458*** (0.2001)
<i>Firm_size</i>		0.1274*** (0.0296)
<i>ROA</i>		-0.1362 (0.5576)
<i>CEO_Duality</i>		0.1979*** (0.0657)
<i>SOE</i>		-0.1538*** (0.0592)
<i>Boardsize</i>		-0.0227 (0.0157)
<i>Industry FE</i>	Yes	Yes
<i>Year FE</i>	Yes	Yes

<i>Observations</i>	2529	2529
<i>Adj. R²</i>	0.013	0.028

Note: Robust standard errors are shown in parentheses, *p < 0.1; **p < 0.05; ***p < 0.01, respectively.

Table 2.
The relationship between NSSF and ESG greenwashing.

3.3 Do analysts play a crucial role in monitoring the firms?

Table 3 reports the moderating effect of analyst attention on the relationship between NSSF ownership and ESG greenwashing. The interaction term between NSSF and analyst attention is negative and statistically significant, indicating that NSSF's inhibitory effect on greenwashing is stronger in firms with higher analyst coverage.

This result suggests that external information intermediaries, such as financial analysts, enhance the effectiveness of institutional monitoring. By increasing transparency and information dissemination, analyst attention complements the NSSF's governance role, further constraining opportunistic disclosure behavior.

The findings highlight the importance of a joint monitoring mechanism in which internal governance by institutional investors and external scrutiny by analysts work together to improve the credibility of ESG reporting.

<i>Variables</i>	Greenwashing _{t+1} (1)
<i>NSSF</i>	0.0388 (0.0332)
<i>AnaAttention</i>	0.0111*** (0.0042)
<i>NSSF x AnaAttention</i>	-0.0030** (0.0012)
<i>Leverage</i>	-0.7328*** (0.2598)
<i>Firm_size</i>	0.1808*** (0.0393)
<i>ROA</i>	-0.6927 (0.7972)
<i>CEO_Duality</i>	0.2101** (0.0953)
<i>SOE</i>	-0.1775** (0.0837)
<i>Boardsize</i>	-0.0499** (0.0199)
<i>Industry FE</i>	Yes
<i>Year FE</i>	Yes

<i>Observations</i>	1431
<i>Adj. R²</i>	0.034

Note: Robust standard errors are shown in parentheses, *p < 0.1; **p < 0.05; ***p < 0.01, respectively.

Table 3
Do analysts play a crucial role in monitoring the firms?

3.4 Heterogeneity analysis

Table 4 presents the heterogeneity analysis based on firms' ownership structure. The results show that the negative relationship between NSSF ownership and ESG greenwashing is more pronounced in state-owned enterprises (SOEs) than in non-state-owned firms.

This finding can be explained by the closer alignment between the NSSF and state governance structures in SOEs. As a public institutional investor, the NSSF may exert stronger influence in firms where state ownership facilitates coordination and strengthens monitoring effectiveness.

In contrast, its governance impact is relatively weaker in non-SOEs, where institutional constraints and ownership fragmentation may limit its influence. In summary, the heterogeneity analysis reinforces the view that institutional context plays a crucial role in shaping the effectiveness of NSSF monitoring.

<i>Variables</i>	Non-SOE Greenwashing _{t+1} (1)	SOE Greenwashing _{t+1} (2)
<i>NSSF</i>	-0.0237 (0.0281)	-0.0484** (0.0241)
<i>Leverage</i>	0.1232 (0.3162)	-1.2561*** (0.2648)
<i>Firm_size</i>	-0.0238 (0.0510)	0.2154*** (0.0364)
<i>ROA</i>	0.4891 (0.8016)	-1.2750 (0.8048)
<i>CEO_Duality</i>	0.2272*** (0.0813)	0.0037 (0.1153)
<i>Boardsize</i>	-0.0255 (0.0254)	-0.0071 (0.0201)
<i>Industry FE</i>	Yes	Yes
<i>Year FE</i>	Yes	Yes
<i>Observations</i>	1144	1385
<i>Adj. R²</i>	0.010	0.046

Note: Robust standard errors are shown in parentheses, *p < 0.1; **p < 0.05; ***p < 0.01, respectively.

Table 4.
Heterogeneity analysis.

Conclusions

This study examines the role of China's National Social Security Fund in curbing corporate ESG greenwashing using a panel dataset of Chinese A-share listed firms from 2011 to 2022. Against the backdrop of increasing concerns about the credibility of ESG disclosures, this paper provides new evidence on whether and how a large public institutional investor can improve the authenticity of corporate sustainability reporting.

The empirical results show that NSSF ownership is significantly associated with lower levels of ESG greenwashing, suggesting that the NSSF plays an effective monitoring role in corporate governance. Despite relatively small shareholdings, its presence exerts a meaningful influence on firms' disclosure behavior, underscoring the importance of long-term, state-backed institutional investors in promoting transparency and reducing managerial opportunism.

Further analysis reveals that this monitoring effect is strengthened by external information environments. Specifically, the negative relationship between NSSF ownership and greenwashing is more pronounced among firms with greater analyst attention, suggesting that external scrutiny complements institutional monitoring. In addition, the NSSF's governance effect is stronger in state-owned enterprises, where alignment with state objectives enhances its ability to influence corporate behavior.

This study contributes to the literature by extending research on ESG greenwashing from the perspective of public institutional investors and by highlighting the unique governance role of state capital in emerging markets. It also provides practical implications for policymakers and regulators, suggesting that strengthening the participation of long-term institutional investors can improve the credibility of ESG disclosures and support the development of more transparent capital markets.

Nevertheless, this study has several limitations. First, the measurement of ESG greenwashing relies on an index constructed from disclosure and performance data, which may not fully capture all dimensions of opportunistic behavior. Second, although various control variables and empirical strategies are employed, potential endogeneity concerns cannot be entirely ruled out. Future research could explore alternative identification strategies, such as natural experiments, and examine the role of other types of institutional investors or cross-country settings.

References

- [1] A. Amel-Zadeh and G. Serafeim, “Why and How Investors Use ESG Information: Evidence from a Global Survey,” *Financial Analysts Journal*, vol. 74, no. 3, pp. 87–103, Jul. 2018, doi: 10.2469/faj.v74.n3.2.
- [2] S. Lei, Y. Chen, and D. Xia, “Does climate risk disclosure affect stock liquidity?,” *Research in International Business and Finance*, vol. 80, p. 103130, Aug. 2025, doi: 10.1016/j.ribaf.2025.103130.
- [3] M. A. Delmas and V. C. Burbano, “The Drivers of Greenwashing,” *California Management Review*, vol. 54, no. 1, pp. 64–87, Oct. 2011, doi: 10.1525/cmr.2011.54.1.64.
- [4] A. Dyck, K. V. Lins, L. Roth, and H. F. Wagner, “Do institutional investors drive corporate social responsibility? International evidence,” *Journal of Financial Economics*, vol. 131, no. 3, pp. 693–714, Mar. 2019, doi: 10.1016/j.jfineco.2018.08.013.
- [5] J. Xiong, L. Chen, Y. Zhu, and T. Maak, “Social Trust and Corporate Greenwashing: Insights from China’s Pilot Social Credit Systems,” *J Bus Ethics*, vol. 204, no. 4, pp. 855–883, Apr. 2026, doi: 10.1007/s10551-025-06076-9.
- [6] P. Chen and A. A. Dagestani, “Greenwashing behavior and firm value – From the perspective of board characteristics,” *Corporate Social Responsibility and Environmental Management*, vol. 30, no. 5, pp. 2330–2343, 2023, doi: 10.1002/csr.2488.
- [7] Y. Wang, F. Hu, and Y. Wang, “Analyst coverage and greenwashing: Evidence from Chinese A-Share listed corporations,” *International Review of Economics & Finance*, vol. 94, p. 103423, Jul. 2024, doi: 10.1016/j.iref.2024.103423.
- [8] D. Xia and J. Shi, “Individual investors’ online voice and corporate environmental information disclosure,” *Finance Research Letters*, vol. 62, p. 105262, Mar. 2024, doi: 10.1016/j.frl.2024.105262.
- [9] F. Zhu, H. Fan, and Z. Zheng, “The Disclosure Fog: Institutional Investors and Corporate Greenwashing,” *International Journal of Finance & Economics*, vol. 30, no. 4, pp. 3856–3874, 2025, doi: 10.1002/ijfe.3096.
- [10] D. Xia, “Green governance: The entry of green investors and stock liquidity,” *Finance Research Letters*, vol. 89, p. 109356, Feb. 2026, doi: 10.1016/j.frl.2025.109356.