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The Impact of State-Owned Equity Participation on the ESG Performance of Private Enterprises: Evidence from China

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Abstract

A robust ESG performance can confer a multitude of positive economic, social, and environmental benefits upon enterprises, thereby augmenting their long-term competitiveness and capacity for sustainable development. The operational activities of state-owned enterprises are more inclined towards the creation of social value, while state-owned equity participation alters the equity structure of private enterprises. Consequently, state-owned equity participation is posited as a pivotal mechanism for enhancing the ESG performance of private enterprises. Utilizing data from A-share listed private enterprises, this study examines the impact of state-owned equity participation on the ESG performance of these entities. Through the construction of a two-way fixed-effects model, the study substantiates that state-owned equity participation significantly bolsters the performance of private enterprises. The robustness of this conclusion is maintained following the application of a PSM-DID model, instrumental variable approach, and a series of robustness checks. Mechanism analysis reveals that state-owned equity participation enhances ESG performance through the governance effect of state-owned shareholders, by increasing the willingness of private enterprises to fulfill ESG responsibilities and alleviating resource constraints. Heterogeneity analysis indicates that the enhancement in ESG performance is more pronounced among heavily polluting enterprises and those in highly competitive industries, with the effect intensifying as the degree of state-owned equity participation deepens. This paper extends the discourse on the pathways of state-owned equity participation and corroborates its positive influence on the ESG performance of private enterprises.

Keywords

State-Owned Equity Participation, ESG Performance, Non-Controlling Shareholders, Financing Constraints

1. Introduction

In August 2015, the Central Committee of the Communist Party of China and the State Council jointly issued the Guiding Opinions on Deepening the Reform of State-Owned Enterprises, explicitly encouraging state capital to participate in non-state-owned enterprises through various methods. This marked the beginning of a new phase of mixed-ownership reform known as state-owned equity participation. With the policy's implementation, state-owned enterprises (SOEs) have increasingly invested in private enterprises, significantly impacting their operations and management.

A robust ESG (Environmental, Social, and Governance) performance can enhance corporate governance (Buchetti et al., 2025), substantially improve firm value (Zhao et al., 2025), mitigate operational risks (Lin et al., 2025), and promote the internationalization of enterprises (Steurer, Fahling, & Zhao, 2024; Zhao, Wang, Tang, & Yang, 2025), among other positive effects. Hence, identifying ways to improve the ESG performance of private enterprises is a topic worth exploring. Participating in state-owned equity participation could potentially serve as a critical pathway for private enterprises to enhance their ESG performance.

From the perspective of corporate governance, state-owned equity participation involves SOEs engaging in private enterprises' operations as non-controlling shareholders. Non-controlling shareholders play a vital role in enhancing corporate governance. For the invested enterprises, these shareholders often exert a long-term positive influence. Specifically, non-controlling shareholders can create checks and balances with the controlling shareholders and the management, thus improving the transparency of corporate information (Cui et al., 2025) and optimizing organizational governance structures (Lu et al., 2023; Yang et al., 2024). Moreover, non-controlling shareholders, such as SOEs, can bring various resources to the enterprises, including technical and financial support (Chen et al., 2025; Wang & Li, 2023).

Furthermore, SOEs' goals extend beyond economic benefits to include achieving significant social value (Zhu et al., 2016). Therefore, through state-owned equity participation, SOEs, while acting as non-controlling shareholders, influence the operations of private enterprises. To accomplish their operational objectives, SOEs may utilize their role as non-controlling shareholders to actively impact the activities of private enterprises, thereby improving their ESG performance.

Existing studies have shown that state-owned equity participation can bring extensive and positive impacts to private enterprises. Specifically, state-owned eq-

uity participation can significantly alleviate the financing constraints faced by private enterprises (Xiao et al., 2024). The entry of state-owned capital is often accompanied by stricter financial supervision and compliance requirements, which improves the quality of information disclosure (Zhao & Mao, 2023) and reduces operational risks (Wang et al., 2025). State-owned equity participation also helps private enterprises mitigate shortages of funds and talent during their digital transformation (Chen et al., 2024). However, some studies indicate that state-owned equity participation might promote tax avoidance behaviors among private enterprises (Ying & Lin, 2024). Whether state-owned equity participation enhances or inhibits the ESG performance of private enterprises remains a question requiring further empirical evidence for validation.

Therefore, an in-depth investigation into the impact of state-owned equity participation on the ESG performance of private enterprises is not only valuable for enriching the theoretical framework of mixed-ownership reform but also provides practical guidance for private enterprises on how to better balance economic interests and sustainable development goals during the process of state-owned equity participation. Moreover, it offers policymakers valuable references for refining policies related to state-owned equity participation. This study will systematically explore the mechanisms and specific manifestations of how state-owned equity participation impacts ESG performance through empirical analysis, aiming to provide meaningful insights into related theoretical and practical issues.

The contributions of this study are as follows: Firstly, existing research mainly focuses on the economic consequences of mixed-ownership reform for state-owned enterprises, while studies on state-owned equity participation with private enterprises as the research subject remain relatively rare. This paper examines the economic consequences of mixed-ownership reform for private enterprises, providing a new perspective on mixed-ownership reform and ESG performance. Secondly, this study investigates the impact of state-owned shareholders on the operations of private enterprises. Most existing literature on state-owned equity participation discusses the resource effects and willingness changes brought about by such participation, neglecting the role of state-owned shareholders as non-controlling shareholders in private enterprises. This study, from the perspective of state-owned shareholders, analyzes their influence on the ESG performance of private enterprises participating in state-owned equity participation. Thirdly, this paper delves into the impact of the depth of state-owned equity participation on the ESG performance of private enterprises. Existing studies tend to focus on whether private enterprises engage in state-owned equity participation and the resulting economic impacts, but they rarely address how the degree of participation affects ESG performance. By introducing continuous variables, this study will provide a more detailed measurement of the relationship between the degree of state-owned equity participation and ESG performance, revealing the impact and mechanisms of varying levels of state-owned capital involvement on the ESG performance of private enterprises.

2. Theoretical Analysis and Research Hypotheses

2.1. State-Owned Equity Participation Can Enhance the ESG Performance of Private Enterprises

Firstly, state-owned enterprises (SOEs) participating as shareholders have a significant impact on the operations of private enterprises, thereby enhancing their ESG performance. The operational objectives of SOEs and private enterprises are not entirely aligned (Yao & Ying, 2025). While private enterprises primarily focus on generating more profit, state-owned enterprises aim to create additional social value alongside ensuring economic benefits (Cheng et al., 2025). To achieve their own operational goals during state-owned equity participation, SOEs influence the operations of private enterprises as shareholders. SOEs can influence private enterprise operations by appointing directors, supervisors, and senior executives. Non-controlling shareholders typically participate in business operations through such appointments (Lu, et al., 2023). Acting as non-controlling shareholders, SOEs may appoint directors, supervisors, and senior executives to engage in the decision-making of significant business activities and oversee the daily operations of private enterprises' management. Furthermore, non-controlling shareholders can influence the operations of the enterprises they hold through the threat of withdrawal (Li et al., 2024b; Ren et al., 2025). Using this mechanism, SOE shareholders can express dissatisfaction with private enterprises' operations by threatening to withdraw, thereby impacting their operational decisions. Through the dual mechanisms of appointing directors and leveraging withdrawal threats, SOEs exert influence over the operations of private enterprises, ultimately promoting their ESG performance.

Secondly, state-owned equity participation significantly enhances private enterprises' willingness to promote ESG performance, thereby improving their ESG outcomes. State-owned enterprises (SOEs) typically bear greater obligations and adhere to higher standards in terms of social responsibility. These values are transmitted to private enterprises through equity ties, fostering a stronger willingness among private enterprises to improve their ESG performance. Due to the critical role of SOEs in both economic and social spheres, their economic actions receive extensive attention from various stakeholders (Lin & Guan, 2024). The public exhibits a multifaceted interest in the economic behavior of SOEs, expecting them not only to generate greater economic benefits but also to achieve greater social value. As a result, private enterprises engaged in state-owned equity participation are significantly influenced by the dual factors of SOE shareholders' expectations and external scrutiny, which boost their willingness to enhance ESG performance (Li et al., 2024a; Zhou et al., 2024). In terms of environmental protection, SOEs perform significantly better than private enterprises (Wang, 2024). Thus, after participating in state-owned equity reforms, the awareness of environmental responsibility among the management of private enterprises increases noticeably. SOEs are also more proactive in responding to national policies, often participat-

ing more actively in targeted poverty alleviation initiatives (Zhao et al., 2023). Consequently, private enterprises involved in state-owned equity participation are more likely to engage in targeted poverty alleviation efforts in the future.

Finally, state-owned equity participation significantly alleviates the resource constraints faced by enterprises, thereby enhancing the ESG performance of private enterprises. Due to differences in property rights between state-owned enterprises (SOEs) and private enterprises, private enterprises are often subject to "property rights discrimination," which negatively affects their ability to access resources. Compared with private enterprises, SOEs receive more favorable credit support from banks (Li et al., 2024c). Moreover, SOEs are more likely to obtain government subsidies (Wang & Wang, 2013). After state-owned equity participation, private enterprises benefit from the credit endorsement provided by SOEs, which sends a positive signal of good operational performance and significantly alleviates "property rights discrimination." After such participation, banks tend to adopt a more optimistic view of the operational and debt repayment capabilities of private enterprises, thereby increasing credit support for those that engage in state-owned equity participation. Additionally, SOEs have inherent advantages in accessing government resources. Following state-owned equity participation, these advantages can be further transferred to private enterprises, increasing their likelihood of receiving government subsidies.

Based on the above theoretical hypotheses, this study proposes Hypothesis 1:

H1: State-owned equity participation significantly enhances the ESG performance of private enterprises.

2.2. State-Owned Equity Participation May Inhibit the ESG Performance of Private Enterprises

Although good ESG performance can alleviate financing constraints and reduce operational risks, the primary objective of private enterprises remains maximizing profits. Improving ESG performance is likely one of the pathways for enterprises to ease financing constraints and reduce operational risks (Bai et al., 2022; Yuan et al., 2025). After participating in state-owned equity participation, private enterprises experience significant reductions in financing costs and operational risks (Li et al., 2024c). Consequently, private enterprises involved in state-owned equity participation may have less need to improve ESG performance as a means of mitigating operational risks, which could result in insufficient willingness to invest in ESG performance, thereby reducing overall ESG outcomes. Moreover, state-owned equity participation may offer a degree of protection to enterprises, thereby inhibiting their ESG performance. Typically, private enterprises have weaker connections to the government and are subject to stricter oversight and regulation. Since state-owned enterprises are owned by the government, state-owned equity participation can be seen as a way for private enterprises to seek property rights protection. After state-owned equity participation, private enterprises may improve their communication with the government and foster better relationships,

potentially leading to relaxed regulatory oversight. State-owned equity participation can also assist enterprises in avoiding taxes, and such effects are more pronounced in regions with stronger government interventions and higher tax oversight (Ying & Lin, 2024). Private enterprises might prioritize short-term profits at the expense of environmental protection, employee rights, and product quality, and may even violate laws or regulations. However, the stronger connections between private enterprises and the government brought by state-owned equity participation may help these enterprises avoid penalties for poor performance in sustainable development. The special protection introduced by state-owned equity participation could reduce private enterprises' willingness to invest in ESG improvements, thereby lowering their ESG performance.

Based on the above theoretical hypotheses, this study proposes Hypothesis 2:

H2: State-owned equity participation may inhibit the ESG performance of private enterprises.

3. Data and Methods

3.1. Model Specification

To test the hypotheses in this study, we construct Model (1) to verify the theoretical hypotheses:

$$ESG_{i,t} = \beta_0 + \beta_1 state_{i,t} + \beta_2 Controls_{i,t} + \sum Year_i + \sum Industry_i + \varepsilon \quad \text{Model (1)}$$

In the model, ESG represents the ESG performance of private enterprises. Drawing on the approach of Tang (2022), the Huazheng ESG evaluation index is used to measure ESG performance. The Huazheng ESG ratings are categorized into nine levels from low to high, with scores from C to AAA assigned values from 1 to 9, respectively. The variable state represents state-owned equity participation. Following prior studies, the presence of state-owned shareholders among the top 10 shareholders (soedum) is used as a proxy variable to indicate whether private enterprises are engaged in state-owned equity participation. The proportion of shares held by state-owned shareholders among the top 10 shareholders (soeov) is used as a proxy variable to measure the extent of state-owned equity participation. The higher the extent of state-owned equity participation, the larger the proportion of shares held by state-owned shareholders among the top 10 total shares. Controls represents control variables. ∑Year and ∑Industry denote fixed year and industry effects, respectively, while ε represents the residual term and β denotes the coefficients of the variables. To account for the factors that may affect ESG performance and state-owned equity participation, this study selects variables related to financial conditions and corporate governance, including ROE, Lev, GrossProfit, Cashflow, Dual, ListAge, TobinQ, Top1, Big4, and Opinion. To exclude unobservable factors within industries and years, this study fixed industry and year effects. The names and definitions of the variables are presented in **Table 1**.

Table 1. Variable definitions.

Explained Variable	ESG	ESG performance score of private enterprises.
Explanatory Variables	soedum	A dummy variable indicating whether there are state-owned shareholders among the top 10 shareholders.
	soeov	The proportion of shares held by state-owned shareholders among the top 10 total shares.
Control Variables	ROE	Return on equity, representing the net income relative to shareholders' equity.
	Lev	Leverage ratio, representing the total debt relative to total assets of the enterprise.
	GrossProfit	Gross profit margin, reflects the profitability efficiency of the enterprise.
	Cashflow	Cash flow ratio, reflecting the liquidity status of the enterprise.
	Dual	A dummy variable indicating whether the chairman and CEO roles are held by the same person.
	ListAge	The number of years since the company was listed, representing the company's listing age.
	TobinQ	Tobin's Q ratio, reflecting the company's market valuation relative to its asset value.
	Top1	The shareholding ratio of the largest shareholder, reflects ownership concentration.
	Big4	A dummy variable indicating whether the enterprise's auditor is one of the Big Four accounting firms.
	Opinion	Audit opinion, reflecting the auditor's evaluation of the enterprise's financial reporting quality.

3.2. Sample and Data Sources

The data used in this study are obtained from the WIND and CSMAR databases, focusing on private listed companies in China from 2009 to 2022. Companies classified as ST, *ST, and those in the financial sector are excluded from the sample. Companies with missing values in key variables or those whose ownership nature changed during the observation period are also excluded. The final sample consists of 3,203 listed companies with a total of 21,285 observations. To mitigate the impact of extreme values, the variables are winsorized at the top and bottom 1% percentiles.

4. Empirical Results

4.1. Descriptive Statistics

The descriptive statistics are presented in Table 2. According to the results, the average ESG performance score of enterprises is 4.162, with a minimum value of 1, a maximum value of 7, and a standard deviation of 0.844. This indicates significant differences in the ESG performance of private enterprises. The mean of soedum is 0.396, while the mean of soeov is 0.028, with a minimum value of 0, a maximum value of 0.336, and a standard deviation of 0.061. Descriptive statistics for the control variables are also shown in Table 2.

Table 2. Descriptive statistics.

Variable	N	Mean	Std. Dev.	Min	Max
ESG	21285	4.162	0.884	1	7
soedum	21285	0.396	0.489	0	1
soeov	21285	0.028	0.061	0	0.336
ROE	21285	0.06	0.134	−0.738	0.318
Lev	21285	0.365	0.191	0.05	0.841
GrossProfit	21285	0.32	0.179	0.019	0.868
Cashflow	21285	0.048	0.07	−0.156	0.248
Dual	21285	0.401	0.49	0	1
ListAge	21285	1.693	0.886	0	3.296
TobinQ	21285	2.145	1.313	0.919	8.69
Top1	21285	32.655	13.928	8.646	71.168
Big4	21285	0.036	0.186	0	1
Opinion	21285	0.972	0.164	0	1

4.2. Baseline Regression Results

Table 3 presents the baseline regression results of the impact of state-owned equity participation on the ESG performance of private enterprises. In column (1), the coefficient of soedum is 0.125 and is significant at the 1% level. In column (2), the coefficient of soeov is 0.510 and is also significant at the 1% level. These results indicate that state-owned equity participation significantly enhances the ESG performance of private enterprises. Furthermore, as the degree of state-owned equity participation increases, the ESG performance of enterprises improves. This verifies the hypothesis of H1, while rejecting the hypothesis of H2. State-owned equity participation significantly promotes the ESG performance of private enterprises, and the higher the degree of participation, the better the ESG performance.

Table 3. Baseline analysis.

	(1) ESGscore	(2) ESGscore
soedum	0.125*** (8.077)	
soeov		0.510*** (4.140)
ROE	0.957*** (13.04)	0.975*** (13.05)
Lev	−0.266*** (−3.164)	−0.262*** (−3.097)
GrossProfit	0.345*** (2.950)	0.359*** (3.078)
Cashflow	0.463*** (2.893)	0.475*** (2.948)
Dual	−0.0163 (−0.892)	−0.0167 (−0.905)
ListAge	−0.167*** (−10.14)	−0.155*** (−9.069)
TobinQ	−0.0577*** (−4.411)	−0.0577*** (−4.458)

Continued

Top1	0.000171 (0.240)	0.000552 (0.773)
Big4	0.200*** (3.028)	0.209*** (3.106)
Opinion	0.497*** (9.847)	0.502*** (10.16)
Constant	3.375*** (39.89)	3.375*** (39.81)
Industry/Year	Yes	Yes
Observations	21,285	21,285
R-squared	0.165	0.162

Note: The values in parentheses represent T-statistics. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, with industry-level clustering. The same applies below.

4.3. Robustness Check

4.3.1. PSM-DID

To alleviate potential selection bias within the model, this study constructs a difference-in-differences (DID) model. To address possible sample selection bias, propensity score matching (PSM) was conducted on the samples of the treatment and control groups. The year prior to implementing state-owned equity participation was used to select the following firm characteristic variables as observable variables: ROE, Lev, GrossProfit, Cashflow, Dual, ListAge, TobinQ, Top1, Big4, and Opinion. Subsequently, the nearest neighbor matching method (1:1 without replacement) was applied to match the sample, with the successfully matched control group serving as the counterfactual outcome for the treatment group. Adopting propensity score matching, and due to the varying time points of state-owned equity participation across private enterprises, this study constructs a multi-period DID model for verification. Treat represents whether an enterprise participates in state-owned equity participation, with a value of 1 if it participates and 0 otherwise. Post represents the time point when the enterprise engages in state-owned equity participation, with a value of 0 before participation and 1 after participation. To address potential sample selection bias, PSM was applied to match the treatment and control groups using the nearest neighbor matching method (1:1), with the successfully matched control group serving as the counterfactual outcome for the treatment group. After conducting propensity score matching, the study performs regression based on Model (2).

$$\begin{aligned} ESG_{i,t} = {} & \beta_0 + \beta_1 Treat_{i,t} * Post_{i,t} + \beta_2 Controls_{i,t} \\ & + \sum Year_i + \sum Industry_i + \varepsilon_{i,t} \end{aligned} \quad \text{Model (2)}$$

The regression results are presented in column (1) of Table 4. After controlling industry and year effects, the coefficient of the core explanatory variable Treat * Post is significantly positive at the 1% level, indicating that state-owned equity participation significantly enhances the ESG performance of enterprises, thereby excluding the possibility of alternative hypotheses.

Table 4. PSM-DID and parallel trend test.

	(1) PSM-DID	(2) ESGscore
Treat*Post	0.120*** (4.027)	
pre_5		0.0922 (1.375)
pre_4		0.0669 (1.332)
pre_3		0.0258 (0.539)
pre_2		−0.0149 (−0.388)
pre_1		0.0309 (0.655)
current		0.0287 (0.980)
las_1		0.178*** (4.663)
las_2		0.253*** (4.020)
las_3		0.112* (1.925)
las_4		0.191*** (3.143)
las_5		0.239*** (2.894)
Controls	Yes	Yes
Constant	4.111*** (40.01)	4.098*** (39.15)
Industry/Year	Yes	Yes
Observations	9,178	9,178
R-squared	0.168	0.174

A necessary condition for effectively implementing the difference-in-differences (DID) method is that the treatment group and the control group should exhibit parallel trends before the event, meaning there are no significant differences in their pre-event trends and no issues of sample self-selection. Since the timing of state-owned equity participation varies across enterprises, this study adopts the event study approach to test the interaction terms between the treatment group and year dummy variables. The dummy variables pre_5, pre_4, pre_3, pre_2, pre_1, current, las_1, las_2, las_3, las_4, and las_5 are set to equal 1 for the fifth, fourth, third, second, and first years before state-owned equity participation, the year of participation, and the first, second, third, fourth, and fifth years after participation, respectively, while other periods are set to 0. This approach examines the effects of state-owned equity participation both before and after its implementation in the treatment and control groups. According to the empirical results, the coefficients for the five periods prior to state-owned equity participation are all insignificant, indicating no significant differences in the ESG performance between the treatment group and the control group before participation. The coefficients for the post-participation periods are 0.178, 0.253, 0.112, 0.191, and 0.239, respectively. Among these, the first, second, fourth, and fifth years are significantly positive at the 1% level, while the third year is slightly significant at the 10% level. These results suggest that state-owned equity participation significantly enhances private enterprises' ESG performance. Overall, Model (2) satisfies the

parallel trend assumption and demonstrates a certain degree of validity.

4.3.2. Instrumental Variable Method

In the process of state-owned equity participation, state-owned shareholders may proactively select private enterprises with good ESG performance to achieve their operational objectives. This may lead to private enterprises with better ESG performance being more likely to become targets for state-owned equity participation, resulting in potential reverse causality issues. To mitigate potential endogeneity problems, this study selects the average proportion of state-owned equity holdings for listed companies within the same industry and year (mean_state_ownership) as an instrumental variable for state-owned equity participation. The mean industry-year state-owned equity holding proportion reflects the overall level of state ownership within the industry. Changes in this level may influence the degree of state-owned equity participation in individual enterprises, making it correlated with state-owned equity participation. As an industry-level variable, changes in the mean industry-year state-owned equity holding proportion are primarily driven by external factors such as ss macroeconomic policies and industry regulations, rather than being directly determined by the ESG performance of individual enterprises. Therefore, it is unlikely to directly affect enterprises' ESG performance but may indirectly influence ESG performance through its impact on the degree of state-owned equity participation. This study employs the two-stage least squares (2SLS) method for instrumental variable regression, with the empirical results shown in columns (1) and (3) of Table 5. The regression coefficients of the instrumental variable are significantly positive, indicating that both the likelihood of private enterprises participating in state-owned equity participation and the degree of participation are significantly influenced by the overall level of state-owned equity participation in the industry. Moreover, the Cragg-Donald F-statistic exceeds the critical value of the Stock-Yogo weak instrument test at the 10% significance level, indicating that there is no weak instrument problem. In the second-stage regressions, columns (2) for soedum and (4) for soeov are significantly positive at the 1% level, consistent with the findings from the baseline analysis.

Table 5. Instrumental variable method.

	(1) soedum	(2) ESGscore	(3) soeov	(4) ESGscore
mean_state_ownership	0.0444*** (6.804)		0.0112*** (10.36)	
soedum		0.495*** (3.046)		
soeov				1.963*** (3.091)
Controls	Yes	Yes	Yes	Yes
Constant	−0.0286 (0.679)	3.274*** (24.72)	0.0132* (1.792)	3.279*** (25.25)
Industry/Year	Yes	Yes	Yes	Yes
Observations	21,285	21,285	21,285	21,285
R-squared	0.105	0.127	0.108	0.152

4.4. Additional Robustness Checks

To ensure the robustness of the research conclusions, the following methods were employed for further verification. First, in addition to controlling for industry and year fixed effects in the original model, high-dimensional fixed effects were included. The results, shown in columns (1) and (2) of Table 6, remain robust. Second, the proxy variable for enterprise ESG performance was replaced with WindESG. The results, presented in columns (3) and (4) of Table 6, also prove to be robust. Finally, given that the Huazheng ESG rating standards underwent a minor adjustment in 2019, the sample was restricted to observations from 2019 onward. The results, displayed in columns (5) and (6) of Table 6, remain consistent and robust.

Table 6. Other robustness checks.

	(1) ESGscore	(2) ESGscore	(3) WindESG	(4) WindESG	(5) ESGscore	(6) ESGscore
soedum	0.124*** (7.395)		0.0664*** (4.538)		0.123*** (6.597)	
soeov		0.512*** (3.873)		0.460** (2.587)		0.332* (1.688)
Conrtols	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.919*** (54.02)	3.909*** (53.89)	5.501*** (98.83)	5.490*** (96.92)	3.016*** (37.61)	3.061*** (37.83)
	Industry*Year	Industry*Year	Industry/Year	Industry/Year	Industry/Year	Industry/Year
Observations	21,285	21,285	11,490	11,490	9,993	9,993
R-squared	0.179	0.176	0.216	0.215	0.181	0.178

5. Mechanism Testing

5.1. Governance Mechanism Testing of State-Owned Shareholders

The operational objectives of state-owned enterprises (SOEs) and private enterprises are not perfectly aligned. To achieve their operational goals and improve the ESG performance of private enterprises, SOEs proactively influence the operations of private enterprises. As non-controlling shareholders, SOEs can influence private enterprises' operations in two ways: First, the presence of the threat of withdrawal can exert a deterring effect on controlling shareholders and senior management of private enterprises, thereby influencing their operational decisions. Second, SOEs can participate in major operational decision-making processes by appointing directors, supervisors, or senior management. Following the approach of Ren et al., this study adopts the proxy variable EXIT to measure the withdrawal threat posed by non-controlling shareholders and verify the moderating effect of the withdrawal threat. Additionally, the presence of SOE-appointed directors, supervisors, or senior management in private enterprises (Boardassign) is used to verify the mediating effect arising from SOE board appointments. The

empirical results are shown in Table 7. From the results, it can be observed that SOEs significantly influence the operations of private enterprises through different channels. In columns (1) and (2), the coefficients of soedum × EXIT and soeov × EXIT on ESG performance are 10.83 and 66.64, respectively, both significant at the 1% level. These findings indicate that the withdrawal threat posed by non-controlling shareholders has a notable impact on the operations of private enterprises, and this impact grows as the degree of state-owned equity participation increases. In columns (3) and (4), the coefficients of soedum and soeov on the Boardassign variable are 0.202 and 2.700, respectively, both significant at the 1% level. These results demonstrate that SOE board appointments have a significant and positive impact on the operations of private enterprises. Furthermore, these findings indicate that state-owned equity participation significantly enhances board appointments by SOEs, and the intensity of such appointments increases proportionally with the degree of state-owned equity participation. The results suggest that SOEs, as non-controlling shareholders, effectively influence the operations of private enterprises through mechanisms such as board appointments and withdrawal threats, thereby promoting the improvement of ESG performance in private enterprises.

Table 7. Mechanism testing of the impact of state-owned shareholders on private enterprises.

	(1) ESGscore	(2) ESGscore	(3) Boardassign	(4) Boardassign
Soedum * exit	10.83** (2.279)			
Soeov * exit		66.64*** (3.002)		
soedum			0.202*** (5.956)	
soeov				2.700*** (22.04)
Conrtols	Yes	Yes	Yes	Yes
Constant	3.675*** (53.35)	3.679*** (53.36)	0.232*** (3.979)	0.0445 (1.051)
Industry/Year	Yes	Yes	Yes	Yes
Observations	21,220	21,220	6,686	6,686
R-squared	0.146	0.146	0.129	0.383

5.2. Mechanism Testing for Enhancing the Willingness of Private Enterprises to Fulfill ESG Responsibilities

Due to the operational objectives of state-owned enterprises (SOEs), which extend beyond merely creating economic benefits, SOEs tend to exhibit a stronger sense of social responsibility in their operations. From the perspective of external governance, state-owned equity participation alters the ownership structure of private enterprises, inherently increasing external scrutiny. Following participation in state-owned equity, personnel from SOEs, in pursuit of their operational goals, are likely to demand participating private enterprises to enhance their awareness of social responsibility, encouraging these enterprises to pay greater attention to

environmental protection and social responsibility. Referring to the study by Duriau et al. (2007), this paper conducts text analysis on the financial reports of listed companies to construct data on environmental responsibility awareness (ERA). Based on corporate announcements on targeted poverty alleviation, a dummy variable was constructed to indicate whether the company plans to participate in poverty alleviation programs (Povertyplan). Additionally, drawing from the study of Cao and Huang (2025), media attention (Media) was constructed as a variable. The mediation effect of state-owned equity participation on ESG performance was tested from three perspectives: executives' environmental awareness, willingness to engage in poverty alleviation, and media attention. The empirical results are presented in **Table 8**. In columns (1) and (2), the effects of soedum and soeov on environmental responsibility awareness (ERA) are significantly positive, with coefficients of 0.200 and 1.251, respectively, both significant at the 1% level. These findings suggest that after state-owned equity participation, the introduction of state ownership enhances the environmental awareness of private enterprise executives, with this effect increasing significantly as the degree of participation deepens. This influence may stem from SOEs' emphasis on environmental responsibility and their optimization of private enterprises' governance structures, prompting private enterprise executives to prioritize environmental factors in decision-making processes. In columns (3) and (4), soedum and soeov have significantly positive effects on the willingness of private enterprises to participate in targeted poverty alleviation (Povertyplan), with coefficients of 0.0409 and 0.408, significant at the 5% and 1% levels, respectively. This indicates that after state-owned equity participation, private enterprises, guided by SOEs, become more actively engaged in social poverty alleviation initiatives, with participation increasing significantly as the degree of state-owned equity participation rises. Columns (5) and (6) show that soedum and soeov significantly positively influence media attention (Media), with coefficients of 0.000494 and 0.00203, both significant at the 1% level. These results suggest that following state-owned equity participation, changes in private enterprises' ownership structures attract greater external attention, leading to increased media coverage and scrutiny. In conclusion, state-owned equity participation enhances private enterprises' willingness to improve ESG performance by increasing executives' environmental awareness, promoting engagement in targeted poverty alleviation, and attracting greater media attention, thereby positively influencing their ESG performance.

Table 8. Mechanism testing of the willingness of private enterprises to perform.

	(1) ERA	(2) ERA	(3) povertyplan	(4) povertyplan	(5) Media	(6) Meida
soedum	0.200*** (6.233)		0.0409** (2.571)		0.000494*** (2.989)	
soeov		1.251*** (3.953)		0.408*** (3.148)		0.00203*** (5.579)

Continued

Conrtols	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.539*** (3.982)	0.508*** (3.703)	0.535*** (8.302)	0.518*** (8.014)	0.00216*** (6.736)	0.00211*** (6.885)
Industry/Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,285	21,285	2,360	2,360	19,366	19,366
R-squared	0.253	0.252	0.250	0.251	0.301	0.299

5.3. Mechanism Testing for Alleviating Resource Constraints on Private Enterprises' ESG Performance

Private enterprises face more significant "resource discrimination" in their operations. After state-owned equity participation, the endorsement from state-owned shareholders can significantly alleviate the resource constraints faced by enterprises. Following state-owned equity participation, the endorsement from SOEs enables private enterprises to secure more credit support from banks, thereby providing them with more resources to improve their ESG performance. Furthermore, SOEs are more likely to receive government support and obtain larger subsidies. After state-owned equity participation, private enterprises benefit from the spillover effects of SOE resources, obtaining additional government subsidies, which enhances their ability to improve ESG performance. This study uses the WW Index and KZ Index to measure the financing constraints faced by enterprises. Following the research of Yan et al. (2025), the proportion of government subsidies to total assets (subsidy) is used to measure the degree of government support received by enterprises, to examine the mediating effect of state-owned equity participation on the improvement of private enterprises' ESG performance. The empirical results are shown in **Table 9**. In columns (1) and (2), the coefficients of soedum and soeov are −0.0104 and −0.0254, respectively, significant at the 1% and 5% levels. These results indicate a significant reduction in financing constraints for private enterprises after state-owned equity participation, with a more pronounced reduction as the degree of participation increases. After state-owned equity participation, private enterprises' ability to obtain credit support from banks and other financial institutions improves significantly. Financial institutions adopt a more favorable attitude toward lending to private enterprises, willing to provide more financial resources. This serves as a critical financial guarantee for the subsequent development of private enterprises and the enhancement of their ESG performance. In columns (3) and (4), the coefficients of soedum and soeov with the KZ Index are −0.0995 and −0.0516, both significant at the 1% and 5% levels, further corroborating the significant effect of state-owned equity participation in alleviating financing constraints for private enterprises. This enhancement enables private enterprises to access funds more smoothly, meeting their operational and strategic investment needs more effectively. From the perspective of government subsidies, in columns (5) and (6), the coefficients of soedum and soeov are 0.000243 and 0.00474, significant at the 10% and 1% levels,

respectively. These results suggest that after state-owned equity participation, the degree of government subsidies obtained by private enterprises increases significantly, with a stronger effect as the degree of participation intensifies. By significantly alleviating resource constraints on private enterprises, state-owned equity participation promotes improvements in ESG performance.

Table 9. Mechanism testing for resource constraint alleviation.

	(1) WW	(2) WW	(3) KZ	(4) KZ	(5) subsidy	(6) subsidy
soedum	−0.0104*** (−7.337)		−0.0995*** (−4.871)		0.000243* (1.909)	
soeov		−0.0254** (−2.139)		−0.516** (−2.292)		0.00474*** (3.427)
Conrtols	Yes	Yes	Yes	Yes	Yes	Yes
Constant	−0.929*** (−146.5)	−0.929*** (−142.2)	−2.244*** (−17.72)	−2.232*** (−17.84)	0.00451*** (7.887)	0.00437*** (7.704)
Industry/Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,481	17,481	21,284	21,284	20,854	20,854
R-squared	0.442	0.437	0.789	0.789	0.086	0.088

6. Heterogeneity Analysis

6.1. Heterogeneity Analysis Based on Enterprise Pollution Levels

For heavily polluting enterprises, maintaining good ESG performance requires greater resource investment. State-owned equity participation alleviates the resource constraints faced by private enterprises, enabling them to allocate more resources toward improving their environmental performance, thereby enhancing their ESG performance. Furthermore, state-owned shareholders, to maintain their own positive social reputation, may also push private enterprises to improve their ESG performance. In columns (1) and (2) of Table 10, the coefficients of soedum for both non-heavily polluting and heavily polluting groups are significantly positive at the 1% level, with the coefficient for heavily polluting enterprises being significantly higher than that for non-heavily polluting enterprises. Similarly, in columns (3) and (4), the coefficients of soeov for both non-heavily polluting and heavily polluting groups are also significantly positive at the 1% level, with the coefficient for heavily polluting enterprises again exceeding that for non-heavily polluting enterprises. According to the empirical results, state-owned equity participation significantly improves the ESG performance of private enterprises, regardless of whether they are heavily polluting enterprises. However, for heavily polluting enterprises, the improvement in ESG performance due to state-owned equity participation is more pronounced. As the degree of state-owned equity participation increases, the improvement in ESG performance for enterprises in heavily polluting industries also increases and is significantly higher than that of non-heavily polluting enterprises.

Table 10. Classification by pollution levels.

	(1) Non-heavy Polluting enterprises	(2) Heavy Polluting enterprises	(3) Non-heavy Polluting enterprises	(4) Heavy Polluting enterprises
soedum	0.101*** (7.368)	0.197*** (8.091)		
soeov			0.417*** (3.781)	0.794*** (4.166)
Conrtols	Yes	Yes	Yes	Yes
Constant	3.953*** (72.49)	3.870*** (41.20)	3.945*** (72.17)	3.850*** (40.62)
Industry/Year	Yes	Yes	Yes	Yes
Observations	15,556	5,729	15,556	5,729
R-squared	0.176	0.148	0.174	0.140
Empirical P-value	0.0000		0.0000	

6.2. Heterogeneity Analysis Based on Competition Intensity

Intense industry competition exerts external pressure on enterprise development. To ensure competitive advantages in highly competitive industries, shareholders often intensify their oversight of managerial behavior, thus mitigating principal-agent issues and improving corporate governance. Furthermore, fierce market competition drives enterprises to seek support from more stakeholders. In such an environment, enterprises tend to actively improve their ESG performance. After state-owned equity participation, private enterprises experience significant alleviation of resource constraints. As a result, private enterprises in highly competitive industries see a substantial improvement in their ESG performance following state-owned equity participation. Additionally, the higher the competition intensity, the better the ESG performance as the level of state-owned equity participation increases. Following the methodology of Wang Yongqin et al., this study uses the Herfindahl-Hirschman Index (HHI) to measure market concentration. The lower the HHI, the higher the competition intensity within the industry. Based on the median HHI for each year, the sample is divided into high-competition and low-competition groups. The empirical results are presented in Table 11. In columns (1) and (2), the coefficients of soedum are significantly positive at the 1% level for both high-competition and low-competition groups, with the coefficient for the high-competition group being significantly higher than that for the low-competition group. Similarly, in columns (3) and (4), the coefficient of soeov is significantly positive at the 1% level for the high-competition group and significantly positive at the 5% level for the low-competition group. According to the empirical results, state-owned equity participation significantly enhances the ESG performance of private enterprises, regardless of whether they are in high-competition or low-competition industries. However, the improvement in ESG performance is more pronounced for enterprises in highly competitive industries. As

the degree of state-owned equity participation increases, the improvement in ESG performance for enterprises in highly competitive industries also increases, with a marginal effect significantly higher than that for enterprises in less competitive industries.

Table 11. Classification by competition intensity.

	(1) High competition	(2) Low competition	(3) High competition	(4) Low competition
soedum	0.129*** (7.655)	0.121*** (7.141)		
soeov			0.577*** (4.508)	0.396*** (2.755)
Conrtols	Yes	Yes	Yes	Yes
Constant	3.842*** (55.17)	4.030*** (62.78)	3.828*** (54.77)	4.024*** (62.43)
Industry/Year	Yes	Yes	Yes	Yes
Observations	10,830	10,454	10,830	10,454
R-squared	0.153	0.191	0.150	0.188
Empirical P-value	0.0000		0.0000	

7. Research Conclusions and Policy Recommendations

Using A-share listed companies from 2009 to 2022 as the sample, this study examines the impact of state-owned equity participation on the ESG performance of private enterprises. The results show that state-owned equity participation significantly enhances the ESG performance of private enterprises. Moreover, as the degree of state-owned equity participation increases, the ESG performance of enterprises improves further. These conclusions remain robust after PSM-DID tests, instrumental variable tests, and the replacement of key variables. Mechanism testing indicates that state-owned shareholders influence the operations of private enterprises by appointing directors, supervisors, and senior executives, as well as forming withdrawal threats, thereby promoting the ESG performance of private enterprises. State-owned equity participation enhances private enterprises' awareness of environmental protection and their willingness to participate in targeted poverty alleviation programs, increasing their willingness to improve ESG performance. Additionally, state-owned equity participation brings greater media attention to private enterprises, thereby further enhancing their willingness to improve ESG performance. The equity participation of state-owned enterprises provides credit endorsement for private enterprises, significantly alleviating the "resource discrimination" faced by private enterprises. This enables private enterprises to access more resources from banks and governments, thereby improving their ESG performance. Heterogeneity analysis reveals that the higher the competition intensity of the industry in which private enterprises operate, the more significant the positive effect of state-owned equity participation on ESG performance. As

the degree of state-owned equity participation increases, its positive impact on the ESG performance of private enterprises in highly competitive industries becomes even more pronounced.

Based on the above conclusions, this study proposes the following recommendations: First, continue promoting mixed-ownership reform and encourage state-owned enterprises (SOEs) to cooperate with private enterprises through equity investments and other forms of collaboration to enhance the ESG performance of private enterprises. To further deepen reform, more flexible and diverse modes of cooperation should be explored, encouraging SOEs and private enterprises to engage in in-depth partnerships in areas such as technological innovation, market expansion, and talent development to achieve mutual benefits and win-win outcomes. Meanwhile, the government should improve relevant laws and regulations to clearly define the rights and obligations of all types of ownership in mixed-ownership reforms, thereby providing institutional support for the smooth advancement of reform. Second, encourage SOEs to actively participate in the management of private enterprises by appointing directors and playing a leading role in areas such as environmental protection and social responsibility. To ensure effective collaboration, incentive mechanisms should be established and improved to encourage SOEs to actively share their expertise in management practices, technological innovation, and other areas to help private enterprises improve their ESG performance. Third, government policy guidance and financial support should encourage private enterprises to increase investments in environmental protection and social responsibility to improve their ESG management capabilities. This could include offering more subsidies and special funds to support private enterprises in research and development of green technologies, energy-saving and emission reduction projects, and social welfare initiatives. Additionally, the ESG evaluation system should be refined to guide investors and the public to pay more attention to the ESG performance of enterprises. A positive incentive mechanism should be created to help enterprises achieve both economic benefits and social benefits.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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