

# Does Board Gender Diversity Moderate the Relationship between Institutional Ownership and ESG Performance? Evidence from China

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## Abstract

This paper empirically investigated the impact of institutional ownership on corporate environmental, social, and corporate governance (ESG) performance among Chinese listed firms between 2011 and 2022, taking into account the moderating effect of board gender diversity. The empirical results indicated that institutional ownership has a positive impact on corporate ESG performance. Moreover, the relationship between institutional ownership and corporate ESG performance was positively moderated by board gender diversity. The findings demonstrated that institutional ownership and board gender diversity can alleviate firms' resource constraints by providing resource support, enabling firms to engage more actively in ESG practices. Consequently, enhances their ESG performance. The combination of sufficient financial resources and diverse human capital can create a competitive advantage for enhancing corporate ESG performance, which provides guidance to firms and policymakers on how to promote corporate sustainable development in China.

**Keywords:** ESG Performance, Institutional Ownership, Board Gender Diversity, Resource Dependence Theory

## Introduction

Recently, climate change has developed into a global challenge (Yao et al., 2023). In response, sustainable development has become a critical concern for the advancement of modern society (Chen et al., 2024). Currently, China is the world's largest energy consumer and carbon emitter (Miao et al., 2023). Its remarkable economic expansion and urbanization have resulted in significant environmental degradation, posing challenges to its sustainable development (Chen, 2024). In 2023, China's carbon emissions accounted for 31.8% of global emissions. Therefore, the balance between economic growth and environmental sustainability become a priority for China. To address this issue, China set the "Dual Carbon"

strategic goal, aiming to peak carbon emissions by 2030 and achieve carbon neutrality by 2060 (Zhang et al., 2023). ESG has emerged as a key tool in helping China reach this goal as it fits well with China's high-quality and sustainable development requirements (Zhao et al., 2023). In the past few years, China has introduced several regulations to enhance ESG disclosure and improve ESG performance among listed companies (Wei & Zhou, 2024). Thus, ESG investing has gained prominence in China. For instance, from 2006 to 2021, the total value of ESG assets in China increased from US\$6.5 trillion to US\$121 trillion (Zahid et al., 2023).

ESG performance is a comprehensive indicator that emphasizes environmental protection, social responsibility, and corporate governance performance, which has become an effective tool for institutional investors and other stakeholders to evaluate the long-term value and sustainability of a company (Tian et al., 2023). Prior literature suggests that the pursuit of ESG performance can benefit firms' behaviour and outcomes, including gaining more stakeholder support (Zhao & Cai, 2023), improving firm financing ability (Zahid et al., 2023), increasing stock return (Li et al., 2023), reducing firm risk (Zhang et al., 2023), enhancing firm reputation (Meng et al., 2023), and ultimately enhancing firm value (Aydoğmuş et al., 2022). In this context, ESG performance has attracted increasing academic and practical attention.

Despite the importance of ESG in promoting sustainability, companies have lower ESG performance levels in China (Liang & Renneboog, 2017; Mu et al., 2023). In 2021, the Chinese ESG rating agency SynTao Green Finance reported that only 6.8% of companies achieved a rating above grade B, while the majority of the companies fell below grade B. This indicates that there is still much room for improvement in the ESG performance of companies in China. ESG practices are characterized by high costs, long investment cycles and uncertain returns, which require significant financial, human, and technological investments (Drempetic et al., 2020; Xue et al., 2023). Resource constraints are the main reason why most companies lack the ability and willingness to engage in ESG practices (Li et al., 2023). When facing resource constraints, firms are more likely to allocate their resources toward profitable activities rather than focus on ESG activities (Akbar et al., 2021). Companies with lower ESG performance have more volatile share prices and higher investment risk and reputational risk (Lu et al., 2023; Zhang et al., 2023). In this context, it is important to explore how to improve corporate ESG performance for the sustainable development of companies. Thus, the main aim of this paper was to explore the impact of institutional ownership on ESG performance and examine the moderating role of board gender diversity in this association within the context of China.

Institutional investors have become key players in China's capital markets, particularly in ESG investing (Lin & Fu, 2017). Over the past decade, the proportion of institutional shareholding in Chinese-listed companies has increased dramatically. Institutional investors typically control substantial resources and hold significant shareholdings in Chinese companies, giving them the motivation and the ability to influence corporate strategic decisions (Chen et al., 2014). Unlike other types of investors, institutional investors are typically professional investors with substantial capital, strong investment expertise, and a long-term perspective (Wang et al., 2023). Firms with institutional ownership often find it easier to obtain internal financial resources (García-Meca et al., 2015).

Board diversity, particularly gender diversity, has become a prominent topic in corporate governance research (Katmon et al., 2017). The 2030 Agenda of the United Nations listed gender equality as the fifth goal of sustainable development (Valls Martínez et al., 2021). Since 2003, some countries such as Norway, Sweden, Spain, and the U.K. have progressively implemented board gender quota laws, requiring a minimum representation of women on corporate boards (Jun et al., 2023). While China has not yet introduced gender quotas for corporate boards, it has begun to emphasize gender diversity, encouraging listed companies to increase the percentage of female directors on boards (Chu et al., 2023). For example, from 2012 to 2022, the proportion of female directors rose from 10.22% to 17.91% on average in Chinese companies (Yan et al., 2024). In November 2022, China hosted the Fifth Board Diversity Forum, which concentrates on the critical role of board diversity in promoting corporate sustainability (Belcher, 2020). Gender diversity brings diverse human capital including different perspectives, cognition, knowledge, and experiences, helping to mitigate errors resulting from individual subjective biases (Abdelkader et al., 2024).

This paper makes some theoretical and practical significance to current academic research. Firstly, it extends the application of resource dependence theory to ESG performance. The existing studies have explained ESG performance based on agency theory, stakeholder theory, and institutional theory. This study focuses on the importance of resource availability in improving corporate ESG performance in China. It adds to the expanding literature on the determinants of ESG performance in emerging economies; Secondly, this paper innovatively investigates the moderating effect of board gender diversity on the relationship between institutional ownership and ESG performance. It suggests that the combination of sufficient financial resources and diverse human capital can create a competitive advantage for corporate sustainable development. Thirdly, this study provides a new solution for firms wishing to enhance their ESG performance. Firms can alleviate resource constraints by attracting more institutional investors as well as increasing the proportion of female directors; Finally, this study also provides practical implications for policymakers. Policymakers should consider enacting board gender quota laws to ensure women managers have the opportunity to participate in major decision-making and corporate governance.

The paper was organized as follows: the next part introduced theoretical analysis and hypothesis development. The third part was concerned with research methodology. The empirical analysis was discussed in the fourth part and the final part offered the conclusion and limitations of the paper.

## **Theoretical Analysis and Hypothesis Development**

### *Resource Dependence Theory*

The resource dependence theory (RDT) posits that firms are not self-sufficient entities and must rely on the external environment to obtain essential resources for their survival and success. These external resources, in turn, influence firms' behaviours, strategies, and performance (Pfeffer et al., 1979). RDT emphasizes that companies manage their external resources to enhance their viability and competitive advantage (Pfeffer, 1972). The implementation of ESG practices demands various types of resources, such as financial capital, human resources, technology, and information to support continuous innovation and risk prevention (Drempetic et al., 2020). However, most companies lack these necessary resources and must depend on external sources. From resource dependence theory

perspective, the availability of resources is a key factor that affects firms' ability to implement ESG practices (Aguilera-Caracuel et al., 2014). According to Xu & Kim (2022), firms with more available resources should be able to initiate ESG activities faster and more effectively. Sufficient resources enable firms to devote time and attention to ESG-related details, such as responding to stakeholders and developing environmental projects (Gallo & Christensen, 2011; Ortas et al., 2018). In contrast, many Chinese firms face resource constraints, particularly in financial capital, human resources, technology, and policy support, which diminishes their internal motivation to pursue ESG (R. Li et al., 2023). Due to the high costs and slow returns of ESG activities (Xue et al., 2023), companies with limited resources may reduce their ESG investment and instead prioritize more profitable projects, negatively affecting their ESG performance (Akbar et al., 2021). Thus, resource dependence theory highlights the importance of external resources in helping firms alleviate resource constraints and improve their ESG performance.

### **Institutional Ownership and ESG performance**

Much of the existing literature has examined the relationship between institutional ownership and ESG performance through the lens of agency theory (Jensen & Meckling, 1976). These studies argued that institutional ownership enhances ESG performance by providing monitoring incentives and improving corporate governance (Liu & Wan, 2023; Sun & Zhao, 2024). As a critical governance mechanism, institutional ownership helps monitor management behaviour and strategic decisions (Bebchuk et al., 2017; Liu et al., 2024), reducing agency costs (Jia et al., 2022).

From the perspective of resource dependence theory, a firm's resources are closely related to its ESG performance. Financial capital serves as a crucial basis for corporate sustainable development (Wang et al., 2022). ESG practice is a long-term investment and requires substantial financial resources (Xue et al., 2023). However, many Chinese firms face financial resource constraints when implementing ESG, which greatly reduces the internal motivation for ESG (Wang et al., 2022). According to Akbar et al. (2021), financial constraints considerably hinder Chinese firms' ability to undertake environmental protection investments because of their limited access to external funds, particularly for private and foreign firms. Some literature suggests that institutional shareholders can provide valuable resources such as financial capital and information. As long-term investors, institutional investors are typically more concerned with ESG issues and actively promote ESG investments (Erhemjams & Huang, 2019). With substantial capital and a strong investment capability, institutional investors play a vital role in providing financial capital for firms (Peng et al., 2023). Firms with institutional ownership often find it easier to obtain internal financial resources (García-Meca et al., 2015). Therefore, institutional ownership can alleviate resource constraints by providing financial resources, enabling firms to better and effectively engage in ESG activities. Institutional investors also act as crucial information sources in China because of their broader information channels (Cornett et al., 2007; Cheng et al., 2016). They excel in collecting and processing information, using their informational advantages to benefit the firms they invest in (Hendershott et al., 2015; Kim & Yi, 2015). Thus, this study posits that institutional ownership helps companies alleviate resource constraints by providing financial support and information resources, thereby improving firms' ESG performance. Given these considerations, we hypothesize:

Hypothesis 1: Institutional ownership positively influences corporate ESG performance.

### **The Moderating Effect of Board Gender Diversity**

A number of studies have found that board gender diversity positively influences ESG performance (Huang & Li, 2024; Yan et al., 2024). Several studies suggest that female directors contribute to ESG performance due to their unique characteristics, values, and ethical behaviours (Issa & Hanaysha, 2023). The resource dependence theory focuses on the board's role in providing resources and views board capital as a valuable strategic resource for companies (Pfeffer, 1972; Hillman & Dalziel, 2003). According to the resource dependence theory perspective, gender-diverse boards can provide the company with vital human capital (perspectives, cognition, expertise, skills, and experience) and relation capital (networks connecting to the external environment) (Hillman et al., 2000). These resources help firms acquire external support, which is essential for improving ESG performance (Van Der Walt & Ingley, 2003). Some studies find that female directors significantly increase corporate decision-making quality and performance by introducing unique and distinctive insights, cognition, and values (Chouaibi et al., 2021; Samara et al., 2022). The participation of women on boards has been shown to enhance corporate social responsibility and promote environmentally friendly practices (Nadeem et al., 2017). Moreover, female directors provide specialized skills, expertise, and guidance in addressing ESG challenges, facilitating firm responses to ESG issues (Wang et al., 2023). Thus, gender diversity on board could broaden perspectives, spark debate, facilitate problem-solving, and then promote decision-making related to ESG (Kyaw et al., 2017; Lewellyn & Muller-Kahle, 2024). In addition, gender-diverse boards often have more extensive networks that strengthen connections with key external stakeholders (Beckman & Haunschild, 2002). Liu et al. (2014) suggest that the networks of female directors are more diverse because they include both same-sex and cross-sex connections. Yang & Xue (2023) indicate that female directors enhance communication with stakeholders, which helps firms gain more external support and resources for ESG initiatives. Thus, drawing on resource dependence theory, board gender diversity strengthens the positive relationship between institutional ownership and ESG performance by offering diverse human capital and relation capital. Those resources enable firms to better understand and address ESG-related challenges, thereby promoting more effective ESG practice. Given the above discussion, we formulate:

Hypothesis 2: Board gender diversity positively moderates the relationship between institutional ownership and ESG performance.

### **Research Method**

#### *Sampling and Data Collection*

Our research sample consisted of Chinese A-listed firms between 2011-2022. ESG performance was derived from the Huazheng ESG ratings database, while other data were obtained from the China Stock Market and Accounting Research (CSMAR) database. Meanwhile, to ensure the reliability and validity of the empirical analysis, several treatments were made to the initial sample: (a) Excluding listed companies in the financial and insurance industry due to their special supervision requirements, operation activities, and accounting treatment (Orazalin & Baydauletov, 2020); (b) Excluding listed companies with "ST", "\*ST", and "PT" symbols; (c) Removing listed companies with missing data of key variables. (d) Winsorizing all continuous variables at the 1% and 99% percentiles. After applying these filters, the final sample comprised 25,907 firm-year observations between 2011-2022.



### Dependent Variable

This study adopted the Huazheng ESG ratings of Sino-Securities Index Information Service Co. Ltd to measure the ESG performance of firms. The Huazheng rating system blends traditional international ESG evaluation frameworks with Chinese specific characteristics, making it widely adopted by academics in China (R. Li et al., 2023; Ning & Zhang, 2023). Compared to other Chinese ESG rating systems, the Huazheng system offers distinct advantages, including a higher update frequency and broader coverage. It encompasses all Chinese A-listed firms. The Huazheng ESG rating system evaluates companies across three primary dimensions (environmental, social, and corporate governance), 16 secondary indicators, 44 tertiary indicators, and over 300 underlying data points. The Huazheng ESG ratings are categorized into 9 grades from low to high C, CC, CCC, B, BB, BBB, A, AA, and AAA. In this study, these nine grades from low to high are assigned values from 1 to 9 as proxy variables for ESG performance. The higher the value, the better the performance of the company.

### Independent Variable

Institutional investors in China include mutual funds, QFII, brokers, insurance companies, security funds, trusts, finance companies, banks, non-financially companies, and other institutions (Liu & Wan, 2023). Thus, institutional ownership was defined as the shareholding of institutional investors (Han, 2022).

### Moderating Variable

Board gender diversity refers to the gender heterogeneity of a company's board of directors, classified into male and female directors (Miller & Del Carmen Triana, 2009). Board gender diversity was measured as the proportion of female directors to the total number of directors on the board (Elnahass et al., 2023).

### Control Variables

Following prior studies, we controlled for firm and corporate governance factors that may influence ESG performance. On the firm level, firm size (SIZE) (Gallo & Christensen, 2011; Dremptic et al., 2020), firm age (AGE) (Withisuphakorn & Jiraporn, 2015; Zaid et al., 2020), firm leverage (LEV) (Du et al., 2022; Kyaw et al., 2017), and return on assets (ROA) (Uyar et al., 2020; Chebbi & Ammer, 2022) was employed as control variables. On the corporate governance level, we controlled for board independence (INDEP) (Lavin & Montecinos-Pearce, 2021; Menicucci & Paolucci, 2022), board meeting frequency (MEET) (Al-Mamun & Seamer, 2020), managerial ownership (MO) (Cho & Ryu, 2022; Sun & Zhao, 2024) and ownership concentration (TOP1). Table 1 presents the detailed measurements of all variables.

### Empirical Model

To investigate the effect of institutional ownership on ESG performance, this study constructed Model 1 to test hypothesis 1:

$$ESG_{it} = \alpha_0 + \alpha_1 IO_{it} + \alpha_2 SIZE_{it} + \alpha_3 AGE_{it} + \alpha_4 LEV_{it} + \alpha_5 ROA_{it} + \alpha_6 INDEP_{it} + \alpha_7 MEET_{it} + \alpha_8 MO_{it} + \alpha_9 TOP1_{it} + \varepsilon_{it}$$

To explore the moderating effect of board gender diversity on the relationship between institutional ownership and ESG performance, this study constructed Model 2 to test hypothesis 2:

$$ESG_{it} = \alpha_0 + \alpha_1 IO_{it} + \alpha_2 BGD_{it} + \alpha_3 IO_{it} \times BGD_{it} + \alpha_4 SIZE_{it} + \alpha_5 AGE_{it} + \alpha_6 LEV_{it} + \alpha_7 ROA_{it} + \alpha_8 INDEP_{it} + \alpha_9 MEET_{it} + \alpha_{10} MO_{it} + \alpha_{11} TOP1_{it} + \varepsilon_{it}$$

Among them,  $ESG_{it}$ —ESG performance of firms  $i$  at year  $t$ ;  $IO_{it}$ —institutional ownership;  $BGD_{it}$ —board gender diversity;  $IO_{it} \times BGD_{it}$ —the interaction term between institutional ownership and board gender diversity;  $SIZE_{it}$ —firm size;  $AGE_{it}$ —firm age;  $LEV_{it}$ —firm leverage;  $ROA_{it}$ —return on asset;  $INDEP_{it}$ —board independence;  $MEET_{it}$ —board meeting frequency;  $MO_{it}$ —managerial ownership;  $TOP1_{it}$ —ownership concentration;  $\alpha_0$ —the constant term;  $\varepsilon_{it}$ —the error term.

Table 1

*Measurement of all variables*

Variables	Symbol	Measurement
<b>Dependent variable</b>		
ESG performance	ESG	ESG performance from Huazheng ESG rating, nine grades of C-AAA are assigned successively from 1 to 9
	ESG2	ESG performance from Huazheng ESG scores, from 0 to 100
<b>Independent variables</b>		
Institutional ownership	IO	The proportion of total shares held by institutional investors
<b>Moderating variable</b>		
Board gender diversity	BGD	The number of female directors/the number of total directors
	BGD2	The Blau index of board gender diversity with two categories: males and females
<b>Control variables</b>		
Firm size	SIZE	The natural logarithm of the total assets
Firm leverage	LEV	The total liabilities/the total assets
Return on asset	ROA	The total net profit/the total assets
Board Independence	INDEP	The number of independent directors/ the number of total directors
Board meeting frequency	MEET	The annual number of board meetings held
Managerial ownership	MO	The proportion of shares held by directors, supervisors, and senior executives
Ownership Concentration	TOP1	The proportion of shares held the largest shareholder

**Empirical Analysis***Descriptive Statistics*

Table 2 shows the descriptive statistics of all variables, covering 25907 samples from 2011 to 2022. The average value for ESG rating is 4.137 (B), ranging from 1.25 (C) to 6 (BBB), suggesting that the overall ESG performance of companies is relatively low in China. The institutional ownership percentage varies significantly, with a mean of 43.855%, a minimum of 0.335%, and a maximum of 91.75%. The percentage of female directors on the board ranges from 0.00% to 55.6%, with a mean value of 15.40%, suggesting a serious gender imbalance among board directors in China. Regarding the control variables, the mean values

of firm size, firm age, firm leverage, and ROA are 22.294, 18.91, 0.423, and 0.038, respectively. The average percentage of independent directors on the board is 37.644%, indicating the board of directors has a degree of independence in China. There was a wide variation in managerial ownership, ranging from 0% to 68.097%. The largest shareholders hold an average of 33.629% of the total shares, with a minimum of 8.26% and a maximum of 73.98%, reflecting considerable differences in ownership concentration among Chinese firms.

Table 2

*Descriptive statistics of variables*

Variables	Obs	Mean	Sd	Min	Median	Max	VIF
ESG	25907	4.137	0.967	1.250	4.000	6.000	-
IO	25907	43.855	24.841	0.335	45.132	91.750	2.890
BGD	25907	15.357	13.232	0.000	12.500	55.556	1.030
SIZE	25907	22.294	1.321	19.847	22.107	26.386	1.690
AGE	25907	18.910	5.946	5.920	18.830	34.000	1.150
LEV	25907	0.423	0.206	0.054	0.414	0.915	1.640
ROA	25907	0.038	0.066	-0.276	0.039	0.209	1.280
INDEP	25907	37.664	5.360	33.333	36.364	57.143	1.010
MEET	25907	9.826	3.783	4.000	9.000	23.000	1.110
MO	25907	13.948	19.598	0.000	1.154	68.097	2.280
TOP1	25907	33.629	14.809	8.260	31.220	73.980	1.540

**Correlation Analysis**

The Pearson correlation analysis for all variables is shown in Table 3. The result presented that IO is significant and positively related to ESG ( $p < 0.001$ ), supporting the tentative hypothesis 1. Additionally, control variables such as SIZE, ROA, INDEP, MO, and TOP1 also exhibited a significant and positive association with ESG at the 1% level. Conversely, AGE, LEV, and MEET were negatively correlated with ESG at the 1% level. The highest correlation coefficient observed is between IO and TOP1, at 0.490, while the lowest is between IO and MO, at -0.635. If the correlation coefficient between two independent variables ranges from -0.800 to 0.800, there is no serious multicollinearity problem. To further assess this, we examined the variance inflation factor (VIF) for all models. Table 2 suggested that the VIF of all variables in our model is less than 3, thereby confirming that there are no serious multicollinearity issues in our study.

Table 3

*Person correlation matrix*

	ESG	IO	BGD	SIZE	AGE	LEV	ROA	INDEP	MEET	MO	TOP
ESG	1										
IO	0.096 ***	1									
BGD	-0.017 ***	-0.102 ***	1								
SIZE	0.221 ***	0.425 ***	-0.128 ***	1							
AGE	-0.056 ***	0.062 ***	0.037 ***	0.221 ***	1						
LEV	-0.105	0.187	-0.101	0.484	0.201	1					



	***	***	***	***	***						
ROA	0.223 ***	0.114 ***	0.026 ***	0.010	-0.100 ***	-0.354 ***	1				
INDEP	0.073 ***	-0.049 ***	0.021 ***	0.005	-0.016 **	-0.014 **	-0.007	1			
MEET	-0.007	0.040 ***	-0.017 ***	0.265 ***	0.064 ***	0.248 ***	-0.073 ***	0.038 ***	1		
MO	0.093 ***	-0.635 ***	0.118 ***	-0.351 ***	-0.261 ***	-0.329 ***	0.153 ***	0.054 ***	-0.069 ***	1	
TOP1	0.119 ***	0.490 ***	-0.015 **	0.171 ***	-0.094 ***	0.026 ***	0.141 ***	0.055 ***	-0.052 ***	-0.066 ***	1

Notes: \*\*\*, \*\*, and \* indicate the level of significance at 10%, 5%, and 1% respectively.

### Institutional Ownership, Board Gender Diversity, and ESG Performance

After conducting the F test, the Breusch Pagan Lagrangian multiplier (LM) test, and the Hausman test, this study selected the fixed effects model (FEM) for empirical analysis. Firstly, we empirically examined the effect of institutional ownership on ESG performance to test hypothesis 1. As shown in Colum (5) of Table 4, the relationship between institutional ownership (IO) and ESG performance (ESG) was significantly positive ( $\alpha=0.0030$ ,  $p<0.001$ ), thereby confirming hypothesis 1. These findings align with previous studies (Jia et al., 2022; Sun & Zhao, 2024), which posited that institutional shareholding improves corporate ESG performance. Furthermore, this study examined the moderating effect of board gender diversity on the relationship between institutional ownership and ESG performance to test hypothesis 2. In the Colum (6) of Table 4, the regression coefficient of institutional ownership (IO) ( $\alpha=0.0022$ ,  $p<0.001$ ) and the interaction term of institutional ownership and board gender diversity (IO×BGD) ( $\alpha=0.0049$ ,  $p<0.001$ ) are both positive and significant. These findings suggest that board gender diversity strengthens the positive relationship between institutional ownership and ESG performance, supporting hypothesis 2.

In terms of control variables, firm size (SIZE) ( $\alpha=0.2625$ ,  $p<0.001$ ) and return on asset (ROA) ( $\alpha=1.6576$ ,  $p<0.001$ ) were significantly and positively associated with ESG performance. These findings align with the resource dependence theory that larger firms can devote time and attention to ESG-related initiatives as they have more resources for sustainability management (Naciti, 2019; Yin et al., 2023). More profitable companies have greater financial resources to invest in ESG activities (Abdelkader et al., 2024). The effect of board independence (INDEP) on ESG performance was significant and positive ( $\alpha=0.0119$ ,  $p<0.001$ ), which aligns with the notion that independent directors enhance ESG performance by monitoring managers to mitigate agency costs (Arayssi et al., 2019). Similarly, the impact of managerial ownership on ESG performance was significant and positive ( $\alpha=0.089$ ,  $p<0.001$ ), which supports the finding that managerial shareholding improves corporate ESG performance by mitigating agency problems (Sun & Zhao, 2024). Conversely, the regression coefficients of firm age (AGE) ( $\alpha=-0.0044$ ,  $p<0.001$ ), firm leverage (LEV) ( $\alpha=-0.8521$ ,  $p<0.001$ ), and board meeting frequency (MEET) ( $\alpha=-0.0083$ ,  $p<0.001$ ) were significantly negative.

Table 4

*Regression results of institutional ownership, board gender diversity, and ESG performance*

Variables	(1) OLS Model 1	(2) OLS Model 2	(3) REM Model 3	(4) REM Model 4	(5) FEM Model 5	(6) FEM Model 6
IO	<b>0.0032***</b> (0.0004)	<b>0.0024***</b> (0.0005)	<b>0.0022***</b> (0.0004)	<b>0.0017***</b> (0.0005)	<b>0.0030***</b> (0.0004)	<b>0.0022***</b> (0.0005)
BGD		<b>-0.2424***</b> (0.0830)		-0.0969 (0.0870)		<b>-0.2208***</b> (0.0832)
IO×BGD		<b>0.0048***</b> (0.0017)		<b>0.0032*</b> (0.0018)		<b>0.0049***</b> (0.0017)
SIZE	<b>0.2551***</b> (0.0054)	<b>0.2561***</b> (0.0055)	<b>0.2210***</b> (0.0075)	<b>0.2217***</b> (0.0075)	<b>0.2625***</b> (0.0056)	<b>0.2639***</b> (0.0057)
AGE	<b>-0.0067***</b> (0.0010)	<b>-0.0067***</b> (0.0010)	<b>-0.0168***</b> (0.0014)	<b>-0.0169***</b> (0.0014)	<b>-0.0044***</b> (0.0011)	<b>-0.0044***</b> (0.0011)
LEV	<b>-0.8060***</b> (0.0343)	<b>-0.8071***</b> (0.0344)	<b>-0.8326***</b> (0.0392)	<b>-0.8307***</b> (0.0392)	<b>-0.8521***</b> (0.0366)	<b>-0.8525***</b> (0.0366)
ROA	<b>1.6827***</b> (0.0947)	<b>1.6766***</b> (0.0948)	<b>0.5339***</b> (0.0838)	<b>0.5315***</b> (0.0838)	<b>1.6576***</b> (0.1044)	<b>1.6506***</b> (0.1043)
INDEP	<b>0.0116***</b> (0.0010)	<b>0.0116***</b> (0.0010)	<b>0.0088***</b> (0.0012)	<b>0.0088***</b> (0.0012)	<b>0.0119***</b> (0.0010)	<b>0.0119***</b> (0.0010)
MEET	<b>-0.0099***</b> (0.0015)	<b>-0.0100***</b> (0.0015)	<b>-0.0092***</b> (0.0015)	<b>-0.0092***</b> (0.0015)	<b>-0.0083***</b> (0.0016)	<b>-0.0084***</b> (0.0016)
MO	<b>0.0087***</b> (0.0004)	<b>0.0088***</b> (0.0004)	<b>0.0076***</b> (0.0005)	<b>0.0075***</b> (0.0005)	<b>0.0089***</b> (0.0004)	<b>0.0089***</b> (0.0004)
TOP1	0.0007 (0.0005)	<b>0.0008*</b> (0.0005)	<b>0.0029***</b> (0.0006)	<b>0.0030***</b> (0.0006)	0.0005 (0.2560)	0.0006 (0.1850)
_CONS	<b>-1.7706***</b> (0.1148)	<b>-1.7570***</b> (0.1156)	<b>-0.6579***</b> (0.1557)	<b>-0.6559***</b> (0.1561)	<b>-1.9779***</b> (0.1195)	<b>-1.9734***</b> (0.1209)
N	25907	25907	25907	25907	25907	25907
R <sup>2</sup>	0.1539	0.1541			0.1595	0.1598
Firm FE	NO	NO			NO	NO
Year FE	NO	NO			YES	YES

Notes: This table summarize the regression result from ordinary least squares (OLS), random effects model (REM), and fixed effects model (FEM). \*, \*\*, and \*\*\* indicate the significance at 10%, 5%, and 1%, respectively. The standard errors are reported in parentheses.

### Robustness Test

To ensure the reliability of the empirical regression results, we performed a robustness test by substituting the measurement approach for both the dependent variable and moderator variable. For the dependent variable, we replaced the Huazheng ESG ratings with Huazheng ESG scores (ESG2), which range from 0 to 100. A higher ESG score indicates that the company with better ESG performance. For the moderator variable, we used the Blau index (BGD2) to measure board gender diversity. The Blau index is a common method for measuring dissimilarities within a group (Harrison & Klein, 2007), which is most widely used to measure board gender diversity in extant literature (Yang & Xue, 2023; Ma et al., 2024). The Blau index is calculated using the following formula:

$$Blau\ index = 1 - \sum P_i^2$$

Where  $i = 1, \dots, n$  represents the number of possible categories, and  $p$  is the percentage of board members in each category (Collins & Blau, 1979). In this study, board gender diversity is categorized into two categories:  $i=1$  refers to male and  $i=2$  refers to female. The value of the Blau index varies between 0 and 1, where a value of 0 indicates that only one gender is represented, and a value of 1 suggests an equal number of male and female board members. Table 5 demonstrated the regression results after substituting measures for ESG performance and board gender diversity. The results in Column (1) indicated that the impact of institutional ownership (IO) on ESG performance (ESG2) is positive and significant ( $\alpha=0.15, p<0.001$ ), further confirming hypothesis 1. The results in Column (2) showed that the interaction term between the institutional ownership and Blau index ( $OI \times BGD2$ ) exhibits a positive and significant correlation with ESG performance ( $\alpha=0.019, p<0.001$ ). This indicated that board gender diversity positively moderates the relationship between institutional ownership and ESG performance, further validating hypothesis 2.

Table 5  
*Robustness Test*

Variables	(1) FEM Model1	(2) FEM Model2
IO	<b>0.015***</b> (7.744)	<b>0.011***</b> (4.206)
BGD2		<b>-0.805**</b> (-2.276)
IO×BGD2		<b>0.019***</b> (2.613)
SIZE	<b>1.348***</b> (45.263)	<b>1.355***</b> (45.048)
AGE	<b>-0.019***</b> (-3.411)	<b>-0.019***</b> (-3.410)
LEV	<b>-4.566***</b> (-23.540)	<b>-4.566***</b> (-23.549)
ROA	<b>9.320***</b> (16.531)	<b>9.285***</b> (16.471)
INDEP	<b>0.063***</b> (11.513)	<b>0.063***</b> (11.534)
MEET	<b>-0.046***</b> (-5.345)	<b>-0.046***</b> (-5.379)
MO	<b>0.042***</b> (19.664)	<b>0.042***</b> (19.721)
TOP1	0.001 (0.598)	0.002 (0.765)
CONS	<b>41.869***</b> (66.409)	<b>41.895***</b> (65.545)
N	25907	25907
R <sup>2</sup>	0.1567	0.1570
Firm FE	NO	NO
Year FE	YES	YES

Notes: \*, \*\*, and \*\*\* indicate the significance at 10%, 5%, and 1%, respectively. The standard errors are reported in parentheses.

### **Conclusion**

This paper constructed balanced panel data to explore the nexus between institutional ownership, board gender diversity, and ESG performance of listed companies over the period from 2011-2022 in China. The study had two key objectives: first, to examine whether institutional ownership influences ESG performance. Second, to explore whether board gender diversity influences the correlation between institutional ownership and ESG performance. The empirical results indicated that: (1) institutional ownership has a positive effect on ESG performance of firms in China; (2) Board gender diversity strengthens the positive relationship between institutional ownership and ESG performance of firms in China. These findings indicated that institutional investors and board gender diversity play crucial roles in promoting ESG performance in China. Based on resource dependence theory, institutional ownership can help Chinese companies alleviate resource constraints by providing financial support and information resources, thereby improving firms' ESG performance. Furthermore, board gender diversity can strengthen the relationship between institutional ownership and ESG performance by enriching firms' human capital and relation capital. These resources enable firms to better understand and address ESG-related issues and promote more effective ESG practices, ultimately improving their ESG performance. Additionally, our findings remain robust after replacing the measurement methods for both the dependent variable and the moderator variable.

### **Limitations**

This study also has some limitations. Firstly, it is limited to Chinese listed firms, and future research should include other companies. Secondly, this study does not consider the impact of different types of institutional investor shareholdings on ESG performance. Finally, this study focuses solely on gender diversity, without looking at other aspects of board members, such as nationality, age, education level, and experience. Hence, future research should address these limitations.

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