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BOARD GENDER DIVERSITY, AUDIT COMMITTEE INDEPENDENCE AND ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) PERFORMANCE

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ABSTRACT

This research explores gender diversity on boards, audit committee independence and environmental, social and governance (ESG) performance, focusing on whether these factors act as substitute or complement in driving corporate ESG commitment. Through analysis involving 20,103 observations from 2011-2020, we examined data from 41 countries. The findings support resource dependence theory, revealing a positive association between female board representation and ESG performance. Furthermore, reflecting the audit committee's active monitoring role, the positive impact of board gender diversity on ESG performance is amplified in firms with more independent audit committees. These international findings suggest policy implications for promoting gender diversity and audit committee independence as strategies to enhance corporate ESG engagement globally.

Keywords: Gender Diversity, Audit Committee, Corporate Governance, ESG

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1. INTRODUCTION

The growing emphasis on stakeholder capitalism and sustainable financial performance has called for corporate commitment towards environmental, social, and governance (ESG) issues. Firms are expected to apprehend their impact on environment and society by engaging in ESG-oriented strategies such as minimising environmental footprints. The commitment to ESG is ultimately

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subject to managerial choices to balance the costs and benefits of sustainability-oriented strategies. Corporate board plays an important role in governing corporate ESG activities to minimise the information asymmetries between the shareholders and the managers (Cheung & Lai, 2023). This study emphasises two important features of corporate boards in most of the codes of corporate governance across the globe, namely diversity and independence.

Diversity is a feature of an effective board, as diverse boards contribute to a vast and novel range of opinions, experiences, and skill sets, which could enhance the effectiveness of analysing risks and making sound decisions (Lenard et al., 2014). Diversity in board gender representation may affect the way managers consider ESG issues when making decisions and leading firms to experience improved governance on ESG (Arayssi et al., 2020). Independence allows the board to resist undue pressure from management, leading to more robust oversight and support on important corporate issues (Siagian & Tresnaningsih, 2011). This study focuses on audit committee independence over other independence measures, given their primary responsibility on the oversight role (Komal et al., 2022), including in ensuring ESG disclosure quality (Arif et al., 2020), making it more relevant to be associated with oversights related to the boards' role in ESG issues. Independence, in the aspect of audit committees, contributes to better monitoring of internal control functions and financial reporting processes, which work to promote ethical disclosure practices and safeguard against diffusion of biased information (Cheung & Lai, 2023). Accordingly, the independence of the audit committee enhances the adherence to high-quality ESG reporting (Arif et al., 2020).

This study explores corporate ESG commitment by investigating whether board gender diversity and audit committee independence act as substitutes or complement in improving ESG performance. We delve into the possibility of boards with a stronger female presence to bring a favourable effect on ESG performance. Furthermore, our analysis investigates how audit committee independence influences the link between board gender diversity and ESG performance. Our study is driven by two existing dilemmas in the corporate governance landscape. First, the nomination of women in the corporate board worldwide remains low, despite the attractive packages, increased number of well-prepared women for board memberships and movements towards a more representative and inclusive system of corporate governance (Young et al., 2024). With women holding less than 25% of board seats (Deloitte, 2024), it raises concern that gender diversity in the boardroom is unlikely to be achieved before 2038. This is a great concern, given that gender diversity has been connected to the improvement in environmentally and socially conscious corporate behaviour, especially in addressing crises to minimise risk of ESG entrenchment. Second, issues on audit committees have always revolved around their ability to be independent, to the extent that there is a national code of corporate governance emphasising the recommendations for majority composition of independent directors in the audit committee. By investigating the synergies of these two governance factors, this study enhances the knowledge on the corporate governance landscape by determining whether the presence of an independent audit committee substitutes for or complements the impact of gender variation on board towards corporate ESG performance.

In the analysis of 20,103 firm-year observations from 41 countries from 2011–2020, we demonstrate greater ESG performance among firms with greater women participation on corporate boards. Further, in firms where the audit committee is more independent, the positive relationship between board gender diversity and ESG performance is more evident. The inferences remain in the additional tests undertaken to confirm the results, including in addressing endogeneity. The

findings corroborate the resource dependence theory of gender diversity on board on top of monitoring effect of the audit committee. Our findings offer international evidence on the need to promote gender variation on corporate boards and greater independence of the audit committee towards promoting better performance in ESG.

This study offers valuable contributions. First, in addressing a lacuna in the literature on corporate governance and ESG performance. Analysis involving the impact of gender diversity on ESG performance (Yahaya, 2025; Disli et al., 2022) and audit committee independence towards ESG outcomes (Seth & Saxena, 2025) have mostly been conducted separately without further investigating their combined influence. We add to the gap since the role of audit committee independence is further investigated, either in substituting or complementing the role of board gender diversity on corporate sustainability. Our approach is crucial as diverse gender on board contributes to broader strategy and viewpoint towards ESG issues (Muhammad & Farooq, 2025) while independent audit committees enhance the boards' oversight role on quality of ESG disclosures. These mechanisms, diversity and independence, are mutually supportive as the insights from diverse boards paired with meticulous oversight from independent audit committees (Popov & Makeeva, 2022) contribute to stronger ESG performance. Second, this study offers international evidence on governance factors that enhance corporate ESG performance. The findings add to literature that are often country-specific (Arif et al., 2022), to reflect on two features of corporate boards that have been the focus of prevailing national corporate governance guidelines: diversity and independence. Since the variations in regulatory environments and governance models between countries significantly impact on ESG disclosures (Buchetti et al., 2025), the focus on these two most prevailing mechanisms are considered an appropriate approach in this cross-country analysis on corporate governance and ESG performance.

We proceed as follows: Section 2 for the literature and hypotheses; Section 3 outlines the research design; Section 4 presents the results; and Section 5 concludes the study.

2. LITERATURE REVIEW

2.1 Board Gender Diversity and ESG Performance

Board diversity includes a range of characteristics reflected in the composition of a corporate board. Diversity is typically achieved by recruiting directors with diverse backgrounds such as gender, ethnicity, educational, and industry experience (Adams et al., 2015). One of the most promoted characteristics is gender diversity, as shown by the momentum in appointing women representation on board worldwide. Many countries are implementing policies and initiatives to encourage greater women participation on corporate boards. Furthermore, gender variations align with the principles of equality and inclusions as highlighted by Sustainable Development Goals, particularly Goal 5, in promoting a workplace environment where individuals of all genders have equal opportunities for leadership towards achieving organisational goals (Tushabe et al., 2023). Extant research reveals that firms with diverse boards often exceed their counterparts in achieving greater financial returns (Setiani, 2023). Diverse gender enriches the range of perspective and experience to decision-making, thus contributing to greater impact on corporate prestige (Rhee et al., 2022) and governance practices (Al-Rahahleh, 2017). A diverse board with varied background and experience contribute to a more rigorous oversight of management accountability and decisions. This

ultimately mitigates agency conflicts to benefit shareholders (Yahaya, 2025). The diverse viewpoints and expertise brought by a varied board of directors' results in a thorough risk assessment and strategic decision-making, resulting in lowering firm risk and contributing to stock market stability (Lenard et al., 2014) and improving stock liquidity (Ahmed & Ali, 2017).

In the aspect of ESG performance, the resource dependence theory suggests that a higher participation of women as directors opens the access to valuable resources and network that gives opportunities in achieving superior ESG performance. The resource dependence theory emphasises that efficient allocation of corporate resources, including counselling, advice and tangible assets, accrue to the firms through female representation on board (Hillman et al., 2007). Diversity is associated with more efficient resource utilisation (Guizani & Abdalkrim, 2021) and the critical resources that diverse boards provide to firms influence ESG performance (Haque & Jones, 2020). Women directors have long-term orientation as compared to men, and these capabilities strengthen their roles in advising boards towards achieving high ESG performance (Remo-Diez et al., 2025). Further, the diverse skills, risk-averse attitude and sensitivity towards environmental and social issues possessed by women directors support their understanding to incorporate ESG considerations into a firm's strategic decision making (Saleh & Maigoshi, 2024). These characteristics of women directors introduce diverse perspectives in enhancing the board's ability in identifying and managing risks associated with ESG. In addition, women directors enhance board effectiveness to broader stakeholder engagement, enabling better management of stakeholder relationships (Fan et al., 2022), which improve their focus on ESG. The resource dependence theory supports that access to external connections to gain a wide array of knowledge and expertise is crucial in promoting ESG compliance (Gavana et al., 2025).

Diverse boards, as they are rich in perspective and creative thinking, contribute to robust decision-making and greater adaptability towards crisis, which is essential to respond to ESG controversies (Muhammad & Farooq, 2025). Firms that benefit from gender-diverse boards are often associated with prioritising environmental sustainability (Özparlak & Gürol, 2025) and social responsibility (Xin et al., 2025). As serving on corporate boards is meant to leverage their full potential, women leaders effectively drive the implementation of environmental solutions as compared to men (Wray et al., 2023). Firms with a diverse gender representation on their board demonstrate greater proficiency in undertaking commitments to minimise environmental emissions within their production and operational activities (Kyaw et al., 2022). Hence, firms are encouraged to strategically restructure their boards by including more women representatives to benefit superior financial performance and advancing ESG practices (Aureli & Brighi, 2025).

Empirically, research suggests that having more women representatives on corporate boards is essential for achieving robust ESG performance (Yahaya, 2025). Gurol and Lagasio (2022) suggest that banks where women hold a greater share of board seats are inclined to have outstanding ESG performance than their peers. In an international analysis, Kamarudin et al. (2021) show that gender-diverse firms tend to perform better corporate sustainability. Female directors not only have diverse perspectives in enhancing board's ability in identifying and managing risks, but their presence impacts the policies, protocols, and methodologies utilised by firms in improving transparency of ESG information (Alodat & Hao, 2024). Ultimately, these factors enable firms to demonstrate the extent of commitment towards social and environmental issues, leading to improved ESG performance (Wasiuzzaman & Mohammad, 2019).

Based on the resource dependence theory and the empirical studies above, we expect that a greater number of female directors positively impacts corporate ESG performance. Women on board serve as valuable resources, since they contribute opinions, ideas, and expertise that enhance corporate commitment towards ESG. In exploring this view, this study expands the knowledge on women participation on boards by utilising samples of firms in various countries, rather than relying on specific countries. This study also advances understanding of corporate governance mechanisms by focusing specifically on the gender composition on board instead of using broader diversity indicators. The focus offers clearer strategies that firms should undertake to improve gender composition on boards and provides valuable insights into how appointing more women directors could enhance ESG performance. Thus, the following hypothesis is proposed:

H_1: There is a positive relationship between board gender diversity and ESG performance.

2.2 Audit Committee Independence, Board Gender Diversity and ESG Performance

In the aspect of ESG performance, Maroun (2022) posits that firms may appoint third party expertise to support an independent committee in overseeing and validating the accuracy of ESG reports, thus safeguarding the interest of their stakeholders. Through independent oversight and rigorous review of ESG data, the audit committee may investigate any potential opportunity for expropriation by insiders (Popov & Makeeva, 2022), restrict management from disclosing only favourable information, and ensure ESG performance is authentic (Cheung & Lai, 2023). Through independent oversight, the committee strengthens the organisation's credibility, thereby cultivating trust among the stakeholders and influencing their decisions.

Generally, the audit committee has a role in overseeing the authenticity of financial reporting (Mohammadi et al., 2025) and monitoring the organisation's internal controls to mitigate operational risks (O'Shaughnessy et al., 2022). Their roles include aligning the internal audit functions with the organisation's strategic objectives (Marx & Voogt, 2010). The oversight responsibilities of the audit committee extend to risk management as the members should possess risk management skills to enhance organisational performance (Weickgenannt et al., 2021). By reducing the divergence of interests between the management and the stakeholders, the audit committee strengthens corporate governance practices and enhances stakeholder trusts, which benefits the organisation (Zaman et al., 2021).

In supporting corporate ESG performance, the audit committee is in the best position to objectively assess and perform its oversight role (Komal et al., 2022) on the ESG initiatives. The independence attribute helps analyse the extent and reliability of ESG disclosure (Arif et al., 2020) as well as ensures that the reporting is accurate, reliable, and in line with established standards and guidelines. As with financial reporting, the adoption of clear policies, internal controls, and governance applied for ESG information guarantees the quality and reliability of data presented to the stakeholders (Santonastaso et al., 2025). This is important given the reputational damage and performance risks associated with inaccurate information due to discounting ESG activities, such as greenwashing. There is strong evidence supporting the favourable impact of audit committee independence on the extent of their monitoring efforts towards ESG performance (Seth & Saxena, 2025). The ability of audit committees to curb earnings manipulation (Ibrahim et al., 2023) draws attention to the critical function of the audit committee members in enhancing reporting transparency and accountability in driving sustainable corporate practices. Mustafa et al. (2018) affirm that the audit committees'

attributes, such as independence, have impacted ESG disclosures positively. Thus, the committee's oversight role is vital in ensuring effective ESG performance (Weickgenannt et al., 2021).

While the link between board gender diversity and ESG performance is addressed in Hypothesis 1, the question remains unanswered is the combined influence of board gender diversity and audit committee independence on ESG performance. Firms with more women directors are often observed to have better ESG performance (Disli et al., 2022). Meanwhile, firms with independent audit committees tend to demonstrate improved ESG outcomes, specifically in the areas of responsible environmental practices, ethical social conduct, and effective corporate leadership (Seth & Saxena, 2025). These findings conclude that both gender variation on corporate boards and audit committee independence have favourable impacts on corporate ESG performance. However, with these two mechanisms in place, further analysis is needed to identify whether they are substitutes or complements. This is an important agenda to address the two most prevailing mechanisms on corporate governance, diversity and independence. More specifically, understanding the corporate governance mechanisms to be focused on to accelerate ESG performance are essential for firms.

On one side, the substitutive argument sets that two governance mechanisms are substitutes, in which only one is needed to ensure governance effectiveness. According to Aguilera et al. (2012), in the substitutability effect, one mechanism performs the same function as another, allowing it to be replaced without impacting the overall system's functionality. In this view, ESG performance is enhanced either by having a gender-diverse board or independent audit committee. Meanwhile, the complementary argument states that there is a reciprocal relationship between the mechanisms, such that adopting one makes the other more valuable, as there are synergetic effects to enhance ESG performance. In this view, the ESG performance is even greater for firms with both mechanisms, namely gender-diverse board and independent audit committee. Based on the evidence supporting the importance of board gender diversity (Disli et al., 2022) and audit committee independence (Seth & Saxena, 2025) on ESG, we argue that both diversity and independence are mutually supportive mechanisms, which then propose a complementary perspective.

We posit, based on the complementary argument, that the independent audit committee may strengthen the board's oversight function on ESG issues (Shakil, 2021) by ensuring that the diverse ideas and perspectives from diverse boards are incorporated in the firm's ESG initiatives and outcomes (Issa, 2023). The independent audit committee reinforces the association between gender variation on board and ESG outcomes by confirming transparent and reliable reported metrics. The active monitoring by the independent audit committee allows better identification of areas for improvement related to fraud risks, assess the alignment of ESG goals with firm's strategic directions, and provide recommendations to sustain responsible business practices. We hypothesise that the relationship between board gender diversity and ESG performance is positively moderated by the independent audit committees.

H_2: The positive relationship between board gender diversity and ESG performance is stronger in firms with higher audit committee independence.

3. METHODOLOGY

This study employs an international dataset to test the proposed hypotheses.

3.1 Sample

Financial and governance data were obtained from the LSEG (Refinitiv) database, while country-level variables, including GDP, female labour force participation, and women's representation in national parliaments, were retrieved from the World Bank database. We begin with the full global dataset of firm-year observations for the period 2011–2020 and follow a series of screening procedures. First, consistent with prior literature, we exclude firms classified under the Global Industry Classification Standard (GICS) sector code 40 (Financials) due to their distinct regulatory and reporting environments. Second, we remove firm-year observations with missing values in the key variables for the analysis. Third, to mitigate the influence of extreme values, all continuous variables are winsorised at the top and bottom 1 percent. The period from 2011 to 2020 was selected because it coincides with the expansion and standardisation of global ESG databases, the introduction of major institutional reforms related to gender diversity, and the acceleration of ESG reporting following international initiatives such as the Paris Agreement, while avoiding the structural disruptions associated with the COVID-19 pandemic. After applying these procedures, the final sample comprises 20,103 firm-year observations from 41 countries.

3.2 Regression Model

We estimate Equation (1) using panel regression techniques with industry and year fixed effects to control unobserved heterogeneity across sectors and time. This specification is appropriate because ESG performance, gender diversity, and audit committee structures are likely influenced by time-invariant industry as well as global shocks or trends that vary by year.

$$ESGSCORE = \beta_0 + \beta_1 DIV\_GENDER + \beta_2 AC\_IND + \beta_3 DIV\_GENDER*AC\_IND + \beta_k CONTROLS + \theta_{1\text{-}n} Fixed\_Effects_t + \varepsilon_{it} \quad (1)$$

where, ESGSCORE proxies for corporate ESG performance, DIV_GENDER proxies for board gender diversity, AC_IND is audit committee independence, CONTROLS proxies for control variables; and Fixed_Effects proxies for industry and year effects. The variables are explained in Section 3.3 below. In the equation, Hypothesis 1 is supported if β_1 is significant and positive while Hypothesis 2 is supported if β_3 is significant and positive.

3.3 Variables

ESGSCORE, the dependent variable, reflects corporate ESG performance. Refinitiv's ESG score, which we utilise, is constructed from three scores, namely environmental (firm's environmental impact and initiatives), social (firm's relationships with stakeholders) and governance (firm's internal structure, board independence, shareholder rights, and business ethics). A higher score reflects stronger ESG practices. For the main analysis, ESGSCORE is proxied by the total reported ESG score that is deflated by 100, following prior studies (Mohamad Ariff et al., 2024). For additional analysis, we categorise ESGSCORE into environmental performance (ESCORE), social performance (SSCORE), and governance performance (GSCORE).

The test variable, DIV_GENDER, serves as proxies for females on corporate boards. It has been employed to measure the strength of corporate boards based on their female composition (Wan Ismail et al., 2023). The variable is measured by the proportion of female directors in the corporate board. AC_IND, the moderating variable, measures the independence of the audit committee. It is calculated as the proportion of independent directors on the committee.

The model incorporates a range of control variables. Firm size (FSIZE) is measured as the natural log of total assets; leverage (LEV) as total liabilities divided by total assets; profitability (ROA) as net income divided by total assets; firm growth (GROWTH) as the change in revenue, board size (BDSIZE) as the total number of directors; growth opportunities (MKTBK) are captured by the market-to-book value ratio; liquidity (QUICK) as calculated as (current assets - inventory) / current liabilities; and shareholder value creation (RETEQ) as measured by the proportion of retained earnings to total equity. Industry litigation risk (LIT) is controlled for using a dummy variable for firms with SIC codes between 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7370. Firm age (AGE) is measured in years of operation. Cash flow volatility (CFOVAR) is calculated as the ratio of cash flow from operations to total assets. Finally, country-level economic fluctuations are controlled using GDP per capita (GDP).

4. RESULTS AND DISCUSSION

Analysis, including descriptive, correlation and regression, are performed using Stata.

4.1 Descriptive Statistics

Table 1: Descriptive Statistics
Panel A: Descriptive Statistics for Overall Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
ESGSCORE	20103	0.440	0.208	0.045	0.886
ESCORE	20103	0.359	0.285	0.000	0.918
GSCORE	20103	0.508	0.223	0.001	0.995
SSCORE	20103	0.439	0.241	0.001	0.982
DIV_GENDER	20103	0.085	0.121	0.000	0.500
DIV_EXEC	20103	0.070	0.117	0.000	0.556
AC_IND	20103	0.900	0.300	0.000	1.000
AC_NONEX	18152	0.562	0.471	0.000	1.000
FSIZE	20103	21.907	1.604	17.794	26.037
LEV	20103	0.227	0.167	0.000	0.683
ROA	20103	0.045	0.095	-0.512	0.313
GROWTH	20103	0.069	0.245	-0.651	1.601
BDSIZE	20103	9.520	2.915	4.000	22.000
MKTBK	20103	3.777	5.055	0.237	47.926
QUICK	20103	1.688	1.612	0.204	11.896
RETEQ	20103	0.429	1.362	-10.322	4.643
LIT	20103	0.087	0.282	0.000	1.000
AGE	20103	9.194	0.848	6.125	10.733
CFOVAR	20103	0.044	0.044	0.005	0.423
GDP	20103	10.433	0.865	7.215	11.542
FEMLAB	18653	78.684	9.502	25.627	94.606
FEMPOL	19844	22.38	8.626	0.000	48.333

Panel B: Descriptive Statistics by Countries

Country	obs	ESGSCORE	ESCORE	SSCORE	GSCORE	DIV_ GENDER	DIV_ EXEC	AC_ IND	AC_ NONEX
Australia	1260	0.376	0.245	0.367	0.511	0.175	0.152	0.823	0.955
Belgium	51	0.485	0.371	0.484	0.559	0.331	0.171	0.941	0.981
Brazil	183	0.498	0.466	0.504	0.508	0.107	0.064	0.831	0.865
Canada	843	0.444	0.379	0.427	0.547	0.173	0.126	0.958	0.918
Chile	224	0.399	0.363	0.408	0.421	0.072	0.060	0.862	0.888
China	1142	0.309	0.236	0.228	0.484	0.128	0.135	0.708	0.801
Germany	130	0.673	0.652	0.706	0.651	0.231	0.113	0.938	0.989
Greece	56	0.557	0.504	0.621	0.473	0.092	0.185	1.000	1.000
Hong Kong	227	0.400	0.376	0.375	0.458	0.061	0.122	0.797	0.954
India	440	0.511	0.460	0.537	0.509	0.111	0.051	0.718	0.925
Indonesia	215	0.443	0.355	0.501	0.441	0.067	0.146	0.967	0.985
Ireland	54	0.495	0.433	0.455	0.642	0.135	0.066	1.000	0.630
Isle of Man	2	0.507	0.616	0.523	0.384	0.141	0.367	1.000	1.000
Israel	120	0.393	0.219	0.407	0.464	0.114	0.106	0.975	0.645
Italy	11	0.454	0.389	0.544	0.43	0.249	0.041	1.000	1.000
Japan	2216	0.460	0.479	0.403	0.497	0.051	0.018	0.906	0.883
Korea (South)	962	0.443	0.423	0.421	0.472	0.023	0.020	0.981	0.986
Kuwait	17	0.380	0.290	0.401	0.451	0.061	0.180	0.941	0.942
Malaysia	354	0.437	0.357	0.46	0.47	0.174	0.245	0.819	0.961
Mexico	114	0.473	0.461	0.471	0.487	0.061	0.045	0.939	0.985
Netherlands	122	0.643	0.633	0.678	0.602	0.215	0.115	1.000	0.768
New Zealand	177	0.381	0.266	0.349	0.523	0.249	0.192	0.859	0.939
Norway	164	0.575	0.550	0.599	0.58	0.395	0.190	0.720	0.896
Oman	6	0.206	0.000	0.074	0.63	0.111	0.134	1.000	1.000
Pakistan	8	0.258	0.135	0.293	0.401	0.084	0.008	0.500	0.947
Panama	5	0.245	0.140	0.328	0.172	0.050	0.029	1.000	N/A
Peru	111	0.354	0.253	0.343	0.51	0.083	0.125	0.649	0.755
Philippines	72	0.294	0.265	0.28	0.365	0.094	0.344	0.347	0.780
Poland	113	0.427	0.373	0.431	0.433	0.133	0.121	0.575	0.885
Romania	1	0.671	0.741	0.808	0.322	0.000	0.400	1.000	1.000
Russian Federation	229	0.435	0.413	0.387	0.529	0.061	0.138	0.799	0.930
Saudi Arabia	110	0.282	0.210	0.23	0.43	0.008	0.020	0.900	0.958
Singapore	225	0.430	0.361	0.422	0.522	0.097	0.174	0.947	0.946
South Africa	615	0.510	0.428	0.522	0.57	0.234	0.203	0.839	0.943
Spain	110	0.636	0.643	0.704	0.513	0.176	0.132	0.727	0.940
Sweden	122	0.666	0.644	0.748	0.562	0.288	0.205	0.795	0.932
Switzerland	447	0.525	0.479	0.561	0.511	0.149	0.065	0.808	0.909
Thailand	179	0.512	0.447	0.564	0.492	0.134	0.254	0.955	0.971
Turkey	169	0.525	0.499	0.532	0.533	0.088	0.104	0.923	0.982
United Kingdom	1327	0.518	0.448	0.532	0.563	0.212	0.135	0.922	0.965
United States	7170	0.423	0.286	0.444	0.503	0.002	0.001	0.970	0.010

Descriptive statistics are in Table 1. Panel A describes the statistics for the overall sample, while Panel B describes the statistics across countries. For the dependent variable, ESGSCORE, the average score is 0.440, with a minimum of 0.045 and a maximum of 0.886. The average values for the component scores for ESGSCORE, ESCORE, GSCORE and SSCORE, are 0.359, 0.508 and 0.439, respectively. The average percentage of females on the corporate board is 8.5%, as shown by the mean for DIV_GENDER. There are firms with no women on board, while the maximum percentage for the board gender diversity is 50%. DIV_EXEC has an average value of 7%. For audit committee independence, AC_IND has an average percentage of 90%, with values as low as 0% and as high as 100%. AC_NONEX, the alternative variable for audit committee independence, has an average value of 56.2%.

For the control variables, the average size of firms is 21.907 (FSIZE), while the average leverage is 0.227 (LEV). The average ROA is 0.045 and the average GROWTH is 0.069. BDSIZE has an

average value of 9.520. For MKTBK, the average is 3.777. QUICK has an average of 1.688 and RETEQ has an average of 0.429. We find 8.7% of the sample are firms from high-litigation industries (LIT) and the age of firms is at an average of 9. CFOVAR has an average value of 0.044. The country-level control, GDP, has an average value of 10.433.

For the country statistics in Panel B, the results indicate that the majority of the observations are from the United States with a total observation of 7,170, followed by Japan (N = 2,216), United Kingdom (N = 1,327) and Australia (N = 1,260). The lowest number of observations are from Romania (N = 1), Isle of Man (N = 2) and Panama (N = 5).

Table 2 tabulates the results of the pairwise correlation analysis. The correlations between ESGSCORE, DIV_GENDER and AC_IND are significant and positive at 0.204 and 0.070, respectively. In considering the multicollinearity issues, we check for the correlations among independent variables since multicollinearity is a concern if the correlation exceeds 0.800 (Kennedy, 2008). However, there is no concern on multicollinearity as the highest correlation between the independent variables is only 0.518, that is between FSIZE and BDSIZE.

Table 2: Pairwise Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ESGSCORE	1.000										
(2) ESCORE	0.867*	1.000									
(3) SSCORE	0.906*	0.733*	1.000								
(4) GSCORE	0.683*	0.417*	0.432*	1.000							
(5) DIV_GENDER	0.204*	0.176*	0.167*	0.189*	1.000						
(6) DIV_EXEC	0.082*	0.063*	0.059*	0.101*	0.556*	1.000					
(7) AC_IND	0.070*	0.009	0.042*	0.144*	-0.133*	-0.125*	1.000				
(8) AC_NONEX	0.100*	0.192*	0.027*	0.071*	0.550*	0.477*	-0.039*	1.000			
(9) FSIZE	0.526*	0.581*	0.437*	0.301*	-0.024*	-0.072*	0.031*	0.047*	1.000		
(10) LEV	0.143*	0.159*	0.137*	0.064*	0.025*	0.025*	-0.019*	-0.008	0.311*	1.000	
(11) ROA	0.097*	0.102*	0.058*	0.085*	0.042*	0.045*	0.018	0.063*	0.128*	-0.141*	1.000
(12) GROWTH	-0.126*	-0.148*	-0.092*	-0.090*	-0.068*	-0.043*	0.005	-0.070*	-0.078*	-0.062*	0.084*
(13) BDSIZE	0.318*	0.380*	0.278*	0.114*	-0.028*	-0.043*	0.005	0.027*	0.518*	0.169*	0.068*
(14) MKTBK	0.014	-0.065*	0.069*	-0.029*	-0.041*	-0.014	0.028*	-0.186*	-0.132*	0.079*	0.142*
(15) QUICK	-0.196*	-0.229*	-0.150*	-0.131*	-0.133*	-0.081*	0.033*	-0.161*	-0.292*	-0.351*	-0.095*
(16) RETEQ	0.185*	0.212*	0.129*	0.135*	0.000	-0.030*	0.008	0.017	0.332*	-0.010	0.508*
(17) LIT	0.020*	-0.054*	0.065*	-0.012	-0.187*	-0.169*	0.072*	-0.338*	-0.035*	-0.096*	-0.021*
(18) AGE	0.208*	0.255*	0.155*	0.116*	0.012	-0.045*	-0.022*	0.063*	0.179*	-0.041*	0.088*
(19) CFOVAR	-0.216*	-0.252*	-0.143*	-0.161*	-0.067*	0.006	-0.013	-0.048*	-0.382*	-0.163*	-0.237*
(20) GDP	0.008	-0.056*	0.032*	0.029*	-0.190*	-0.293*	0.184*	-0.451*	-0.077*	-0.056*	-0.124*
(21) FEMLAB	0.009	-0.082*	-0.119*	-0.033*	0.118*	0.033*	0.051*	-0.289*	-0.153*	-0.021*	-0.085*
(22) FEMPOL	0.074*	-0.008	0.228*	0.132*	0.447*	0.304*	-0.070*	0.166*	-0.211*	0.021*	-0.057*

*Note: * p<0.01*

Variables	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(12) GROWTH	1.000										
(13) BDSIZE	-0.081*	1.000									
(14) MKTBK	0.132*	-0.047*	1.000								
(15) QUICK	0.116*	-0.184*	0.038*	1.000							
(16) RETEQ	-0.096*	0.193*	-0.123*	-0.167*	1.000						
(17) LIT	0.048*	-0.047*	0.143*	0.052*	-0.064*	1.000					
(18) AGE	-0.137*	0.197*	-0.117*	-0.077*	0.208*	-0.097*	1.000				
(19) CFOVAR	0.187*	-0.219*	0.182*	0.311*	-0.395*	0.021*	-0.201*	1.000			
(20) GDP	0.041*	-0.153*	0.055*	0.117*	-0.060*	0.179*	-0.040*	0.033*	1.000		
(21) FEMLAB	0.057*	-0.189*	0.079*	0.043*	-0.073*	0.117*	-0.164*	0.055*	0.648*	1.000	
(22) FEMPOL	-0.016	-0.171*	0.031*	-0.052*	-0.075*	-0.034*	-0.128*	0.056*	0.075*	0.434*	1.000

*Note: * p<0.01*

4.2 Main Regression Analysis

Table 3 presents the results of the main regression analysis to test the hypotheses. Column (1) incorporates the test variables, DIV_GENDER, while Column (2) includes the moderating variable, AC_IND. The results for the full model are in Column (3), which includes the interaction variable, DIV_GENDER*AC_IND. The coefficient for DIV_GENDER is significant and positive in both Column (1) and (2), while the coefficient for AC_IND is significant and positive in Column (2).

Table 3: Regression Estimates: Various Estimation Procedures

	(1) DV=ESGSCORE	(2) DV=ESGSCORE	(3) DV=ESGSCORE
CONSTANT	-1.597***	-1.610***	-1.593***
	(-56.251)	(-56.903)	(-56.028)
DIV_GENDER	0.400***	0.412***	0.268***
	(39.744)	(40.914)	(9.667)
AC_IND		0.052***	0.031***
		(13.177)	(5.646)
*DIV_GENDER*AC_IND*			0.165***
			(5.576)
FSIZE	0.067***	0.066***	0.066***
	(69.318)	(69.161)	(69.189)
LEV	-0.032***	-0.031***	-0.030***
	(-3.928)	(-3.808)	(-3.742)
ROA	0.073***	0.068***	0.066***
	(4.765)	(4.429)	(4.325)
GROWTH	-0.071***	-0.069***	-0.069***
	(-14.016)	(-13.846)	(-13.794)
BDSIZE	0.005***	0.005***	0.005***
	(10.908)	(10.906)	(10.962)
MKTBK	0.004***	0.003***	0.003***
	(13.774)	(13.656)	(13.700)
QUICK	-0.005***	-0.006***	-0.006***
	(-6.462)	(-6.740)	(-6.607)
RETEQ	-0.000	-0.000	-0.000
	(-0.286)	(-0.092)	(-0.044)
LIT	0.038***	0.037***	0.038***
	(7.895)	(7.654)	(7.833)
AGE	0.026***	0.027***	0.027***
	(17.958)	(18.292)	(18.384)
CFOVAR	0.127***	0.133***	0.130***
	(3.980)	(4.189)	(4.088)
GDP	0.022***	0.019***	0.020***
	(15.700)	(13.480)	(13.675)
Fixed Effects	Included	Included	Included
Adj.R2	0.38	0.39	0.39
N	20103	20103	20103
F-stat	403.445	399.624	389.038

Note: t statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01)

Referring to Column (3), DIV_GENDER is significantly positive (0.268; $p < 0.01$), suggesting that firms with greater gender diversity have higher ESG performance, in line with hypothesis 1.

AC_IND is also shown to have significant and positive coefficients (0.031; p<0.01), indicating that firms with highly independent audit committees outperform their counterparts in terms of ESG. For Hypothesis 2, the test on the moderating effect of audit committee independence on the association between board gender diversity and ESG performance is shown by the coefficient of DIV_GENDER*AC_IND. The results imply that DIV_GENDER*AC_IND is significantly positive (0.165; p<0.01), providing support for Hypothesis 2, and demonstrating that the positive association between board gender diversity and ESG performance is amplified in firms with greater audit committee independence. Table 3 shows that all control variables, except for RETEQ, exhibit a statistically significant relationship with ESG performance. The coefficients of FSIZE, ROA, BDSIZE, MKTBK, LIT, AGE, CFOVAR, and GDP are significant and positive. Meanwhile, LEV, GROWTH and QUICK have significant and negative coefficients.

4.3 Additional Analysis

For robustness, we perform additional analyses. In the first category of analysis, considering that one of the common limitations of research relates to the measurement of the variables, we employ alternative measurements for the variables. The results in Table 4 consist of those analyses.

Table 4: Regression Estimates: Alternative Measurements of Variables

	(1) Change DV to ESCORE	(2) Change DV to SSCORE	(3) Change DV to GSCORE	(4) Change IV to DIV_EXEC	(5) Change MV to AC_NONEX
CONSTANT	-2.214***	-0.644***	-1.418***	-1.380***	-1.385***
	(-73.805)	(-21.750)	(-49.217)	(-58.221)	(-59.194)
DIV_GENDER	0.262***	0.248***	0.278***		-0.646***
	(7.610)	(7.320)	(7.868)		(-10.765)
DIV_EXEC				0.009	
				(0.304)	
AC_IND	0.001	0.104***	0.025***	0.024***	
	(0.086)	(15.330)	(3.729)	(4.731)	
AC_NONEX					-0.020***
					(-5.305)
*DIV_GENDER*AC_IND*	0.190***	0.163***	0.131***		
	(5.162)	(4.550)	(3.491)		
*DIV_EXEC*AC_IND*				0.280***	
				(9.045)	
*DIV_GENDER*AC_NONEX*					1.119***
					(17.606)
FSIZE	0.095***	0.043***	0.067***	0.067***	0.067***
	(79.660)	(36.305)	(56.461)	(68.347)	(69.291)
LEV	-0.053***	-0.043***	-0.006	-0.042***	-0.050***
	(-5.014)	(-4.337)	(-0.600)	(-5.112)	(-6.129)
ROA	0.066***	0.071***	-0.007	0.048***	0.049***
	(3.627)	(4.008)	(-0.385)	(3.345)	(3.513)
GROWTH	-0.090***	-0.052***	-0.066***	-0.071***	-0.065***
	(-14.712)	(-8.433)	(-10.328)	(-14.311)	(-13.062)
BDSIZE	0.009***	-0.004***	0.006***	0.004***	0.005***
	(13.966)	(-7.058)	(9.650)	(7.484)	(9.219)

MKTBK	0.003***	0.001***	0.005***	0.004***	0.003***
	(7.844)	(4.339)	(16.562)	(14.126)	(13.025)
QUICK	-0.005***	-0.006***	-0.004***	-0.007***	-0.004***
	(-4.524)	(-5.802)	(-3.928)	(-8.723)	(-4.442)
RETEQ	-0.005***	0.003**	0.002	-0.000	0.000
	(-3.828)	(2.234)	(1.405)	(-0.233)	(0.138)
LIT	0.003	0.026***	0.078***	0.032***	0.027***
	(0.450)	(4.519)	(15.264)	(7.193)	(5.902)
AGE	0.041***	0.015***	0.024***	0.027***	0.028***
	(21.063)	(8.599)	(13.190)	(18.151)	(18.380)
CFOVAR	0.119***	-0.094**	0.282***	0.055*	0.095***
	(3.410)	(-2.515)	(7.550)	(1.899)	(3.349)
GDP	0.015***	0.017***	0.024***	0.022***	0.013***
	(7.844)	(9.268)	(11.795)	(12.758)	(7.480)
Fixed Effects	Included	Included	Included	Included	Included
Adj.R2	0.43	0.18	0.29	0.36	0.41
N	20103	20103	20103	20103	18152
F-stat	756.430	167.784	352.552	487.144	565.970

Note: t statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01)

First, the ESGSCORE is replaced with the component scores for ESG, which are the ESCORE (Column 1), the SSCORE (Column 2), and the GSCORE (Column 3). ESCORE refers to the usage, risks and conservation of natural and environmental resources; SSCORE refers to the relationships involving other businesses and the communities; and GSCORE refers to the corporate governance quality associated with the management systems and management of long-term risks and opportunities. The results in Table 4 show support for both hypotheses. The coefficients for the scores for the ESG components and for the interaction variables involving audit committee independence in Columns (1), (2) and (3) are significant and positive.

Second, DIV_GENDER, which is the proportion of women on the corporate board, is replaced with DIV_EXEC. DIV_EXEC is the proportion of executive directors on the corporate board. The results in Column (4) of Table 4 indicate that DIV_EXEC is not shown to be significant. However, the coefficient for DIV_EXEC*AC_IND is significant and positive (0.280; p <0.01). Third, we employ AC_NONEX to replace AC_IND as the measure for audit committee independence. AC_NONEX is the proportion of non-executive directors on the audit committee. Using AC_NONEX as an alternative for audit committee independence, the results in Column (5) of Table 4 are consistent with the primary findings in Table 3. These results provide further support for the positive relationship between gender diversity and ESG performance, and the moderating role of audit committee independence in strengthening this relationship.

Further, we consider the possibility that our results could be confounded by the 'noise' caused by the selected samples. More specifically, Table 5 tabulates the results that cater for the COVID19 effect, the 2011 global financial crisis effect, and small observations.

Table 5: Regression Estimates: Different Samples

	(1) NONCOVID19	(2) COVID19	(3) NONGFC	(4) GFC	(5) Observation >100
CONSTANT	-1.409***	-1.330***	-1.393***	-1.614***	-1.395***
	(-56.103)	(-23.049)	(-58.777)	(-15.663)	(-59.990)
DIV_GENDER	0.262***	0.295***	0.260***	0.253	0.267***
	(8.750)	(5.617)	(9.982)	(0.960)	(10.121)
AC_IND	0.034***	0.076***	0.040***	0.078***	0.036***
	(6.024)	(6.090)	(7.521)	(2.721)	(6.942)
*DIV_GENDER*AC_IND*	0.163***	0.068	0.153***	0.208	0.151***
	(5.089)	(1.210)	(5.483)	(0.772)	(5.342)
FSIZE	0.068***	0.061***	0.066***	0.078***	0.067***
	(65.019)	(25.383)	(67.286)	(18.071)	(69.488)
LEV	-0.042***	0.021	-0.030***	-0.060	-0.035***
	(-4.762)	(1.043)	(-3.609)	(-1.622)	(-4.289)
ROA	0.033**	0.050	0.035**	0.136	0.043***
	(2.121)	(1.504)	(2.479)	(1.625)	(3.049)
GROWTH	-0.071***	-0.055***	-0.065***	-0.113***	-0.069***
	(-13.031)	(-4.901)	(-12.906)	(-5.518)	(-13.873)
BDSIZE	0.004***	0.006***	0.005***	0.001	0.004***
	(7.154)	(3.518)	(8.170)	(0.456)	(7.591)
MKTBK	0.004***	0.002***	0.003***	0.009***	0.004***
	(14.709)	(3.867)	(13.703)	(5.332)	(14.445)
QUICK	-0.006***	-0.001	-0.005***	-0.008**	-0.005***
	(-6.473)	(-0.725)	(-5.797)	(-2.005)	(-5.913)
RETEQ	0.001	-0.002	0.000	0.013*	0.000
	(1.105)	(-0.839)	(0.214)	(1.829)	(0.433)
LIT	0.044***	0.048***	0.044***	0.062***	0.045***
	(9.205)	(4.248)	(9.793)	(2.836)	(10.222)
AGE	0.026***	0.032***	0.027***	0.022***	0.026***
	(16.610)	(7.555)	(17.699)	(4.221)	(17.696)
CFOVAR	0.114***	0.097	0.097***	0.210	0.108***
	(3.833)	(1.116)	(3.384)	(1.644)	(3.819)
GDP	0.018***	0.028***	0.019***	0.027***	0.019***
	(10.074)	(7.065)	(11.621)	(3.965)	(11.422)
Fixed Effects	Included	Included	Included	Included	Included
Adj.R2	0.38	0.38	0.39	0.36	0.38
N	17137	2966	18841	1262	19820
F-stat	491.333	116.476	547.271	46.022	555.881

Note: t statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01)

In Columns (1) and (2) of Table 5, the results of the NONCOVID19 and COVID19 samples are presented respectively. The COVID19 sample includes the observations from the year 2020, and the NONCOVID19 sample otherwise. For the NONCOVID19 sample, the results in Column (1) show similarities to the main results as the coefficients for DIV_GENDER and DIV_GENDER*AC_IND are significant and positive. For the COVID19 sample, while DIV_GENDER has a significant and positive coefficient, the coefficient for DIV_GENDER*AC_IND is not significant. These results suggest that the moderating effect of audit committee independence on board gender diversity-ESG performance relationship is not evidenced for the COVID19 sample.

In Columns (3) and (4) of Table 5, the results of the NONGFC sample and the GFC sample are presented. The GFC sample, in Column (4), consists of the observations from the global financial crisis year of 2011, while observations from the other years are in the NONGFC sample in Column (3). The results in Column (3) demonstrate a positive association between board gender diversity and ESG performance, with audit committee independence playing a moderating role. In contrast, Column (4) fails to find statistically significant results for both hypotheses.

In Column (5) of Table 5, additional analysis is employed by excluding countries with less than 100 observations to cater for the concern that our main results are confounded by the number of observations in each country. Nevertheless, as shown in Column (5), the results continue to give support to both hypotheses set earlier. Board gender diversity relates to greater ESG performance, and the relationship is moderated by audit committee independence in the corporate board.

Table 6: Regression Estimates: Various Estimation Procedures

	(1) OLS with Heteroskedasticity-Robust SEs (White)	(2) OLS with Huber-White Robust SEs	(3) High-Dimensional Fixed Effects	(4) Weighted least square (WLS)
CONSTANT	-1.593***	-1.701***	-1.576***	-1.594***
	(-57.729)	(-58.223)	(-57.304)	(-58.704)
DIV_GENDER	0.268***	0.285***	0.268***	0.268***
	(10.501)	(10.014)	(9.667)	(10.500)
AC_IND	0.031***	0.030***	0.031***	0.031***
	(5.881)	(5.384)	(5.646)	(5.891)
*DIV_GENDER*AC_IND*	0.165***	0.170***	0.165***	0.165***
	(6.018)	(5.601)	(5.576)	(6.016)
FSIZE	0.066***	0.069***	0.066***	0.066***
	(69.842)	(69.919)	(69.189)	(69.905)
LEV	-0.030***	-0.032***	-0.030***	-0.030***
	(-3.744)	(-3.869)	(-3.742)	(-3.771)
ROA	0.066***	0.057***	0.066***	0.067***
	(4.751)	(3.618)	(4.325)	(4.778)
GROWTH	-0.069***	-0.067***	-0.069***	-0.069***
	(-14.187)	(-13.073)	(-13.794)	(-14.212)
BDSIZE	0.005***	0.006***	0.005***	0.005***
	(9.609)	(11.926)	(10.962)	(9.569)
MKTBK	0.003***	0.003***	0.003***	0.003***
	(13.719)	(13.063)	(13.700)	(13.712)
QUICK	-0.006***	-0.005***	-0.006***	-0.006***
	(-6.883)	(-5.823)	(-6.607)	(-6.865)
RETEQ	-0.000	-0.000	-0.000	-0.000
	(-0.047)	(-0.129)	(-0.044)	(-0.054)
LIT	0.038***	0.037***	0.038***	0.038***
	(8.571)	(7.539)	(7.833)	(8.592)
AGE	0.027***	0.029***	0.027***	0.027***
	(18.227)	(19.173)	(18.384)	(18.210)
CFOVAR	0.130***	0.148***	0.130***	0.130***
	(4.624)	(4.531)	(4.088)	(4.636)
GDP	0.020***	0.022***	0.020***	0.020***
	(12.158)	(14.829)	(13.675)	(12.153)

Fixed Effects	Included	Included	Included	Included
Adj.R2	0.39	0.39	0.39	0.39
N	20103	20103	20103	20103
F-stat	560.557	397.834	839.639	758.828

Note: t statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01)

To further ensure the robustness of findings, we re-estimate the models using alternative procedures, as reported in Table 6. First, we employ OLS with heteroskedasticity-robust standard errors (White correction) to account for potential non-constant error variances, and then apply the Huber–White robust estimator, which provides stricter adjustments and is less sensitive to outliers and influential observations (Huber, 1964). We also estimate the model using high-dimensional fixed effects regression, which absorbs industry, year, and country fixed effects to control for unobserved heterogeneity across these dimensions. Finally, we use weighted least squares (WLS) to mitigate concerns that unequal sample sizes across countries disproportionately influence the results. We find the results remain remarkably consistent across all four estimation approaches, providing strong assurance that our conclusions are not an artifact of a particular statistical method.

4.4 Endogeneity Analysis

A concern in our study is endogeneity, particularly that board gender diversity and ESG performance may be jointly influenced by unobserved factors. For example, firms with stronger ESG commitments may more likely appoint female directors, creating simultaneity bias. To address this concern, we employ an instrumental variable two-stage least squares (IV-2SLS) regression approach.

We use two external instruments: female labour force participation (FEMLAB) and the proportion of women in national parliaments (FEMPOL). These instruments are theoretically and empirically justified where higher female participation in the labour market and stronger female representation in politics increase the supply of qualified women for leadership positions, making it more likely for firms to appoint women directors. Further, these factors are determined at the country level and are unlikely to directly affect individual firms' ESG performance beyond their impact on the availability of female directors, thereby satisfying the exclusion restriction. The first-stage results, in Column (1) of Table 7, confirm that both instruments are highly significant predictors of board gender diversity, with an F-statistic of 270.95, comfortably exceeding the conventional threshold of 10, suggesting strong instrument relevance.

Table 7: Regression Estimates: Two Stage Least-square (2SLS) Regression

	(1) First Stage	(2) Second Stage
CONSTANT	10.760***	-1.579***
	(5.613)	(-50.345)
PRED_DIV_GENDER		0.005***
		(9.877)
AC_IND		0.001
		(0.146)
PRED_DIV_GENDER *AC_IND		0.003***
		(5.799)
FEMLAB	0.189***	
	(15.356)	
FEMPOL	0.577***	
	(54.625)	
FSIZE	0.563***	0.073***
	(8.900)	(73.658)
LEV	-4.676***	-0.036***
	(-8.950)	(-4.364)
ROA	5.215***	0.032**
	(5.368)	(2.102)
GROWTH	-1.521***	-0.048***
	(-4.626)	(-9.207)
BDSIZE	-0.075**	0.005***
	(-2.437)	(10.802)
MKTBK	-0.058***	0.004***
	(-3.555)	(13.958)
QUICK	-0.566***	-0.002**
	(-10.595)	(-2.491)
RETEQ	-0.624***	0.002
	(-9.077)	(1.412)
LIT	-6.553***	0.055***
	(-21.738)	(11.085)
AGE	0.499***	0.019***
	(5.347)	(13.104)
CFOVAR	-13.699***	0.196***
	(-6.746)	(6.085)
GDP	-4.187***	0.010***
	(-29.478)	(5.676)
Fixed Effects	Included	Included
Adj.R2	0.32	0.42
N	18396	18396
F-stat	270.949	401.544

Note: t statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01)

For the second-stage regression results, in Column (2), the coefficient for predicted board gender diversity (PRED_DIV_GENDER) is positive and statistically significant (0.005, p<0.01), indicating that greater female representation on boards improves firms' ESG performance. While audit committee independence (AC_IND) alone does not exhibit a significant effect, the interaction between predicted board gender diversity and audit committee independence (PRED_DIV_GENDER *AC_IND) is positive and highly significant (0.003, p<0.01). These

findings highlight that the beneficial effect of gender-diverse boards on ESG outcomes is amplified when audit committees are more independent, consistent with the view that these governance mechanisms operate as complements rather than substitutes.

Overall, these results reinforce our main conclusions. Board gender diversity contributes positively to ESG performance, and this effect is magnified when supported by strong audit committee oversight.

5. CONCLUSION

Considering the paradox between the benefits of engaging in ESG and the challenges of such commitment, this study explores whether corporate ESG performance can be enhanced through appropriate governance mechanisms. The findings indicate that firms with greater board gender diversity tend to exhibit higher ESG performance, and such a relationship becomes greater for firms with higher audit committee independence. The findings support the resource dependence theory, which emphasise that having greater women participation on board expands wider access to valuable resources and improved decision-making. Moreover, the findings corroborate the view that the aspects of diversity and independence are important features of corporate board that can effectively bring impact to better ESG outcomes.

This study highlights the importance of having a balanced gender composition on boards and ensuring the audit committees' independence while serving their duties and offering several implications. For firms, focus should be made in complying with the existing policies and recommendations towards higher women representation on board and more audit committee independence to improve ESG outcomes, strengthen reputation, and create sustainable value creation. Improving the diversity of the corporate board brings positive implications to ESG practices by promoting more balanced decision-making, improved stakeholder engagement and stronger commitment towards sustainable initiatives. Meanwhile, strengthening audit committee independence may enhance the transparency and quality of ESG disclosures in reflecting the company's ESG activities. Nevertheless, efforts towards diversity and independence should not be taken as to 'tick the box' purpose. Instead, firms should prioritise the selection of credible women directors and qualified independent board members to truly gain the benefit.

For policy makers, stronger oversight into the implementation of policies related to gender diversity and audit committee independence are recommended to refine corporate practices on governance and sustainability in support of long-term sustainability goals. Focus should also be given to gaps in current corporate practices, as to understand the challenges in adhering to the policies. Due to the importance of both diversity and independence, solutions should be derived to address obstacles faced by firms that are not able to comply with the best practices. For example, on the availability of the potential candidates for board members. Findings of this study suggest the best practices to maximise the advantage gender diversity could bring in enhancing ESG performance, while highlighting the significant role of the audit committee in providing independent oversight. This study provides significant perspectives to corporate stakeholders in understanding efforts that enhance corporate ESG performance through variation in board composition and strong governance structure.

Several limitations have also been identified as important avenues for future research. First, this study applies quantitative methods using the data from Refinitiv to investigate the interplay between gender variation on board, audit committee independence, and ESG performance. Future research can consider adopting qualitative approaches such as semi-structured interviews with the board members or case studies for selected industries. The recommended research approach could provide in-depth understanding of the challenges that the corporate board face in dealing with ESG activities, and how the diversity and independence features of the board overcome those challenges. Second, the aspect of diversity in this study is limited to gender diversity, to contribute to policy implications of the specific diversity mechanism. Further investigation is warranted to examine the influence of a wider range of diversity dimensions, including culture, education, ethnicity, and experience towards ESG performance, especially by relating to the specific demographic features of countries. The different diversity aspects may impact ESG outcomes and decision-making processes by the board in different ways. Finally, while this study's sample is firms from countries all over the world, future studies may consider focusing on specific economic regions, such as ASEAN or MENA, to explore the different cultures, legal and economic context that have significant impact on ESG performance. We also note that dynamic panel GMM offers a useful complementary approach, which future studies may employ to further validate the governance–ESG relationships.

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