“Sustainability governance and CEO compensation in MENA firms”

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SUSTAINABILITY GOVERNANCE AND CEO COMPENSATION IN MENA FIRMS

Abstract

This study examines whether CEOs receive higher compensation when their firms establish high-quality sustainability committees and obtain independent third-party assurance of their sustainability reports, and whether board gender diversity and CEO board membership moderate these relationships. The empirical dataset comprises publicly listed firms from 13 countries in the MENA region. It includes 2,183 firm-year observations drawn from 486 firms over the 2014–2023 period. The data were primarily obtained from the Refinitiv database and analyzed using panel regression models with firm and year-fixed effects. The results reveal that both sustainability committee quality and external assurance quality are positively associated with CEO compensation ($r = 0.17$, $p < 0.05$; $r = 0.05$, $p < 0.05$), supporting the signaling and stakeholder theories by emphasizing how robust ESG governance conveys legitimacy and aligns executive incentives with sustainable value creation. Board gender diversity weakened the positive effect of sustainability committee quality on pay (interaction $\beta = -0.00$, $p < 0.01$), suggesting stronger oversight and reduced symbolic ESG use. Conversely, CEO board membership shows no significant moderating effect, indicating limited influence in this context. Additional analyses confirm the robustness of these relationships and reveal that improvements in ESG and CO_2 performance partially mediate the link between governance structure and executive remuneration. This study offers practical insights for policymakers and boards aiming to align CEO compensation with sustainability objectives in contexts with limited regulatory enforcement.

Keywords CEO compensation, sustainability governance, ESG committee, external assurance, board diversity, emerging markets

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INTRODUCTION

Executive compensation in MENA firms remains misaligned with rising ESG demands from investors and other stakeholders, as many boards continue to reward CEOs predominantly for financial results, even though ESG factors are increasingly being incorporated into pay structures in other markets (Christensen et al., 2021; Flammer et al., 2019).

Two institutional features of MENA markets reinforce this disconnect:

1) ownership concentration, which limits investor activism and strengthens managerial power; and

2) weak regulatory enforcement, which reduces external pressure for ESG integration (Young et al., 2008; AlHares et al., 2019).

Within this context, sustainability governance mechanisms, such as dedicated sustainability committees and external assurance of sustainability reports, may play a dual role: they may signal credible ESG commitment and support higher CEO pay by demonstrating enhanced oversight, or they may be used symbolically to legitimize compensation without substantive improvements in oversight.

The scientific problem addressed in this study is the unclear role of sustainability governance mechanisms in determining CEO compensation in emerging markets, particularly in the MENA region. Prior research has mainly examined either ESG outcomes (whether ESG improves firm performance) or pay–performance sensitivity (whether CEO pay is aligned with financial results), but has largely ignored whether governance inputs themselves, the structures and processes that firms establish to govern ESG, such as sustainability committees and external assurance, systematically influence compensation decisions, especially in weak institutional settings. In such environments, sustainability governance can foster genuine accountability or enable opportunistic pay decisions justified by superficial ESG structures (Basali, 2025).

Therefore, this study asks whether high-quality sustainability committees and independent external assurance of sustainability reports are associated with higher CEO compensation in MENA firms and whether these relationships are moderated by board gender diversity and CEO board membership. Clarifying these mechanisms in the MENA context is important for boards and regulators who increasingly promote sustainability governance practices yet face uncertainty about whether these arrangements deliver real accountability or primarily serve symbolic purposes.

1. LITERATURE REVIEW AND HYPOTHESES

Recent scholarship has increasingly highlighted the necessity of evaluating CEO compensation through environmental, social, and governance (ESG) factors. Boards and stakeholders call for a connection between pay, long-term value generation, and sustainability outcomes (Flammer et al., 2019; Veltri et al., 2025). Regulators, proxy advisors, and institutional investors increasingly scrutinize whether CEO pay reflects firms' social and environmental impacts rather than being driven solely by short-term financial results (Veltri et al., 2025). Although research on ESG and executive compensation has grown, its findings remain mixed. Some studies document a positive association between ESG performance and the level or structure of executive pay, suggesting that boards reward sustainability-related achievements (Flammer et al., 2019; Zhu et al., 2024), whereas others highlight design weaknesses and greenwashing risks that may decouple CEO rewards from genuine ESG outcomes (Berrone & Gomez-Mejia, 2009). Previous studies have predominantly focused on either incorporating ESG metrics into incentive contracts (Flammer et al., 2019; Zhu et al., 2024) or examining how ESG outcomes affect executive pay and firm risk (Berrone & Gomez-Mejia, 2009; Muazaroh et al., 2025). Overall, this literature pays limited attention to the internal governance processes through which ESG information is translated into CEO pay contracts. In particular, it largely overlooks structural governance mechanisms such as board-level sustainability committees and the external assurance of sustainability reports, even though these mechanisms can influence the selection, monitoring, and credibility of ESG indicators used in compensation design (Al-Shaer & Zaman, 2019; Tumewang et al., 2025). This gap is particularly relevant in emerging markets such as the MENA region, where weak institutions, concentrated ownership, and changing regulatory frameworks create distinct conditions for ESG governance and pay settings (Basali, 2025). In such contexts, formal ESG-linked compensation practices may coexist with substantial discretion and opacity, making it crucial to understand whether sustainability committees and external assurance operate as effective governance tools or merely as symbolic devices in the design of CEO compensation.

This study utilizes signaling theory (Connelly et al., 2011; Spence, 1973) and stakeholder theory (Donaldson & Preston, 1995; Freeman, 2010) to contextualize these dynamics. From a signaling perspective, sustainability governance mechanisms serve as reliable indicators of ESG dedication, thereby justifying increased CEO compensation as a reward for legitimacy and enhanced reputation. Board-level arrangements, such as sustainability committees, and the voluntary decision to obtain external assurance for sustainability reports can serve as costly, observable signals that distinguish firms genuinely committed

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to ESG from those engaging in symbolic compliance, especially in environments characterized by high information asymmetry, such as the MENA region. From a stakeholder perspective, these mechanisms introduce accountability, ensuring that executive incentives align with shareholder wealth as well as the interests of a wider range of stakeholders (Jones et al., 2018). Stakeholder theory suggests that embedding ESG considerations into governance structures and incentive schemes helps internalize stakeholder expectations, reduce conflicts, and foster long-term value creation, thereby legitimizing higher, but better-justified, CEO pay (Donaldson & Preston, 1995; Freeman, 2010). Our hypotheses are based on these two theoretical lenses. Specifically, we use signaling theory to argue that ESG-related governance mechanisms legitimize higher compensation when ESG performance is credibly demonstrated. Stakeholder theory argues that these mechanisms constrain opportunistic rent extraction by tying CEO rewards to a broader set of financial and non-financial outcomes.

Board-level sustainability committees have become key innovations in governance, responsible for managing ESG risks, directing sustainability strategies, and improving disclosure quality (Aini et al., 2025; Li et al., 2025; Sánchez et al., 2019). Empirical studies show that firms with a dedicated sustainability or CSR committee tend to exhibit higher ESG performance and more extensive non-financial reporting, particularly when the committee has a clear mandate and is integrated into the board's oversight process (Tumewang et al., 2025). Committees with greater independence, ESG expertise, and meeting frequency are generally associated with better ESG outcomes and more credible reporting, as they enhance the board's capacity to oversee ESG risks and opportunities and to supervise sustainability disclosures (Tumewang et al., 2025). In this view, the existence of a board-level sustainability committee operates as a visible and potentially costly signal of the firm's dedication to ESG integration, which may legitimize higher CEO pay when it is tied to ambitious sustainability objectives. From a stakeholder perspective, these committees establish accountability frameworks that incorporate nonfinancial criteria into compensation decisions, thereby limiting opportunistic pay practices (Flammer et al., 2019). By embedding ESG metrics in performance evaluation and overseeing their use in incentive contracts, sustainability committees can align CEO compensation with the interests of a broader set of stakeholders and reduce the scope of opportunistic use of vague or easily achievable ESG targets (Flammer et al., 2019).

Nevertheless, most prior studies have focused on the connection between committees and ESG performance, rather than executive compensation. The literature has largely examined how the presence or characteristics of sustainability committees relate to ESG scores and disclosure quality, but it has rarely analyzed how these committees influence the level and structure of CEO pay or the inclusion of ESG-linked incentives (Tumewang et al., 2025; Veltri et al., 2025). This creates a gap, particularly in MENA regions, where committees might be used symbolically to justify increased CEO compensation (AlHares et al., 2019). In MENA markets, characterized by concentrated ownership, family or state control, and evolving corporate governance codes, sustainability committees may be adopted to respond to external pressure from investors and regulators; however, their actual involvement in constraining or shaping CEO compensation remains unclear (OECD, 2019). Accordingly, we expect that firms with higher-quality sustainability committees will grant higher compensation to their CEOs, as this body broadens and rewards CEOs beyond financial performance. Drawing on signaling and stakeholder perspectives, we therefore expect sustainability committee quality to be positively associated with CEO compensation because high-quality committees expand the set of performance dimensions considered beyond short-term financial indicators and help justify higher, but better aligned, rewards.

Board diversity, especially in terms of gender, enhances governance effectiveness by expanding perspectives, minimizing groupthink, and improving stakeholder responsiveness (Harjoto et al., 2015; Post & Byron, 2015; Terjesen et al., 2009). Boards with diverse members are linked to better ESG outcomes, higher corporate social performance, more balanced ESG disclosure, and increased accountability in compensation decisions (García-Sánchez et al., 2019; Harjoto et al.,

2015). A large body of empirical work shows that gender-diverse boards are associated with better monitoring and greater involvement in strategy, which, in turn, strengthens accountability in areas such as executive compensation. Recent studies also indicate that board gender diversity can shape how other governance mechanisms operate, including board committees and pay-setting bodies, by enhancing challenges, oversight, and sensitivity to stakeholder concerns (Mihail et al., 2022; Muazaroh et al., 2025).

Evidence suggests that gender-diverse boards amplify the benefits of specialized committees and ESG oversight, strengthen firms' oversight capabilities, and reduce agency costs (Cabeza-García et al., 2018). Additionally, Shakil (2021) demonstrates that board gender diversity moderates the relationship between ESG controversies and financial risk, enhancing firms' governance capabilities to effectively manage sustainability challenges. Taken together, these studies emphasize that gender diversity contributes not only to the effectiveness of ESG-related board structures but also to broader corporate outcomes, including risk management, sustainability performance, and the governance of executive pay.

Based on stakeholder and signaling theories, boards with greater gender diversity are more likely to provide effective oversight by representing a broader range of stakeholder interests and conveying credible governance signals to the market (Odriozola et al., 2024). From a signaling perspective, the presence of women on boards can signal a stronger commitment to stakeholder orientation and responsible business practices, which may increase external confidence in the integrity of ESG-linked pay arrangements (Post & Byron, 2015). From a stakeholder perspective, gender-diverse boards are more likely to internalize heterogeneous stakeholder claims and support governance arrangements that protect these interests, including the design of executive compensation contracts. Female board members often push for the genuine incorporation of sustainability principles, which decreases the likelihood that ESG committees are used merely for greenwashing and limits excessive CEO pay justified by weak ESG narratives (Bouteska et al., 2024). Gender-diverse boards are more likely to align CEO compensation with concrete ESG outcomes, thereby enhancing accountability and sending clearer signals of genuine commitment to responsible practices, while restraining opportunistic pay policies (Harjoto et al., 2015; Shakil, 2021). Therefore, we expect board gender diversity to shape the way sustainability committees affect CEO pay. In line with this evidence, we argue that board gender diversity moderates the association between sustainability committee quality and CEO compensation, reinforcing the disciplining and signaling roles of these committees in ESG-related pay settings.

Although previous studies have explored different aspects of board characteristics, the specific influence of CEO presence on the board as a moderating element in the relationship between sustainability committee quality and CEO compensation requires more thorough exploration. Existing work on CEO power and board structure shows that CEO involvement in the board can significantly affect monitoring intensity and the effectiveness of governance mechanisms; however, it has not explicitly examined how this feature conditions the role of sustainability committees in ESG-linked paysettings. From the stakeholder theory perspective, having a CEO on the board might realign governance priorities toward managerial interests, thereby reducing the board's ability to address a wide range of stakeholder concerns and diminishing the beneficial impact of high-quality sustainability committees on aligning executive compensation. When the CEO sits on the board, and especially when the CEO chairs it, the asymmetry of power vis-à-vis non-executive directors can limit the committee's capacity to challenge pay proposals and insist on robust ESG criteria, weakening the alignment with stakeholder interests. Signaling theory suggests that a CEO's board membership serves as a powerful signal to external stakeholders about the quality of governance, influencing perceptions of the board's dedication to incorporating ESG criteria into compensation decisions. However, this signal may be ambiguous, as it can simultaneously convey strong CEO leadership and raise concerns about board independence.

Empirical evidence indicates that CEOs who are also part of the board wield more power over strategic and operational choices such as compensa-

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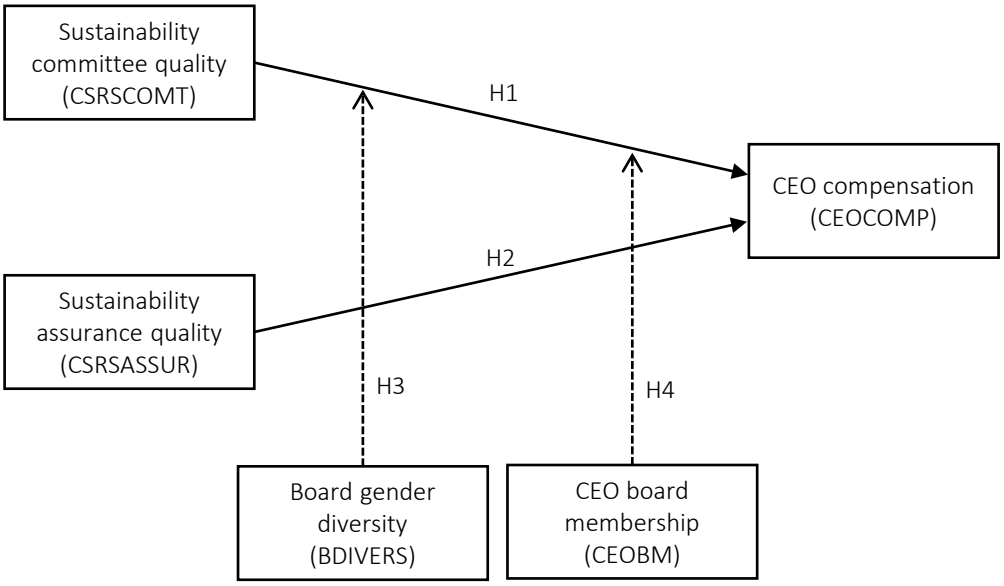

Figure 1. Conceptual framework

tion policies, potentially undermining the board's independence (Oyinlola, 2025; Reddy et al., 2015). Studies on CEO power and CSR-linked compensation show that powerful CEOs are more likely to influence the design of incentive contracts and may obtain higher pay even when CSR or ESG metrics are formally included, raising questions about the effectiveness of governance safeguards (AlShaer et al., 2023; Haque, 2017). This heightened managerial authority might lead sustainability committees to engage in token compliance with ESG objectives, thereby reducing their real impact and allowing CEOs to rationalize increased pay through superficial sustainability efforts rather than through actual performance enhancements (Menla Ali et al., 2024). In environments where external oversight is weak and ownership is concentrated, as in many emerging markets, CEO board membership can exacerbate agency problems, making it harder for boards to hold management accountable for ESG targets and weakening the disciplining role of ESG-linked compensation arrangements (Reddy et al., 2015).

However, some evidence also suggests that the impact of CEO board membership is context-dependent and may be less detrimental when boards are otherwise strong, committees are well-designed, and institutional frameworks are robust. In such settings, close CEO involvement in board deliberations can facilitate information sharing and lead to more informed, albeit closely monitored, decisions on ESG-linked compensation. Overall, these mixed insights highlight the need for a detailed examination of how CEO board membership affects the relationship between sustainability committee quality and CEO pay, particularly in emerging markets, such as the MENA region.

Taken together, prior research shows that ESG performance and ESG-linked incentives are increasingly reflected in CEO pay, but the evidence is mixed and often silent on the internal governance processes through which ESG information is incorporated into compensation design. Existing studies highlight the importance of board structures, such as sustainability committees and external assurance, and board characteristics, such as gender diversity and CEO power, for ESG outcomes and disclosure. However, they provide limited evidence on how these mechanisms jointly shape CEO compensation, especially in emerging markets.

Building on signaling and stakeholder theories, this study examines whether sustainability committee quality and sustainability assurance quality are associated with CEO compensation, and whether board gender diversity and CEO board membership moderate these relationships in the MENA region.

Drawing on the above theoretical arguments and prior empirical evidence, we summarize our expectations in the following hypotheses:

H1: Sustainability committee quality is positively associated with CEO compensation.

H2: Sustainability assurance quality is positively associated with CEO compensation.

H3: Board-gender diversity positively moderates the relationship between sustainability committee quality and CEO compensation.

H4: CEO board membership negatively moderates the relationship between sustainability committee quality and CEO compensation.

Figure 1 presents a conceptual framework that summarizes the main and moderating effects.

2. METHODS

The dataset for this study was obtained from the Refinitiv (LSEG) database. The financial and governance variables are sourced from Refinitiv's financial and ESG governance modules and are subject to the provider's licensing and usage conditions. Table 1 presents the sampling procedure and distribution of observations. Observations lacking crucial data for the main variables were omitted from the analysis. The final dataset included 2,183 firm-year observations from 486 publicly listed firms across 13 MENA countries from 2014 to 2023. The sample is relatively well distributed over time, with a noticeable increase in data availability in the later years, especially from 2020 onwards. Approximately 67% of observations fall between 2020 and 2023, highlighting the region's increasing focus on ESG disclosure and executive transparency in recent years. The financial sector leads in representation at 32.4%, followed by real estate and consumer non-cyclical industries. Turkey accounts for 26% of the distribution, and Saudi Arabia and the UAE each account for 14%.

The dependent variable is CEO compensation (CEOCOMP), sourced from Refinitiv and defined as the CEO's compensation score linked to total shareholder return. This standardized metric encompasses both fixed and variable compensation elements tied to shareholder value, allowing for comparability across different companies and nations. While most prior studies measure CEO compensation through manually gathered data on salaries, bonuses, and equity incentives (Core et al., 1999; Edmans & Gabaix, 2016), the LSEG score offers a more systematic and internationally consistent measure, which is especially beneficial in the MENA region, where disclosure practices can vary significantly.

Table 1. Sample selection and distribution for MENA firms (2014–2023)

Panel A: Sample selection					
Total observations for MENA firms with CEO compensation data available for 2014–2023					2,320
Minus: Missing data					(137)
Total sampled observations					2,183
Unique firms					486
Panel B: Distribution by year, industry, and country					
Year	**%**	**Industry**	**%**	**Country**	**%**
2014	03.53	Academic & Educational Services	00.50	Bahrain	03.48
2015	04.44	Basic materials	10.67	Egypt	06.69
2016	05.08	Consumer cyclicals	09.85	Israel	06.46
2017	05.31	Consumer non-cyclicals	10.90	Jordan	01.28
2018	06.18	Energy	03.85	Kuwait	05.50
2019	08.02	Financials	32.43	Lebanon	00.09
2020	09.76	Healthcare	02.93	Morocco	06.73
2021	15.53	Industrials	10.63	Oman	03.71
2022	19.93	Real Estate	11.82	Qatar	11.31
2023	22.22	Technology	04.12	Saudi Arabia	14.38
	–	Utilities	02.29	Tunisia	00.09
		–		Turkey	25.97
				The United Arab Emirates	14.29

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The key independent variables are sustainability committee quality (CSRSCOMT) and sustainability assurance quality (CSRSASSUR), both provided by LSEG. Sustainability committee quality was measured using a standardized score that indicated the presence and effectiveness of CSR/sustainability committees or teams responsible for decision-making regarding ESG strategies. This score reflects a board's structural commitment to sustainable governance. Aini et al. (2025) highlighted the significance of such committees through manual content analysis of reports; however, our method provides broader coverage and greater comparability. Sustainability assurance quality is evaluated as the score of firms' external audits of CSR/sustainability reports, which cover health and safety, environmental, and social disclosures. While previous studies have explored assurance quality using manually collected data (Cho et al., 2012; Simnett et al., 2009), our approach using LSEG offers a standardized metric that is particularly beneficial for comparing emerging markets across different countries. Using LSEG-based metrics for sustainability governance aligns with existing conceptual definitions in the literature, while providing standardized, large-scale indicators that are comparable across countries and firms in the MENA region. This approach allowed us to cover a broad sample and replicate the analysis in other settings where LSEG data are available.

We examine two moderating variables: board diversity (BDIVERS), measured as the percentage of female directors on the board, a widely adopted method in recent empirical literature (Behlau et al., 2024; Borges et al., 2025; Le & Ngo, 2024). CEO board membership (CEOBM) is defined as a binary indicator equal to 1 if the CEO also serves as a member of the board, and 0 otherwise, consistent with established research practices (Arora, 2023; Chen et al., 2006; Tan & Liu, 2016; Upadhyay & Sriram, 2021).

The control variables typically used in prior executive compensation literature have been included in our models: board independence (BOIND), board size (BSZ), firm size (SIZE), R&D intensity (LNRD), profitability (ROA), inventory ratio (INVONT), financial leverage (LEV), operating cash flow (OCFASS), and liquidity (CURATIO). A comprehensive overview of all the variables, including definitions and measurements, is provided in Table 2.

Table 2. Variable definitions and measurements

Variable	Definition	Measurement
Dependent Variable		
CEOCOMP	CEO's total compensation	Score of CEO's compensation linked to total shareholder return, as defined by LSEG
Independent Variables		
CSRSCOMT	Sustainability committee quality	Score of the CSR committee or team responsible for decision-making on CSR strategies as defined by LSEG
CSRSASSUR	Sustainability assurance quality	Score of the firm's external audit of its CSR/H&S/Sustainability report and other sustainability as measured by LSEG
Moderating Variables		
BDIVERS	Board gender diversity	Percentage of female directors on the board
CEOBM	CEO's board membership	Dummy variable: 1 if CEO is also a board member, 0 otherwise
Control Variables		
BOIND	Board independence	Percentage of independent directors on the board
BSZ	Board size	Number of directors on the board
SIZE	Firm size	Natural log of total assets
LNRD	R&D intensity	Natural log of total research and development expenses
ROA	Profitability	Net income scaled by total assets
INVONT	Inventory ratio	Inventory ratio as scaled by total assets
LEV	Financial leverage	Total liabilities scaled by total assets
OCFASS	Operating cash flow	Net operating cash scaled by total assets
CURATIO	Liquidity	Current ratio as current assets is scaled by current liabilities
Country FE	Country fixed effect	Dummy variable to control for country effects
Industry FE	Industry fixed effect	Dummy variable to control for industry effects
Year FE	Year fixed effect	Dummy variable to control for year effects

To test our hypotheses, we estimate panel regressions with firm and year fixed effects. This approach accounts for unobserved heterogeneity and time trends, which could bias relationships of interest. Our baseline model for testing Hypotheses 1 and 2 is as follows.

$$\begin{aligned} &CEOCOMP\_it = \beta 0 + \beta 1\ CSRSCOMT\_it \\ &+\beta 2\ CSRSASSUR\_it + \beta 3\ BOIND\_it \\ &+\ \beta 4\ BSZ\_it + \beta 5\ SIZE\_it + \beta 6\ LNRD\_it \\ &+\beta 7\ ROA\_it + \beta 8\ INVONT\_it + \ \beta 9\ LEV\_it \\ &+\beta 10\ OCFASS\_it + \beta 11\ CURATIO\_it \\ &+CountryFE + IndustryFE + YearFE + \varepsilon\_it. \end{aligned} \quad (1)$$

To test Hypotheses 3 and 4, we extend the baseline model to include the moderating effects of board diversity (BDIVERS) and CEO board membership (CEOBM), expressed through the interaction terms:

$$\begin{aligned} &CEOCOMP\_it = \beta 0 + \beta 1 \cdot CSRSCOMT\_it \\ &+\beta 2 \cdot CSRSASSUR\_it + \beta 3 \cdot BDIVERS\_it \\ &+\beta 4 \cdot CEOBM\_it \\ &+\beta 5\left(CSRSCOMT\_it \cdot BDIVERS\_it\right) \\ &+\beta 6\left(CSRSCOMT\_it \cdot CEOBM\_it\right) \\ &+\beta 7 \cdot BOIND\_it + \beta 8 \cdot BSZ\_it \\ &+\beta 9 \cdot SIZE\_it + \beta 10 \cdot LNRD\_it \\ &+\beta 11 \cdot ROA\_it + \beta 12 \cdot INVONT\_it \\ &+\beta 13 \cdot LEV\_it + \beta 14\ OCFASS\_it \\ &+\beta 15 \cdot CURATIO\_it \\ &+CountryFE + IndustryFE + YearFE + \varepsilon\_it. \end{aligned} \quad (2)$$

All models include country, industry, and year fixed effects, and standard errors are clustered at the firm level to correct for heteroscedasticity and serial correlations. The variance inflation factors (VIFs) for all regressors remained well below the conventional threshold of 5, indicating that multicollinearity was not a concern.

To further ensure the reliability of our results, we conduct several robustness checks, including alternative measures of CEO compensation and sustainability governance, additional governance and audit-related controls, lagged specifications to address potential simultaneity, and propensity score matching to mitigate selection bias.

3. RESULTS

Table 3 reports the descriptive statistics for the main variables utilized in the analysis. The distribution of CEO compensation is notably skewed, with an average of 2.34 and a median close to zero. This distribution indicates that numerous companies in the MENA region report relatively modest executive compensation, often restricted to base salary, while only a portion reveal more comprehensive compensation packages. Despite excluding observations with missing or incomplete data from the sample, this skewness highlights ongoing disclosure challenges typical of emerging markets.

Table 3. Descriptive statistics

Variables	N	Mean	SD	p25	Median	p75
CEOCOMP	2183	2.34	14.71	0.00	0.00	0.00
CSRSCOMT	2183	13.29	27.92	0.00	0.00	0.00
CSRSASSUR	2183	14.67	32.56	0.00	0.00	0.00
BDIVERS	2183	9.71	12.07	0.00	7.14	16.67
BOIND	2183	19.74	29.89	0.00	0.00	37.63
CEOBM	2183	0.36	0.48	0.00	0.00	1.00
BSZ	2183	9.35	2.69	7.00	9.00	11.00
SIZE	2183	22.08	1.97	20.70	22.13	23.34
LNRD	2183	1.29	4.14	0.00	0.00	0.00
ROA	2183	0.05	0.11	0.01	0.03	0.07
INVONT	2183	0.06	0.42	0.00	0.00	0.02
LEV	2183	0.64	0.24	0.47	0.68	0.86
OCFASS	2183	0.20	4.36	-0.00	0.00	0.04
CURATIO	2183	2.93	9.52	1.00	1.09	1.90

Note: See Table 2 for variable definitions.

The sustainability committee quality and sustainability assurance quality also showed low average values, with medians at zero, suggesting that many companies do not have formal ESG governance structures. Board diversity is limited, with an average of just below 10% and a median of 7.14%, highlighting the underrepresentation of women on corporate boards in MENA companies. These descriptive trends collectively highlight the region's institutional weaknesses and underscore the need to examine how sustainable governance mechanisms shape executive compensation.

The sample revealed considerable differences in the board structures. The number of board members varies between seven and 11, with a median of nine, while board independence is slightly below 20%, which is comparatively low according to international standards. Other financial control

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variables, including return on assets, leverage, and liquidity, exhibit moderate variability, suggesting a diverse range of firms in terms of size, performance, and capital structure.

These descriptive trends collectively highlight the institutional weaknesses of the region and emphasize the need to explore how sustainable governance mechanisms influence executive compensation. They also provided an initial context for testing *H1* and *H2* on the links between sustainability committee quality, sustainability assurance quality, and CEO pay.

Table 4 reports pairwise Pearson correlations among all variables and offers a preliminary view of the relationships underlying *H1–H4*. The results suggest that CEO compensation (CEOCOMP) shows a moderately significant correlation with both sustainability committee quality (CSRSCOMT) ($r = 0.17$, $p < 0.05$) and external assurance quality (CSRSASSUR) ($r = 0.05$, $p < 0.05$), highlighting the connection between advanced ESG governance structures and executive remuneration. Furthermore, the results suggest that board diversity (BDIVERS) and CEO board membership (CEOBM) exhibit minimal correlations with CEO compensation (CEOCOMP), both having a correlation coefficient of $r = -0.02$ ($p < 0.05$). This suggests that these governance characteristics do not directly impact compensation. Regarding control variables, the results indicate that CEO compensation is positively correlated with board independence (BOIND) and negatively correlated with board size (BSZ).

Table 4 also shows the issue of multicollinearity. However, the most notable correlation among the independent variables was found between board independence (BOIND) and sustainability committee quality (CSRSCOMT) ($r = 0.54$, $p < 0.05$), suggesting that none of the independent variable pairs in the correlation matrix exceeded a coefficient of 0.70, effectively eliminating significant multicollinearity concerns. This conclusion is supported by the variance inflation factor (VIF) values, which are all below three in the untabulated results, further confirming that multicollinearity is not an issue for subsequent regression analyses.

Table 5 reports the OLS regression results for *H1* and *H2*, which examine how sustainability committee quality and sustainability assurance quality are associated with CEO compensation. Across all specifications, sustainability committee quality shows a positive and significant correlation with CEO pay, with coefficients ranging from 0.07 to 0.09 ($p < 0.01$). This indicates that CEOs at companies with more robust sustainability committees generally earn higher compensation, highlighting their leadership in handling ESG risks, meeting stakeholder expectations, and fulfilling broader governance duties.

Similarly, sustainability assurance quality consistently exhibits a positive and significant correlation with CEO compensation across all models, with coefficients ranging from 0.02 to 0.04 and a *p*-value of less than 0.01. This finding aligns with the signaling hypothesis, suggesting that companies

Table 4. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) CEOCOMP	1.00													
(2) CSRSCOMT	0.17*	1.00												
(3) CSRSASSUR	0.05*	0.04	1.00											
(4) BDIVERS	−0.02	0.08*	0.21*	1.00										
(5) BOIND	0.15*	0.54*	−0.06*	0.04	1.00									
(6) CEOBM	−0.02	0.08*	0.12*	0.12*	0.03	1.00								
(7) BSZ	−0.05*	−0.06*	0.10*	0.01	−0.18*	0.14*	1.00							
(8) SIZE	0.03	−0.02	0.25*	−0.07*	−0.16*	−0.01	0.30*	1.00						
(9) LNRD	−0.04	0.16*	0.02	0.10*	0.06*	0.06*	−0.02	−0.08*	1.00					
(10) ROA	0.00	0.03	0.02	0.05*	0.05*	0.11*	−0.02	−0.06*	0.08*	1.00				
(11) INVONT	0.00	0.09*	−0.04	0.01	0.13*	−0.01	−0.09*	−0.19*	0.04*	−0.02	1.00			
(12) LEV	−0.03	−0.06*	0.13*	0.06*	−0.15*	0.01	0.23*	0.48*	−0.08*	−0.26*	−0.14*	1.00		
(13) OCFASS	0.00	0.03	−0.02	−0.03	0.03	−0.04*	−0.03	−0.08*	−0.01	0.00	0.07*	−0.07*	1.00	
(14) CURATIO	−0.03	−0.05*	0.03	0.01	−0.05*	0.00	−0.02	0.03	−0.03	0.02	−0.01	−0.06*	−0.01	1.00

Note: * Indicates significance at p < 0.05. See Table 2 for variable definitions.

that secure more credible and thorough assurance not only enhance the trustworthiness of their sustainability reports but also support the increase in CEO incentives through enhanced legitimacy and accountability to stakeholders.

Table 5. Regression results for H1 and H2 (sustainability governance and CEO compensation)

Variables	(1)	(2)	(3)	(4)	(5)
	CEOCOMP				
CSRSCOMT	0.09***	0.07***	0.07***	0.07***	0.07***
	(12.37)	(4.94)	(4.54)	(4.25)	(4.07)
CSRSASSUR	0.02***	0.02***	0.04***	0.04***	0.03***
	(3.29)	(6.74)	(4.31)	(5.03)	(3.67)
BOIND		0.04***	0.04***	0.04***	0.03***
		(4.36)	(3.34)	(2.91)	(2.84)
BSZ		–0.22***	–0.25***	–0.28***	–0.24***
		(–6.07)	(–4.86)	(–5.81)	(–3.78)
SIZE		0.49***	0.42***	0.43***	0.58***
		(5.01)	(6.34)	(7.55)	(6.54)
LNRD		–0.22***	–0.18***	–0.21***	–0.20***
		(–6.40)	(–6.34)	(–4.34)	(–4.10)
ROA		–1.81	–0.33	–0.63	–1.14
		(–0.69)	(–0.19)	(–0.32)	(–0.53)
INVONT		–0.64***	–0.40***	–0.27*	–0.30**
		(–4.00)	(–2.60)	(–1.79)	(–2.07)
LEV		–3.32***	–2.38**	–2.48**	–2.68**
		(–2.96)	(–2.01)	(–2.09)	(–2.03)
OCFASS		–0.01	–0.01*	–0.02	–0.02*
		(–0.63)	(–1.79)	(–1.48)	(–1.81)
CURATIO		–0.04***	–0.03***	–0.03***	–0.03***
		(–7.02)	(–6.80)	(–8.28)	(–7.58)
COUNTRYDMY			YES	YES	YES
INDUSTDMY				YES	YES
YEARDMY					YES
_cons	0.86***	–5.75***	0.51	2.66	–1.82
	(3.38)	(–3.03)	(0.20)	(1.31)	(–0.59)
Observations	2183	2183	2183	2183	2183
R-squared	0.03	0.05	0.07	0.08	0.08

Note: T-values are in parentheses. ***, **, and * indicate significance at p < 0.01, p < 0.05, and p < 0.10, respectively. See Table 2 for variable definitions.

Among the control variables, board independence shows a positive and significant correlation with CEO compensation, whereas board size and R&D intensity are negatively linked to compensation. This emphasizes the role of larger boards in oversight and the balance between focusing on innovation and rewarding management. Conversely, firm size consistently has a strong positive impact ($p < 0.01$), indicating that larger companies tend to offer more generous CEO compensation packages. Additionally, the inventory ratio and financial leverage have negative and significant coefficients, suggesting that operational and financial limitations restrict CEO pay. Liquidity also has a negative relationship with CEO compensation, whereas profitability and operating cash flow do not have significant effects, highlighting the weak alignment between pay and performance in emerging markets.

The inclusion of country, industry, and year fixed effects enhances the models' explanatory capacity, with *R*-squared values rising from 0.03 in Model 1 to 0.08 in Model 5. Together, these results offer strong support for Hypotheses 1 and 2, demonstrating that sustainability governance mechanisms through committee oversight and assurance practices play a crucial role in determining CEO compensation in MENA firms.

Table 6 presents the moderating effects predicted in *H3* and *H4*, focusing on board gender diversity and CEO board membership. In Model 1, the interaction term (CSRSCOMT × BDIVERS) is both negative and highly significant ($\beta = -0.00$, $p < 0.01$). This result indicates that the positive link between sustainability committee quality and CEO compensation is reduced in companies with higher board gender diversity. Consistent with stakeholder theory, diverse boards may apply more rigorous oversight, thereby limiting excessive compensation that could result from purely symbolic ESG efforts. In contrast, the effect of sustainability assurance quality on CEO compensation remains unchanged by board diversity, as their interaction is not significant.

Model 2 examined the moderating role of CEO board membership. The analysis found that neither the direct influence of CEO board membership nor its interactions with the sustainability committee or sustainability assurance quality are statistically significant. This finding suggests that CEO board membership does not significantly influence the impact of sustainability governance on executive pay. However, this conclusion should be approached with caution because CEO membership may indicate more nuanced power dynamics that require additional robustness checks.

The control variables align with the baseline findings: board independence and firm size are positively correlated with CEO compensation,

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whereas board size, R&D intensity, inventory ratio, financial leverage, and liquidity exhibit significant negative correlations. The *R*-squared values remained stable at 0.08, indicating that adding interaction terms enhanced theoretical understanding without significantly affecting the fit of the model.

Table A1 in Appendix A reports the robustness checks using alternative measures for both dependent and independent variables. Models 1–3 re-estimate the baseline regressions using a dichotomous approach to measure CEO compensation and logistic regressions. Across all columns, both sustainability committee quality and sustainability assurance quality remain positively and significantly associated with CEO compensation ($p < 0.01$), reinforcing the validity of the main results.

Model 1 indicates a slightly significant positive impact of board diversity, although this effect is not present in Models 2 and 3. Notably, the interaction term (CSRSCOMT×BDIVERS) remained negative and significant ($p < 0.01$), reinforcing the moderating influence of gender diversity even when different compensation definitions were considered.

Models 4–6 use different methods to operationalize the independent variables. Specifically, the coefficients for sustainability assurance quality remained robust and significant when employing various committee and assurance quality metrics ($\beta = 0.04$, $p < 0.01$). However, the coefficients of the sustainability committee quality become weaker and lose significance in some specifications. This suggests that the assurance mechanism has a more consistent influence on CEO compensation than the committee structure, although the overall trend aligns with baseline findings.

Overall, these robustness tests confirm that the primary results are not influenced by the variable definitions. The significance of sustainability committee quality, sustainability assurance quality, and interaction with board diversity across various specifications enhances confidence in the conclusions of this study. These findings provide additional support for *H1–H3*.

Table 6. Regression results for H3 and H4 (moderating effects of board diversity and CEO board membership)

Variables	(1)	(2)
	CEOCOMP	
CSRSCOMT	0.09***	0.07***
	(4.33)	(5.92)
CSRSASSUR	0.03**	0.03***
	(2.01)	(3.27)
BDIVERS	0.04*	
	(1.69)	
CSRSCOMT_ BDIVERS	−0.00***	
	(−4.90)	
CSRSASSUR_BDIVERS	0.00	
	(0.17)	
CEOBM		0.03
		(0.04)
CSRSCOMT_CEOBM		−0.02
		(−0.40)
CSRSCOMT_CEOBM		−0.01
		(−0.63)
BOIND	0.04***	0.04***
	(3.10)	(2.74)
BSZ	−0.25***	−0.23***
	(−3.56)	(−3.89)
SIZE	0.52***	0.59***
	(5.77)	(5.92)
LNRD	−0.19***	−0.20***
	(−3.91)	(−3.07)
ROA	−1.06	−1.06
	(−0.52)	(−0.49)
INVONT	−0.37**	−0.33**
	(−2.34)	(−2.29)
LEV	−2.48*	−2.66**
	(−1.93)	(−2.07)
OCFASS	−0.02	−0.02*
	(−1.33)	(−1.77)
CURATIO	−0.03***	−0.03***
	(−8.73)	(−7.39)
COUNTRYDMY	YES	
INDUSTDMY	YES	
YEARDMY	YES	
_cons	−0.67	−2.10
	(−0.21)	(−0.64)
Observations	2183	2183
R-squared	0.08	0.08

Note: T-values are in parentheses. ***, **, and * indicate significance at p < 0.01, p < 0.05, and p < 0.10, respectively. See Table 2 for variable definitions.

Table A2 in Appendix A reports additional robustness checks that address omittedvariable bias and simultaneity by including further governance and audit-related controls (Models 1–3) and lagged specifications to capture the simultaneity effects (Models 4–6).

In Models 1–3, even after accounting for factors such as audit committee independence and expertise, audit fees, type of audit firm, market-to-book value, and firm-fixed effects, the coefficients for both sustainability committee quality and sustainability assurance quality remained positive and statistically significant ($p < 0.01$). This indicates that the omitted variable bias does not influence the main effects. Notably, the negative and highly significant moderating effect of board diversity persisted, further supporting the strength of the interaction.

Models 4–6 employ a one-year lagged dependent variable method to address concerns about simultaneity and establish causality effects. To measure sustainability committee quality and sustainability assurance quality, we run our main model using one-year lagged CEO compensation, instead of the main dependent variable. The findings align with the baseline results: both sustainability committee quality and sustainability assurance quality are positively and significantly linked to CEO compensation, whereas their interaction with board diversity is negatively and significantly correlated.

Collectively, these findings provide compelling evidence that identified relationships are genuine. By addressing both omitted variable bias and simultaneity, the analysis validates the robustness of the main conclusions regarding the influence of sustainability governance mechanisms on CEO compensation. This set of tests further corroborated *H1–H3*.

To further address potential endogeneity issues, we employed propensity score matching (PSM) to reduce selection bias in firms' choices to form sustainability committees or seek external assurance. The findings presented in Table A3 in Appendix A confirm the robustness of the main results. Notably, after deriving the PSM samples, sustainability committee quality continues to show a positive and significant correlation with CEO compensation across all models, whereas sustainability assurance quality consistently demonstrates a positive impact. Additionally, the moderating influences of board diversity and CEO board membership are largely maintained in the matched samples. These results indicate that our evidence for *H1–H4* is not driven by selection bias in the adoption of sustainability committees or external assurance.

Finally, to explore the mechanisms underlying *H1* and *H2*, we examine whether the presence of sustainability committees and assurance practices improves firms' ESG performance. As indicated in Table A4 in Appendix A, both sustainability committee quality and sustainability assurance quality are positively and significantly linked to overall ESG scores (ESGS) and CO_2 emission reduction scores (CO2S). These results imply that sustainability governance structures compensate executives for meaningful enhancement in corporate sustainability performance. This evidence supports the view that the capacity of a firm to achieve better ESG outcomes mediates the relationship between sustainable governance and CEO compensation.

Overall, additional tests reinforce the credibility of our findings and support the argument that sustainability governance mechanisms are robust predictors and mediators of executive compensation. These results are consistent with the view that improvements in ESG performance and CO_2 reductions partially mediate the relationships hypothesized in *H1* and *H2*.

4. DISCUSSION

This study offers new insights into the influence of sustainability governance mechanisms on CEO remuneration in the MENA region. The results show that the sustainability committee's quality and sustainability assurance quality are positively and significantly associated with CEO compensation, supporting *H1* and *H2*. These findings are consistent with signaling theory, which argues that firms use visible governance practices to signal credible ESG commitment to external stakeholders (Connelly et al., 2011; Spence, 1973). By establishing stronger sustainability committees and obtaining independent assurance of sustainability reports, firms signal that ESG issues are integrated into strategic decision-making, which boards may reward through higher CEO pay. The findings also resonate with stakeholder theory (Donaldson & Preston, 1995; Freeman, 2010), as they suggest that

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CEOs are compensated not only for financial performance, but also for managing broader stakeholder expectations and aligning firm practices with long-term sustainability objectives (Eccles et al., 2014; Flammer et al., 2019). Overall, the evidence extends prior work on ESG-linked incentives by showing that board-level sustainability governance structures are associated with CEO compensation in an emergingmarket context.

The moderating analysis highlights the important boundary conditions. Board gender diversity has a negative moderating effect on the relationship between sustainability committee quality and CEO compensation, thus supporting *H3*. This implies that, in firms with more gender-diverse boards, the positive association between committee quality and CEO pay is weaker, suggesting that diverse boards exercise stronger oversight and constrain the use of ESG committees as a symbolic justification for higher compensation. This result is consistent with prior evidence that gender-diverse boards enhance monitoring, reduce managerial opportunism, and curb excessive CEO pay (Post & Byron, 2015; Terjesen et al., 2009). At the same time, the interaction between assurance quality and board diversity is not significant, indicating that external verification processes may be less dependent on the internal composition of the board and more dependent on professional assurance standards and external demand for credible reporting.

In contrast, CEO board membership does not significantly moderate the relationship between sustainability committee quality and CEO compensation, providing no support for *H4*. This suggests that in the sampled MENA firms, CEO presence on the board does not substantially alter how sustainability governance mechanisms affect remuneration. Prior studies in developed markets report that CEO board membership can weaken board independence and increase CEO influence over pay (Krause et al., 2014). Its effects also depend on the institutional context (Yu, 2023). The absence of a strong moderating effect here may reflect the dominance of concentrated ownership and weaker enforcement mechanisms in MENA markets, which can overshadow any additional influence of CEO board membership. In this setting, ownership structures and external constraints may play a more critical role than formal board seats in shaping the ESG–compensation relationship.

The behavior of the control variables provides further context for these findings. Firm size has a significantly positive impact on CEO compensation, aligning with compensation literature, which indicates that larger companies typically provide more generous executive packages (Core et al., 1999). Conversely, factors such as board size, R&D intensity, inventory ratio, financial leverage, and liquidity are negatively correlated with CEO pay, thus highlighting the limiting effects of resource commitment and financial risk. Profitability (ROA) and operating cash flow (OCFASS) do not show significant effects, indicating a weak alignment between pay and performance in emerging markets. This is consistent with previous findings that institutional voids often disconnect CEO compensation from company performance (Young et al., 2008). These patterns underline the importance of considering firm-level constraints and institutional features when interpreting ESG-related pay outcomes.

Additional analyses reinforce the robustness and validity of the main findings. Alternative operationalizations of CEO compensation and key governance variables, including audit-related controls, lagged specifications, and propensity score matching, confirm that sustainability committee quality and sustainability assurance quality remain positively and significantly associated with CEO compensation. The negative moderating effect of board diversity is preserved across most specifications, underscoring its importance in constraining the opportunistic use of ESG governance mechanisms. These robustness checks mitigate concerns about omitted variable bias, simultaneity, and selection in sustainability governance structures, thereby strengthening the causal interpretation of the documented relationships.

Finally, mechanism analysis indicates that improvements in overall ESG performance and CO_2 emission reductions partially mediate the relationship between sustainability governance structures and CEO pay. Both sustainability committee quality and sustainability assurance quality are positively associated with ESG scores and CO_2

reductions, and these performance indicators, in turn, are linked to higher CEO compensation. This pattern suggests that boards are more likely to reward CEOs when sustainability governance translates into substantive outcomes rather than merely symbolic structures. In other words, sustainability committees and external assurance appear to influence CEO compensation not only directly through governance signaling and stakeholder legitimacy but also indirectly by fostering better sustainability performance that boards and stakeholders perceive as valuable. Overall, the robustness checks and mechanism analyses support the view that sustainability committees and external assurance play a substantive role in shaping CEO compensation in MENA firms, whereas board diversity acts as an important internal constraint on the use of these mechanisms to justify higher pay.

CONCLUSION

This study investigates whether sustainability committee quality and sustainability assurance quality are associated with CEO compensation in MENA firms and whether these relationships are moderated by board gender diversity and CEO board membership. Using 2,183 firm-year observations from 486 listed firms from 2014 to 2023, the analysis shows that both sustainability committee quality and sustainability assurance quality are positively related to CEO pay, while board gender diversity weakens the committee–compensation link, and CEO board membership does not have a significant moderating effect. These results indicate that sustainability governance mechanisms play a substantive role in shaping CEO remuneration in an emerging market context, and that boards that are more gender-diverse are better able to limit the purely symbolic use of ESG committees as a justification for higher pay. Taken together, the findings suggest that well-designed sustainability committees and credible external assurance are rewarded in CEO compensation packages, consistent with signaling and stakeholder theories that emphasize legitimacy, accountability, and the integration of ESG issues into strategic decision-making. At the same time, institutional features and ownership structures in MENA may constrain the additional influence of CEO board membership on the ESG–pay relationship.

AUTHOR CONTRIBUTIONS

Conceptualization: Amor Ayed.
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Formal analysis: Amor Ayed.
Funding acquisition: Amor Ayed.
Investigation: Amor Ayed.
Methodology: Amor Ayed.
Project administration: Amor Ayed.
Resources: Amor Ayed.
Software: Amor Ayed.
Supervision: Amor Ayed.
Validation: Amor Ayed.
Visualization: Amor Ayed.
Writing – original draft: Amor Ayed.
Writing – review & editing: Amor Ayed.

AVAILABILITY OF DATA AND MATERIAL

The data used in this study were obtained from Refinitiv and are subject to licensing restrictions; therefore, they cannot be publicly shared. The data may be made available by the author upon reasonable request, subject to Refinitiv's terms and conditions.

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APPENDIX A

Table A1. Robustness checks using alternative measures

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Alternative for DV			Alternative for IVs		
CSRSCOMT	0.02***	0..00***	0.00***	–1.01**	–0.01	–0.01
	(3.59)	(6.09)	(7.08)	(–2.03)	(–1.34)	(–1.58)
CSRSASSUR	0.01**	0.00**	0.00***	2.99***	0.04**	0.04***
	(2.40)	(1.99)	(3.19)	(4.81)	(2.31)	(3.36)
BDIVERS		0.00**			–0.00	
		(2.29)			(–0.81)	
CSRSCOMT_ BDIVERS		–0.00***			0.00	
		(–6.21)			(1.41)	
CSRSASSUR_ BDIVERS		0.00			–0.00	
		(0.27)			(–0.22)	
CEOBM			0.00			–0.01
			(0.35)			(–1.55)
CSRSCOMT_ CEOBM			–0.00			0.01
			(–1.01)			(1.47)
CSRSCOMT_ CEOBM			–0.00			–0.02
			(–0.99)			(–0.95)
CONTROLS	YES					
COUNTRYDMY	YES					
INDUSTDMY	YES					
YEARDMY	YES					
_cons	–36.28	–0.03	–0.06	–6.13**	–0.09***	–0.09***
	(–0.01)	(–0.91)	(–1.64)	(–2.53)	(–3.06)	(–3.02)
Observations	1335	1288	1288	2183	2053	2053
R-squared	0.30	0.30	0.29	0.07	0.16	0.16

Note: T-values are in parentheses. ***, **, and * indicate significance at p < 0.01, p < 0.05, and p < 0.10, respectively. CONTROLS is an indicator of whether to include our control variables. See Table 2 for variable definitions.

Table A2. Robustness checks for omitted variables and simultaneity

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	CEOCOMP					
	Adding Controls			Simultaneity Effect		
CSRSCOMT	0.07***	0.09***	0.08***	0.06***	0.08***	0.06***
	(4.57)	(4.50)	(6.09)	(2.72)	(2.86)	(3.57)
CSRSASSUR	0.03***	0.03**	0.04***	0.02**	0.03**	0.02***
	(2.75)	(2.03)	(2.86)	(2.39)	(2.04)	(2.62)
BDIVERS		0.03			0.04	
		(1.41)			(1.34)	
CSRSCOMT_ BDIVERS		–0.00***			–0.00***	
		(–4.60)			(–3.88)	
CSRSASSUR_ BDIVERS		0.00			–0.00	
		(0.07)			(–1.11)	
CEOBM			0.12			0.08
			(0.17)			(0.22)
CSRSCOMT_ CEOBM			–0.01			–0.01
			(–0.24)			(–0.37)
CSRSCOMT_ CEOBM			–0.01			–0.02*
			(–0.42)			(–1.82)
REC	–0.54***	–0.52***	–0.54***			
	(–2.74)	(–2.78)	(–2.61)			
MVBV	–0.01***	–0.01***	–0.01***			
	(–3.62)	(–4.32)	(–4.86)			

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Table A2 (cont.). Robustness checks for omitted variables and simultaneity

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	CEOCOMP					
	Adding Controls			Simultaneity Effect		
ADFEE	−0.00***	−0.00***	−0.00***			
	(−4.57)	(−4.42)	(−3.09)			
ACIND	−0.05***	−0.05***	−0.05***			
	(−3.56)	(−3.49)	(−3.58)			
ACEXPDUMY	−2.67***	−2.69***	−2.67***			
	(−2.75)	(−2.83)	(−2.71)			
ADTYPE	0.89	0.76	0.88			
	(1.38)	(1.18)	(1.49)			
IAF	0.50	0.48	0.49			
	(1.42)	(1.40)	(1.45)			
FIRMDM		YES				
CONTROLS			YES			
COUNTRYDMY			YES			
INDUSTDMY			YES			
YEARDMY			YES			
_cons	−1.67	−0.52	−1.80	−0.25	0.84	−0.64
	(−0.41)	(−0.12)	(−0.43)	(−0.06)	(0.17)	(−0.13)
Observations	2183	2183	2183	1697	1697	1697
R-squared	0.10	0.10	0.10	0.07	0.08	0.07

Note: T-values are in parentheses. ***, **, and * indicate significance at p < 0.01, p < 0.05, and p < 0.10, respectively. REC is the ratio of accounts receivable to total assets; MVBV is the ratio of equity market capitalization to equity book value; ADFEE is natural log of audit fees paid to financial statements external auditors; ACIND is percentage of independent directors on audit committee; ACEXPDUMY is indicator variable if the audit committee has at least one financial expertise director; ADTYPE is indicator variable if the company external auditor is one of BIG4 audit firms; IAF is indicator variable if the company has internal audit function; FIRMDM is indicator for firms fixed effects; CONTROLS is an indicator for including our control variables. See Table 2 for variable definitions.

Table A3. Propensity score matching (PSM) robustness checks

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	CEOCOMP					
CSRSCOMT	0.07***	0.09***	0.08***			
	(3.60)	(3.51)	(3.93)			
CSRSASSUR				0.03***	0.04***	0.06***
				(4.47)	(2.73)	(3.48)
BDIVERS		0.03			0.08	
		(1.16)			(0.98)	
CSRSCOMT_ BDIVERS		−0.00***				
		(−3.50)				
CSRSASSUR_ BDIVERS					−0.00	
					(−0.72)	
CEOBM			0.61			6.39*
			(1.27)			(1.71)
CSRSCOMT_ CEOBM			−0.03			
			(−0.73)			
CSRSCOMT_ CEOBM						−0.08**
						(−2.21)
CONTROLS			YES			
COUNTRYDMY			YES			
INDUSTDMY			YES			
YEARDMY			YES			
_cons	−6.99**	−5.51	−7.09**	14.70**	14.65**	14.88**
	(−2.04)	(−1.57)	(−2.03)	(2.54)	(2.53)	(2.29)
Observations	1632	1632	1632	702	702	702
R-squared	0.09	0.09	0.09	0.21	0.22	0.23

Note: T-values are in parentheses. ***, **, and * indicate significance at p < 0.01, p < 0.05, and p < 0.10, respectively. See Table 2 for variable definitions.

Table A4. Mechanism analysis: ESG performance and CO_2 emissions

Variables	(1)	(2)
	ESGS	CO2S
CSRSCOMT	0.04***	0.07***
	(3.24)	(3.32)
CSRSASSUR	0.23***	0.32***
	(22.21)	(19.32)
BOIND	0.02	–0.02
	(1.38)	(–0.96)
BSZ	0.55***	0.86***
	(4.42)	(8.37)
SIZE	3.67***	4.30***
	(12.07)	(15.22)
LNRD	0.12	0.09
	(1.26)	(1.17)
ROA	2.61	7.76***
	(0.78)	(4.63)
INVONT	–2.05***	–1.47***
	(–4.71)	(–2.81)
LEV	3.97*	1.49
	(1.73)	(0.33)
OCFASS	–0.01	0.00
	(–0.11)	(0.25)
CURATIO	–0.06*	–0.09***
	(–1.94)	(–3.26)
CONTROLS	YES	
COUNTRYDMY	YES	
INDUSTDMY	YES	
YEARDMY	YES	
_cons	–74.65***	–118.38***
	(–8.60)	(–21.17)
Observations	2183	2183
R-squared	0.55	0.62

Note: T-values are in parentheses. ***, **, and * indicate significance at $p < 0.01$, $p < 0.05$, and $p < 0.10$, respectively. ESGS is an overall company score based on self-reported information in the environmental, social, and corporate governance pillars; CO2S is a score of a company's commitment and effectiveness toward reducing environmental emissions in the production and operational processes. See Table 2 for variable definitions.

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