

Does diversity matter? Examining the association between board gender inclusion and greenwashing practices in ASEAN-5 countries

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Abstract

Purpose – Although board gender inclusion has often been associated with greater engagement in sustainability initiatives, the rise of greenwashing raises questions about the authenticity of such commitments. Despite growing global attention, empirical evidence on this issue remains limited in the Association of Southeast Asian Nations (ASEAN) context. This study examines the association between board gender inclusion and greenwashing practices in ASEAN-5 countries (Indonesia, Malaysia, Singapore, Thailand and the Philippines). Furthermore, it explores the moderating role of chief executive officer (CEO) duality, firm-level and institutional heterogeneity and critical mass dynamics in relation to greenwashing.

Design/methodology/approach – Our study uses an unbalanced panel of 322 nonfinancial listed companies across ASEAN-5 during 2016–2023. Data were obtained from Bloomberg, the London Stock Exchange Group and the World Bank. The analysis uses fixed-effect models with cluster-robust standard errors and a two-step generalized method of moments approach.

Findings – Board gender inclusion is associated with lower greenwashing. However, this association weakens when CEO duality is present. The analysis further indicates that board gender inclusion may mitigate greenwashing primarily among firms with high profitability, low leverage and small size, as well as in countries with stronger regulatory quality. In addition, the effect of board gender inclusion exhibits a critical mass threshold (approximately 20% of total board members), suggesting a meaningful level at which greenwashing may be reduced.

Originality/value – This study fills a critical gap in the literature on gender-diverse boards and greenwashing within the ASEAN context. By integrating the moderating role of CEO duality and examining critical mass theory, our study offers new empirical insight into how board gender inclusion may influence the integrity of corporate sustainability practices. Additionally, this study develops an alternative dummy-variable measure of greenwashing.

Keywords Board gender inclusion, CEO duality, Greenwashing, Critical mass

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1. Introduction

As environmental pollution continues to intensify, companies across the globe have devoted greater attention to sustainability concerns (Guo *et al.*, 2018). Yet, company management seeking short-term gains exploits greenwashing as a deceptive environmental, social and governance (ESG) campaign (Zheng and Li, 2024). According to Delmas and Burbano (2011), greenwashing is defined as the combination of inadequate environmental performance and overstated claims. Firms may make sustainability claims without taking substantive action to fulfill their responsibilities, resulting in symbolic or potentially misleading communication. Accordingly, stakeholder trust may be eroded, potentially undermining sustainability efforts.

The Association of Southeast Asian Nations (ASEAN) has actively worked to enhance environmental collaboration among its member states since 1977. In 2015, ASEAN leaders introduced the ASEAN Socio-Cultural Community (ASCC) Blueprint 2025, which guides ASEAN's efforts to foster environmentally sustainable cities and tackle climate change (The ASEAN Secretariat, 2016). ASCC was strengthened in 2023 when ASEAN countries declared their commitment to enhancing sustainable engagement during growing risks posed by climate change, urbanization and natural hazards (ASEAN, 2023). However, greenwashing threatens the credibility of these initiatives.

One potential way to address greenwashing is to strengthen gender inclusion on boards. Recent studies suggest that board gender inclusion can improve corporate outcomes by fostering diverse experiences, knowledge, skills, values, environmental awareness and leadership styles (Kim *et al.*, 2026; Saktiawan *et al.*, 2026b; Tu *et al.*, 2026). Gender-diverse boards can broaden access to relevant information, guide corporate strategy and monitor management actions while providing oversight for external stakeholders (Åberg *et al.*, 2019; Adams *et al.*, 2010; Kim *et al.*, 2026). In turn, gender-diverse boards may help curb greenwashing while reducing agency costs (Liu, 2024). Challenging this view, Cahyono *et al.* (2025) reveal that female directors reduce environmental transparency disclosure, creating a paradoxical board-diversity outcome.

A classic study by Kangun *et al.* (1991) examined greenwashing in advertising, categorizing it as outright falsehoods, omissions, or vagueness. In contrast, executional greenwashing conveys a more subtle message, such as blue and green colors that evoke nature or images of endangered animals (Parguel *et al.*, 2015). Meanwhile, empirical studies show consistent patterns regarding board gender inclusion and greenwashing across regions. For example, Cotugno *et al.* (2026) reveal a negative association between the presence of female directors and greenwashing in European firms from 2013 to 2022. In Asia, Nepal *et al.* (2025) used data from publicly listed Chinese companies and concluded that greater gender diversity inhibits greenwashing. Chen and Dagestani (2023) also find that female directors, age diversity, educational backgrounds and shareholder aggregation deter greenwashing, whereas local directors and political connections tend to encourage it. However, firm-level greenwashing in the ASEAN context remains unexplored.

This study explores firm-level greenwashing and highlights gaps in the existing ASEAN gender-inclusion literature. Although systematic evidence is limited, reports suggest that greenwashing is emerging as an issue in Southeast Asia (Ang, 2024). Gender inclusion in ASEAN also faces implementation challenges, including tokenism. For instance, Indonesia and Malaysia are characterized by deeply rooted patriarchal cultures (Aspinall *et al.*, 2021; Chen *et al.*, 2022), which may contribute to low or symbolic female board representation. Deloitte (2024) reported that between 2021 and 2023, women's representation on boards increased by 2.8% points to 17.1%. This proportion remains lower than that in other regions, such as Europe at 34.4% and North America at 28.6% (Credit Suisse, 2021). We use a dataset comprising 322 listed nonfinancial companies across the ASEAN-5 countries—Indonesia, Malaysia, Singapore, Thailand and the Philippines—over the 2016–2023 period. To measure greenwashing, we calculated the discrepancy between ESG disclosure and performance, following Fathoni *et al.* (2025), Kathan *et al.* (2025) and Zheng and Li (2024). Our ESG disclosure and performance data were obtained from Bloomberg and the London Stock

Exchange Group (LSEG). The analysis applies fixed-effects (FE) models with cluster-robust standard errors and a two-step generalized method of moments (GMM).

Our study makes five contributions. First, to the best of our knowledge, this work provides preliminary empirical evidence on the board gender inclusion-greenwashing nexus in the ASEAN region. Sustainability disclosure requirements across ASEAN countries remain fragmented. Malaysia has mandated ESG reporting since 2016, whereas several other countries, including Indonesia and the Philippines, still use voluntary regulation ([Asian Development Bank Institute, 2020](#)). Furthermore, Indonesia and Malaysia are associated with patriarchal cultures, which may affect corporate governance practices and sustainability reporting ([Aspinall et al., 2021](#); [Chen et al., 2022](#); [Saktiawan et al., 2026b](#)). Second, we incorporate chief executive officer (CEO) duality as a moderating factor, an aspect that has received limited attention in this context. Integrating leadership structure into the analysis allows a more nuanced understanding of how gender-diverse boards function across different governance arrangements. Third, given that firm characteristics and external institutional conditions may shape the observed relationship ([Lestari et al., 2024](#); [Nepal et al., 2025](#); [Pinheiro et al., 2025](#)), we conduct heterogeneity analyses to examine whether the results vary across different firm- and country-level contexts. Building on [Nepal et al. \(2025\)](#) and [Lestari et al. \(2024\)](#), we include profitability as an additional factor alongside size and leverage. We use regulatory quality (RQ) to assess the external institutional environment, given its capacity to establish sustainability standards ([Khosravi et al., 2024](#); [Pinheiro et al., 2025](#)). Fourth, we extend the emerging debate on critical mass theory from a broader gender-inclusion perspective. When the proportion of female directors remains low, their contribution may be less effective because their presence may be tokenistic rather than substantively influential. Unlike the previous study by [Saktiawan et al. \(2026b\)](#), we use the critical mass approach, following [Dobija et al. \(2022\)](#), to identify the critical point using proportion-based dummy variables. Finally, we develop a greenwashing dummy variable as an alternative proxy to enrich the literature.

Our baseline findings indicate that board gender inclusion is associated with a lower likelihood of greenwashing. Nonetheless, the association weakens when the CEO also serves as board chair. The results also vary across firm and institutional characteristics. The negative association is observed among companies with high profitability, low leverage and small size, as well as in countries with stronger RQ. Moreover, the critical mass results suggest that approximately 20% female board representation may constitute a meaningful threshold for mitigating greenwashing.

The remainder of this paper proceeds as follows. [Section 2](#) provides the theoretical underpinnings and literature review, leading to hypothesis development. [Section 3](#) outlines the data, variable measurements and econometric approach. [Section 4](#) reports the empirical findings along with robustness tests. [Section 5](#) presents the conclusion and offers suggestions for future research.

2. Theoretical underpinnings and hypothesis development

2.1 Building theoretical frameworks to understand the board gender inclusion-greenwashing nexus

Sustainability reporting may create problems when managers make symbolic claims because of its complexity and measurement difficulties ([Menla Ali et al., 2024](#)). Extending from agency theory ([Fama and Jensen, 1983](#)), managers may overstate a company's environmental performance to improve its reputation, protect its compensation, or avoid criticism ([Li et al., 2023](#)), especially when board monitoring is weak. In response, female directors may help limit greenwashing by mitigating agency conflicts ([Liu, 2024](#)). [Adams et al. \(2010\)](#) suggest that female directors may allocate greater effort to oversight than their male counterparts. Female directors may also be more likely to represent a broad range of shareholders, including those who prioritize sustainability and to discourage overstated sustainability claims.

Complementing this perspective, resource dependence theory (RDT) argues that board gender inclusion may broaden access to external expertise and stakeholder networks, thereby reducing exposure (Nguyen *et al.*, 2021). Board gender inclusion is viewed as a resource that offers reputational advantages and may help align the interests of multiple stakeholders and the company (Davis and Cobb, 2010; Saktiawan *et al.*, 2026b).

2.2 Hypothesis development

2.2.1 Board gender inclusion and greenwashing tendency. Prior studies suggest that women are generally more sensitive to environmental or sustainability issues when fulfilling corporate responsibilities (Birindelli *et al.*, 2018; Kim *et al.*, 2026). Female directors may therefore support corporate success by maintaining legitimacy and credibility through integrity-based practices. Here, RDT holds that the resources associated with board gender inclusion can provide a competitive advantage (Nguyen *et al.*, 2021). Greater heterogeneity in board composition may reduce conformity pressures and homogeneous thinking, thereby improving the board's capacity to implement sustainable strategies (Kim *et al.*, 2026). Consistent with this view, several recent studies have found that gender inclusion can reduce greenwashing by facilitating comprehensive environmental strategies (Kim *et al.*, 2026; Nepal *et al.*, 2025), increasing awareness of climate risks (Liu, 2024) and improving the accuracy of environmental claims (Khan, 2022). Together, stronger monitoring and enhanced access to accountability mechanisms suggest that firms with greater board gender diversity may be less likely to engage in greenwashing. Therefore, we propose the first hypothesis:

H1. Board gender inclusion is negatively associated with corporate greenwashing.

2.2.2 Moderating role of CEO duality. Although board gender inclusion may enhance monitoring and resource provision, its effectiveness may depend on the firm's governance structure. In a one-tier system, the CEO may also serve as board chair (CEO duality), which can limit directors' oversight and shareholder influence by concentrating power (Romano *et al.*, 2020). When managers hold excessive power, they may behave opportunistically and take greater risks in pursuit of short-term profits, which can increase moral hazard, including greenwashing. CEOs may resort to greenwashing as a shortcut to protect their future careers and maximize profits (He *et al.*, 2023; Menla Ali *et al.*, 2024). Naciti (2019) and Shahbaz *et al.* (2020) documented that CEO duality negatively affects ESG performance, raising concerns that companies with CEO duality may not fulfill their stated sustainability pledges. Accordingly, we propose the second hypothesis:

H2. CEO duality weakens the negative association between board gender inclusion and greenwashing.

3. Research method

3.1 Variable measurements

3.1.1 Greenwashing. Following widely used approaches in the greenwashing literature, such as Fathoni *et al.* (2025) and Kathan *et al.* (2025), we measure greenwashing as the difference between Bloomberg ESG disclosure and LSEG ESG performance. According to Yu *et al.* (2020), Bloomberg's ESG disclosure focuses only on the quantity of publicly disclosed ESG data and not on its performance. Kathan *et al.* (2025) explain that a high ESG disclosure score does not accurately reflect a company's actual commitment to sustainability campaigns. In contrast, LSEG ESG performance is not based solely on the number of disclosures communicated but is also standardized and audited, with a weighted score (LSEG, 2026). The scope of LSEG ESG performance is broader, comprising 870 metrics across three pillars and 10 themes (Saktiawan *et al.*, 2026b). These pillars and themes include environmental factors, assessed based on innovations, resource use and emissions; social factors, assessed through

community, workforce, human rights and product responsibility; and governance factors, evaluated based on corporate social responsibility strategy, shareholders and management. Both ESG scores range from 0 to 100, with higher scores indicating stronger ESG disclosure or performance. Before calculating the discrepancy between ESG disclosure and performance scores, the values are standardized as follows:

$$\text{Normalized Bloomberg ESG disclosure (ESGD}_{it}) = \left(\frac{BESGD_{it} - \bar{X}_{BESGD_{it}}}{\sigma_{BESGD_{it}}} \right) \quad (1)$$

$$\text{Normalized LSEG ESG performance (ESGP}_{it}) = \left(\frac{LESGP_{it} - \bar{X}_{LESGP_{it}}}{\sigma_{LESGP_{it}}} \right) \quad (2)$$

$$\text{Greenwashing}_{it} = \text{Normalized ESGD}_{it} - \text{Normalized ESGP}_{it} \quad (3)$$

From Equation (1), $BESGD_{it}$ is the firm-level disclosure for company i in year t relative to the same industrial sector. $\bar{X}_{BESGD_{it}}$ and $\sigma_{BESGD_{it}}$ represent the average value and standard deviation of ESG disclosure, respectively. The same normalization applies to the LSEG ESG performance in Equation (2) and Equation (3) takes the difference. If the greenwashing value is greater than 0, the company is engaging in greenwashing because the information it provides appears better than its actual performance, and vice versa (Nepal *et al.*, 2025). Ling *et al.* (2025) also emphasized that a high greenwashing value indicates underperforming sustainability efforts.

We also create a greenwashing dummy variable as an alternative proxy, assigning 1 if the company overclaims in its ESG disclosures and 0 otherwise. This proxy implies that higher ESG performance relative to disclosure indicates no overstatement in the company's sustainability efforts. Conversely, lower performance relative to disclosure suggests potential greenwashing.

3.1.2 Gender inclusion and CEO duality. To measure board gender inclusion, we use female director representation as a proxy, operationalized in three ways following the recent research by Saktiawan *et al.* (2026b). First, FD1 is the total number of female directors on company boards. Second, FD2 is the number of female directors divided by the total number of board members expressed as a percentage. Third, FD3 is a dummy variable that equals 1 if the company has more female directors than the median and 0 otherwise. To identify the critical point in board gender inclusion, we also construct proportion-based dummy variables using the percentage of female directors (FD4 to FD7), consistent with Dobija *et al.* (2022). CEO duality is captured using a dummy variable that equals 1 if the CEO also serves as board chair and 0 otherwise, following Fathoni *et al.* (2025) and Nepal *et al.* (2025).

3.1.3 Control variables. We apply several control variables at the company and country levels to reduce omitted-variable bias. ESG scores are closely related to firm characteristics, particularly financial condition (Saktiawan *et al.*, 2026a, b; Zahid *et al.*, 2023). Therefore, we include firm-level control variables such as firm size (FZ), capital structure (Lev), firm profitability (FP) and government ownership (Gov). Prior research suggests that ESG transformation is relatively costly and depends on firms' financial and internal capabilities. Zahid *et al.* (2023) further indicated that government ownership may facilitate access to sustainability-related funding that supports ESG initiatives. We also include board size (BZ) because larger boards may complicate coordination and decision-making (Saktiawan *et al.*, 2026b). From a macro perspective, the COVID-19 pandemic from 2020 to 2022 created a sustainability dilemma because financial resources were diverted elsewhere (Amankwah-Amoah, 2020). Finally, sustainability outcomes are closely tied to country-level policies and conditions. Thus, gross domestic product (GDP) growth and RQ are included as country-level

variables (Pinheiro *et al.*, 2025; Saktiawan *et al.*, 2026b). Table A1 [1] summarizes all variables used in the study.

3.2 Data, sample and sources

This study uses unbalanced panel data covering ASEAN-5 countries (Indonesia, Malaysia, Thailand, Singapore and the Philippines) between 2016 and 2023. According to Syahfitri and Risfandy (2023), these five countries represent the ASEAN region in economic and geopolitical terms. Our sample includes public companies across all industries except the financial sector. Financial firms are excluded because stricter regulation may affect their greenwashing behavior (Yu *et al.*, 2020). We obtain data from several sources, including Bloomberg for ESG disclosure scores, the LSEG for ESG performance and other company-level variables and the World Bank for country-level datasets. We winsorize continuous variables at the 1st and 99th percentiles to mitigate the effects of outliers.

3.3 Econometric models

To evaluate the association of board gender inclusion and CEO duality with greenwashing, we use the following econometric specifications:

$$GW_{it} = \alpha_0 + \beta_1 FDOB_{it} + \beta_2 Dual_{it} + \beta_3 Covid_t + \phi X_{it} + v_i + \varepsilon_{it} \quad (4)$$

$$GW_{it} = \alpha_0 + \beta_1 FDOB_{it} + \beta_2 Dual_{it} + \beta_3 Covid_t + \beta_4 FDOB * Dual_{it} + \phi X_{it} + v_i + \varepsilon_{it} \quad (5)$$

$$GW_{it} = \alpha_0 + \beta_1 FDOB_{it} + \beta_2 Dual_{it} + \beta_3 Covid_t + \phi X_{it} + v_i + H1/H2 + \varepsilon_{it} \quad (6)$$

Equations (4)–(6) are estimated using fixed-effect models. GW denotes the dependent greenwashing variable, operationalized as greenwashing tendency (GWSH) and a dummy measure (GWD). FDOB reflects board gender inclusion. Dual refers to CEO duality, which interacts with FDOB in Equation (5) to assess the moderating effect. COVID denotes the COVID-19 period (2020–2022). X represents control variables at the company and country levels (see Table A1 [1] for more detailed information). v_i captures firm effects to control for unobserved firm-specific heterogeneity and time-invariant factors. To account for heteroskedasticity and within-cluster correlation, following Petersen (2009), we use firm-clustered standard errors. Equation (6) is used to test heterogeneous effects with categorical variables (H1/H2), as implemented by Saktiawan *et al.* (2026c).

Previous studies have cautioned against potential endogeneity between board gender inclusion and greenwashing (Liu, 2024; Nepal *et al.*, 2025). Potential reverse causality arises because the environmental awareness and leadership styles of female directors may influence companies' greenwashing, while companies may also appoint female directors to build their image, prevent greenwashing and support sustainability campaigns. Omitted-variable bias may also arise when factors that influence the board gender inclusion-greenwashing nexus are not included in the model. Potential omitted variables include ESG controversies and sustainability-related board governance (Fathoni *et al.*, 2025; Pratama *et al.*, 2025). Therefore, we address endogeneity by re-estimating Equation (4) using 1-year-lagged board gender inclusion variables and the two-step GMM estimator proposed by Blundell and Bond (1998). As documented by Wintoki *et al.* (2012), dynamic panel GMM allows lagged values to serve as internal instruments. Model diagnostics rely on the Sargan and Arellano–Bond tests to assess specification validity (Arellano, 2002).

4. Results and discussion

4.1 Descriptive statistics and correlation matrix

To provide an initial overview of the data, we present descriptive statistics in Table A2 [1]. All proxies have 1,266 firm-year observations. The average value of GWSH is 0.092 with a

standard deviation of 0.763, indicating that ESG disclosure scores exceed ESG performance scores on average. FD1 and FD2 have mean values of 2.014 and 21.324, respectively. Thus, firms have an average of approximately 2 female directors, representing 21.324% of board members. The Dual variable, with a mean value of 0.151, indicates that CEO duality occurs in 15.1% of firm-year observations. [Table A2 \[1\]](#) also displays the correlation matrix results. Pairwise correlations among most variables are generally around 0.2, indicating a relatively low correlation. Several proxies are highly correlated, such as GWSH/GWD, FD1, FD2 and FD3, but this is not a concern for the reported models because proxies for the same construct are entered in separate regressions.

4.2 Baseline regression and interaction results

Our initial findings ([Table 1](#), columns 1 and 2) reveal that two proxies for board gender inclusion have significant negative associations with greenwashing at the 5 and 1%

Table 1. Baseline result

	FE (1) GWSH	FE (2) GWSH	FE (3) GWSH	FE (4) GWSH
FD1	−1.109** (−2.32)		−1.733*** (−3.47)	
FD2		−0.137*** (−3.14)		−0.181*** (−3.93)
Dual	−2.957 (−1.19)	−3.010 (−1.21)	−6.893** (−2.26)	−7.150** (−2.19)
FD1*Dual			2.013*** (3.26)	
FD*Dual				0.191*** (2.64)
Covid	−0.262 (−0.57)	−0.264 (−0.57)	−0.303 (−0.66)	−0.311 (−0.68)
Gov	4.587* (1.70)	4.590 (1.64)	4.872* (1.84)	4.751* (1.70)
FZ	−1.854 (−1.02)	−1.752 (−0.97)	−1.700 (−0.93)	−1.622 (−0.90)
Lev	0.557 (0.96)	0.578 (1.02)	0.543 (0.93)	0.568 (0.98)
FP	0.168 (0.10)	0.111 (0.06)	0.0539 (0.03)	−0.0184 (−0.01)
BZ	0.823*** (2.98)	0.591** (2.15)	0.889*** (3.18)	0.602** (2.21)
GDP	−0.129** (−2.42)	−0.132** (−2.48)	−0.133** (−2.49)	−0.133** (−2.48)
RQ	−7.276 (−1.60)	−7.224 (−1.59)	−6.670 (−1.48)	−6.656 (−1.48)
Firm effects	YES	YES	YES	YES
Constant	38.49 (0.99)	39.21 (1.02)	35.30 (0.91)	36.90 (0.97)
Marginal effects				
Dual+(FD1Dual)			−4.8804* (−1.80)	
Dual+(FD2Dual)				−6.9594** (−2.16)
N. Obs	1,266	1,266	1,266	1,266
N. Firms	322	322	322	322
R-Sq With	0.0404	0.0433	0.0483	0.0492

Note(s): Robust *t*-statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ represent the significance level

significance levels. These results indicate that greater board gender inclusion is associated with lower greenwashing. Therefore, our first hypothesis is supported. BZ and GDP are other variables significantly associated with greenwashing practices. BZ has a significant positive association with greenwashing (Table 1, columns 1 and 2). In contrast, GDP has a significant negative association with greenwashing at the 5% level (Table 1, columns 1 and 2). The results further show that the negative association between board gender inclusion and greenwashing is weaker when CEO duality is present, as indicated by the moderation and marginal results (Table 1, columns 3 and 4). Accordingly, our second hypothesis is also supported.

4.3 Heterogeneity and critical mass results

Following Nepal *et al.* (2025) and Pinheiro *et al.* (2025), we tested heterogeneity across profitability, leverage, size and RQ. We divided the sample into two levels based on the median value: high vs low profitability and leverage, large vs small FZ and higher vs lower RQ. The RQ classification places Singapore and Malaysia in the higher-quality category, while Thailand, the Philippines and Indonesia are in the lower-quality category. Tables A3 [1] and A4 [1] present the heterogeneity test results. The significant negative association between board gender inclusion and greenwashing is observed only among companies with high profitability (Table A3 [1], columns 1 and 3), low leverage (Table A3 [1], columns 6 and 8) and small size (Table A4 [1], columns 2 and 4), as well as in countries with higher RQ (Table A4 [1], columns 5 and 7).

Next, we examine the critical mass to identify the threshold at which board gender inclusion is associated with lower overclaiming of ESG outcomes. Table A5 [1], columns 1–4 indicates that board gender inclusion may curb greenwashing when female directors constitute at least 20% of the board (FD6). Conversely, the association is not statistically significant when the proportion of female directors exceeds the 40% threshold (FD7). This FD7 estimate should be interpreted with caution because the small number of observations limits statistical power.

4.4 Robustness tests and endogeneity concerns

To assess the consistency of our findings, we used several alternative measures. First, a dummy variable equals 1 if the number of female directors exceeds the median and 0 otherwise. Second, we develop a dummy variable for greenwashing tendency, assigning 1 when ESG performance is lower than ESG disclosure and 0 otherwise. Columns 1–3 of Table A6 [1] present the robustness test results, which are consistent with the baseline findings. We also use a 1-year-lagged board gender inclusion measure and GMM estimation to address endogeneity concerns, as explained previously. The results remain similar, although the significance level weakens to 5% in the lagged specification (Table A7 [1], columns 1 and 2). The two-step GMM results are presented in Table A7 [1] (columns 3–6) and are consistent with our primary analysis. The diagnostic results show that the Sargan tests fail to reject the null hypothesis, providing no evidence against instrument validity under this test, and that there is no evidence of second-order autocorrelation (AR2). These diagnostics support the appropriateness of the GMM specification. The number of instruments (38) remains lower than the number of firms (280), suggesting that instrument proliferation is unlikely.

4.5 Discussion

4.5.1 Board gender inclusion, CEO duality and greenwashing. Li *et al.* (2023) previously reported greenwashing as a shortcut strategy used by companies to improve their financial performance, especially when environmental regulations remain underdeveloped. Similar conditions are also evident in ASEAN, where existing laws and regulations remain less developed than those in Europe and North America (Khunkaew *et al.*, 2023; Saktiawan *et al.*, 2026b). In addition to this less-developed legal framework, ownership is highly concentrated, with approximately 66% of firms having three largest shareholders who control more than

50% of the shares (OECD, 2024). This high ownership concentration may increase the risk of opportunistic disclosure (Fan *et al.*, 2025).

Here, female directors may lower the risk of greenwashing by strengthening oversight of overstated corporate claims. Following agency theory, female directors may place greater emphasis on transparency and accountability when implementing sustainable practices and addressing related stakeholder tensions (Menicucci and Paolucci, 2023). Female directors may view greenwashing as a threat to firm legitimacy and stakeholder trust. Prior literature has associated female directors with greater risk aversion and adherence to ethical norms (Doan and Iskandar-Datta, 2020; Tu *et al.*, 2026), characteristics that may reduce misleading symbolic disclosure. Decisions involving female directors may also place greater emphasis on nonfinancial aspects (Hollindale *et al.*, 2019), including substantive commitment to sustainability initiatives (Kim *et al.*, 2026). From an RDT perspective, these governance contributions may help companies gain a competitive advantage through more authentic sustainability practices (Nguyen *et al.*, 2021). Several recent studies support our findings, including Fathoni *et al.* (2025), Liu (2024) and Nepal *et al.* (2025).

Nonetheless, the mitigating effect of board gender inclusion on overclaiming ESG outcomes may also depend on the CEO's power over the board. According to agency theory, when a CEO also serves as board chair, power tends to be concentrated, limiting the board's oversight function (Bel-Oms *et al.*, 2024). In the ASEAN corporate context, CEO duality may co-exist with high ownership concentration (OECD, 2024), particularly when the CEO is from a controlling family, thereby centralizing managerial power and control (Itan *et al.*, 2024). This concentration may reduce participation in decision-making by other directors and increase conflicts of interest (Romano *et al.*, 2020), limiting female directors' ability to counter CEO greenwashing. CEOs may use greenwashing as a shortcut to pursue bonuses, career advancement and a positive image without delivering substantial environmental performance. In other words, CEOs may behave opportunistically and take greater risks, as argued by Pham *et al.* (2015). Our findings extend the results of Naciti (2019) and Shahbaz *et al.* (2020), which suggest that CEO duality may impede corporate ESG performance.

4.5.2 Heterogeneity factors and critical mass. In terms of internal characteristics, companies with high profitability have sufficient financial resources to implement ESG initiatives. Saktiawan *et al.* (2026a) explain that sustainability campaigns, especially those focused on environmental practices, entail high costs. Given that the ASEAN-5 markets are relatively less ESG-conscious (Saktiawan *et al.*, 2026b), the required investment may be more burdensome. Accordingly, financial capability plays a significant role in successful ESG transformation (Ridwan and Alghifari, 2025). Our argument is also consistent with the slack resource theory explained by Heubeck and Ahrens (2025). Hence, the mitigating association of female directors with overclaiming sustainability outcomes is stronger in highly profitable companies. The attenuating association is also evident among low-leverage companies. Companies with low debt burdens may face less pressure to appear environmentally friendly. Conversely, highly leveraged firms are expected to demonstrate strong sustainability performance to secure financing (Malik and Kashiramka, 2025). Thus, the role of board gender inclusion may be constrained when a company prioritizes projecting a sustainable image and maintaining access to financing.

The preventive effect of female directors is also statistically insignificant in large companies, possibly because of greater scrutiny from sustainability stakeholders (Zhang, 2022). Kim and Lyon (2011) emphasize that large companies may use overly positive environmental imagery to avert criticism from sustainability groups. Large companies also have greater resources and influence, including the ability to lobby governments regarding sustainability regulation and enforcement (Delmas and Burbano, 2011). Our reasoning is also supported by the results, which show that when a country's RQ is lower, board gender inclusion is not significantly associated with lower greenwashing. Greenwashing generally arises under conditions of weak environmental attention (Li *et al.*, 2023; Zheng and Li, 2024). A recent study by Saktiawan *et al.* (2026b) confirms that among the ASEAN-5 countries,

gender diversity promotes sustainability only in Malaysia and Singapore, where ESG-conscious markets are well established. Both countries have stronger regulatory and governance standards that support authentic sustainability initiatives (Saktiawan *et al.*, 2026b). Bella and Pratama (2025) also report that companies in Singapore and Malaysia, characterized by stronger regulatory frameworks, tend to align their board governance mechanisms with ESG outcomes. In contrast, countries with developing institutional frameworks, such as Indonesia, Thailand and the Philippines, may be more susceptible to overclaiming corporate sustainability performance.

Turning to the critical mass findings, prior research suggests that when the proportion of female directors is insufficient, their influence on counter greenwashing may be weaker (Fathoni *et al.*, 2025). When representation is low, female directors' voices may carry less influence (Dobija *et al.*, 2022). Our results reaffirm the importance of a critical mass of female directors (approximately 20%) in strengthening their ability to implement and sustain substantive sustainability practices (Alsagr and Apergis, 2026; Birindelli *et al.*, 2018).

5. Conclusion and recommendations

Our study investigates the association between board gender inclusion and corporate greenwashing in ASEAN-5 countries. Our findings indicate that gender-inclusive boards are associated with lower greenwashing. This pattern may reflect more participative governance that incorporates the perspectives of multiple parties, especially ESG-conscious stakeholders and supports more authentic sustainability practices. These governance resources are particularly relevant because environmental oversight in the ASEAN region remains relatively fragile, creating opportunities for companies to overclaim ESG outcomes. From an agency theory perspective, female directors may help constrain overstatement in symbolic sustainability performance. In turn, RDT considers board gender inclusion an important resource for strengthening sustainability credibility. However, this mitigating association weakens when the company has a CEO who is also the board chair. When a CEO holds both positions, power is concentrated, which may limit board oversight, including the participation of female directors. Consequently, female directors may have fewer opportunities to provide input or participate in decision-making. Our interaction analysis is consistent with agency theory, which emphasizes the importance of CEO supervision and control.

Moreover, we find that this mitigating association is concentrated among companies with high profitability, low leverage and small size, as well as in countries with higher RQ. Companies with high profitability have greater financial resources to implement costly sustainability transformations. In this context, female directors may be better positioned to make substantive contributions. By contrast, companies with high leverage and large size may prioritize their image or reputation in response to external pressure, potentially constraining the role of female directors. We also find that RQ is an important condition shaping the effectiveness of efforts to limit greenwashing. Our results are consistent with institutional theory because the dynamics of corporate greenwashing appear to depend on prevailing pressures and regulations. Moreover, the results suggest a meaningful threshold at which board gender inclusion is associated with lower greenwashing (approximately 20% female directors). These findings support critical mass theory, which contends that female directors' voices become more influential after a meaningful representation threshold is reached.

This study has important implications for policymakers. One policy approach is the implementation of quotas (e.g. gender-responsive governance regulations), as used in parts of Europe, where representation targets commonly range from 30% to 40% (Mateos de Cabo *et al.*, 2022). Based on our findings, we suggest that a 20% proportion of female directors may represent a meaningful threshold associated with lower corporate greenwashing. Regulators can also develop ESG assurance mechanisms that verify reported ESG claims against actual outcomes. Equally important is strengthening the oversight ecosystem to support board gender

inclusion. One way to achieve this is through mandatory ESG reporting, as implemented in Singapore and Malaysia. From a managerial perspective, clear governance guidelines concerning board composition, structure, authority and duties are needed to limit excessive CEO power under a duality structure. Firms could also increase the proportion of female directors through dedicated recruitment processes to reach the identified threshold.

Despite its contributions and implications, our study has some limitations. Although we normalized the ESG scores from both databases before calculating the difference, the proxy may be limited by differences in the ESG measurement scopes across the two databases. The constructed greenwashing dummy also has limitations because it cannot capture low, medium and high levels of greenwashing, especially when the gap between disclosure and performance is small. Future work could develop more sophisticated calculations to capture the intensity of greenwashing. Further research may include variables such as the tenure or background of female directors to deepen the analysis.

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Note

1. Please see this on the Online [Appendix](#).

Supplementary material

The supplementary material for this article can be found online.

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