RESEARCH ARTICLE

DOI: 10.54392/ajir26220

ASIAN JOURNAL OF INTERDISCIPLINARY RESEARCH

Asian Research Association

Greenwashing, Female Directors, and Financial Performance in Emerging Asian Banks

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DOI: https://doi.org/10.54392/ajir26220

Received: 09-03-2026; Revised: 05-06-2026; Accepted: 16-06-2026; Published: 24-06-2026

Abstract: In Emerging Asia's rapidly evolving banking industry, financial institutions face dual pressures: to contribute to economic development and to address global sustainability expectations in response to climate change. These pressures are further complicated by institutional voids and high information asymmetry in the region, which may increase the risk of greenwashing. Greenwashing refers to a situation in which financial institutions make environmentally responsible statements that do not fully reflect their environmental performance. By applying Legitimacy Theory and Upper Echelons Theory, this paper explores the association between greenwashing and the market valuation of banks and examines whether board gender diversity acts as an internal governance mechanism in this emerging market context. This study employs 751 firm-year observations from 136 commercial banks in Emerging Asia for the period 2015–2024. Feasible Generalized Least Squares is used for heteroskedastic panels and FE-Clustered sensitivity checks address within-banks serial correlation. Further robustness and sensitivity tests are performed using alternative board gender diversity measures and FE-Clustered specification. The results reveal that greenwashing is significantly and negatively associated with Tobin's Q. Moreover, the results suggest that board gender diversity may weaken the negative association between greenwashing and Tobin's Q. According to the marginal effects analysis, the negative association becomes statistically indistinguishable from zero at approximately 20–30% female board representation and turns positive at higher levels of diversity. In addition, the mechanism analysis shows that female board representation is negatively associated with the Greenwashing Index, providing evidence consistent with a monitoring channel. Overall, the findings suggest that board gender diversity may function as a governance-signaling mechanism that strengthens disclosure credibility in Emerging Asian banking markets. Since this study relies on observational panel data, the results should be interpreted as associative rather than causal.

Keywords: Greenwashing, Financial Performance, Gender Diversity, Emerging Asia Banking, Governance Signaling.

1. Introduction

Global banks now face greater demands to incorporate sustainability into their financial strategies considering the rising climate and environment-related risks (Arayssi *et al.,* 2020; Wu & Shen, 2013). The banking sector is not merely a financial intermediary but plays an important part in financing a transition towards a lower-carbon economy (Nizam *et al.,* 2019; International Energy Agency [IEA], 2024). This tension is particularly visible in Emerging Asia, where banks remain central to economic growth while facing increasing pressure to demonstrate environmental responsibility. Many banks from Emerging Asia still provide funding for carbon-intensive sectors, which makes the issue of credibility in environmental disclosure crucial (Asian Development Bank, 2023; ClientEarth *et al.,* 2023). Emerging Asian economies contribute substantially to global emissions, and banks therefore remain closely connected to the financing of carbon-intensive activities (IEA, 2024; Overland *et al.,* 2021). In contrast to Europe, in Emerging Asia there is no single approach to disclosure due to the absence of a unified disclosure framework comparable to the Sustainable Finance Disclosure Regulation (Dikau & Volz, 2021; Khanna & Palepu, 2010).

Although 'Emerging Asia' is conceptualized as a homogeneous construct, such treatment may hide substantial institutional variations (Khanna & Palepu, 2010), which appear across markets in financial market development, regulatory intensity, enforcement of ESG disclosure, and relative significance of internal governance

mechanisms. Some economies like China, South Korea, Taiwan have developed capital markets and have increasingly issued regulation on mandatory ESG reporting, prompted by the state (Alsayegh *et al.,* 2020; Du, 2015). While ASEAN (Indonesia, Malaysia, Thailand, Philippines, Vietnam) and South Asian (India) markets suffers from "institutional voids" (Khanna & Palepu, 2010; Mair & Mart, 2005) and rely more on banking finance (Al-Homaidi *et al.,* 2018). In particular, for these emerging capital markets, the formal monitoring on the truthfulness of the disclosure of environment claim by regulators is less complete, thus the board structure is acting as a critical internal governance mechanism in signaling the truthfulness of the disclosure to the investors according to the signaling theory (Su *et al.,* 2016; Suchman, 1995) so as to reduce information asymmetry (Abad *et al.,* 2017; Mustaruddin *et al.,* 2017).

This setting creates opportunities for "greenwashing," which is defined as a symbolic communication process in which there exists a discrepancy between environmental claim-making and environmental action (Berrone *et al.,* 2009; Walker & Wan, 2012). Within the context of Emerging Asia, although greenwashing can be analyzed from the financial perspective, greenwashing is more accurately conceptualized as a multidimensional problem associated with governance and communication in multiple institutional settings (Yu *et al.,* 2020; Galletta *et al.,* 2024). Emerging Asia is diverse in terms of governance mechanisms, disclosure sophistication, and CSR market reactions. For example, China has developed more sophisticated disclosure practices and more visible market reactions to CSR, while some other economies remain at earlier stages of CSR adoption and often interpret CSR through a philanthropic lens (Kao *et al.,* 2018; Gunawan, 2016). In this regard, there is a need to examine the interpretation of environmental claims under different institutional environments. It should be noted that in emerging markets where formal institutions are transitioning, it becomes the role of the internal governance structures to monitor the credibility of disclosure.

Considering the uneven development of external regulatory oversight in the area, internal supervision through board structures remains an important governance mechanism (McGuinness *et al.,* 2017; Adams & Ferreira, 2009). The critical but poorly investigated dimension of corporate governance within this framework is the gender diversity among board members (Wasiuzzaman & Mohammad, 2019; Arayssi *et al.*, 2020). Drawing on Upper Echelons Theory, this study proposes an enhanced disclosure-monitoring mechanism as an ex-ante hypothesis rather than a simplistic post hoc explanation (Hambrick & Mason, 1984; Abatecola & Cristofaro, 2018). We contend that female directors may bring different perspectives regarding risk oversight and disclosure practices, greater awareness of reputation-related risks, and stronger incentives for monitoring because their reputational capital is more vulnerable in information-asymmetric settings (Liu *et al.,* 2013; Zahid *et al.,* 2023). Our study considers gender diversity as a conditional governance measure, whereby female participation on boards may serve as an important governance mechanism to facilitate the disclosure of information (Pathan & Faff, 2012; Abad *et al.,* 2017). Instead of adopting normative essentialism, we analyze the role of female participation in boards in encouraging firms to improve the consistency between environmental disclosure and environmental performance (Lu & Herremans, 2019).

Our inquiry evaluates the nexus between the impact of gender diversity on greenwashing and market discipline in Emerging Asia using a consistent sample of 751 firm-year observations from banks included in the MSCI Emerging Markets Asia Index (2015–2024). Given a mean female representation of 16.40% in our sample, we examine whether female participation has achieved a critical mass that could enable its influence on environmental policy (Kramer *et al.,* 2006; Konrad *et al.,* 2008). We test whether there may be a threshold range at which female participation can counteract the adverse valuation effects of greenwashing on Tobin's Q ratio (Joecks *et al.,* 2013; Brahma *et al.,* 2021). This will allow us to move away from generalizing about the region and toward a contextually justified approach based on analysis (Galletta *et al.,* 2024; Yu *et al.,* 2020).

This paper contributes to the growing body of knowledge on ESG by moving beyond the Western-based approaches to an in-depth analysis of Asia, where greenwashing is still an emerging issue (Birindelli *et al.,* 2024; Alsayegh *et al.,* 2020). Through the lens of the legitimacy theory and information asymmetry framework, the study is consistent with the destructive financial effects of greenwashing, even in dynamic growth contexts (Suchman, 1995; Du, 2015). Additionally, the study contributes to the discussion of corporate governance by illustrating gender diversity as a reliable mechanism for reducing disclosure inconsistency (Lara *et al.,* 2017; Wan Abdullah *et al.,* 2021). These results have implications for policymakers in Emerging Asia to strengthen investor confidence by addressing internal board composition issues (Asian Development Bank, 2023; Su *et al.,* 2016). In conclusion, this paper indicates that gender diversity is not only an approach to satisfy social demands for equality but also an instrument

for promoting accountability in financial transactions (McGuinness *et al.,* 2017; Eliwa *et al.,* 2023). Furthermore, to account for institutional heterogeneity, this study performs a subsample analysis focusing on markets with higher institutional voids.

2. Literature Review and Hypothesis Development

2.1 Theoretical Framework

In this research, the key theoretical constructs that are used to explore the connection among greenwashing, corporate governance, and market valuation include Legitimacy Theory and Upper Echelons Theory (Suchman, 1995; Deegan, 2002; Hambrick & Mason, 1984; Abatecola & Cristofaro, 2018). Legitimacy Theory explains why banks may use environmental disclosure to manage stakeholder expectations when their actual environmental performance remains contested. Upper Echelons Theory helps explain why board characteristics, including gender diversity, may influence disclosure oversight and risk monitoring. The Institutional Theory is incorporated as a contextual support on the functioning of the chosen corporate governance practices within heterogeneous Emerging Asia contexts (Khanna & Palepu, 2010; Mair & Martí, 2005). In turn, the Critical Mass Theory and the application of the Blau Index approach is used as complementary theories to consider gender diversity from different perspectives (Kramer *et al.,* 2006; Konrad *et al.,* 2008; Joecks *et al.,* 2013; Blau, 1977; Dang *et al.,* 2023).

2.1.1 Legitimacy Theory and Decoupling

The Legitimacy Theory argues that organizations are created through a social contract, where such entities have to guarantee their actions conform to society's expectations, thus ensuring that they maintain their right to exist (Deegan, 2002). In terms of the financial institutions in Emerging Asia, the "legitimacy gap" occurs because they use resources to fund "brown assets," despite the fact that they are sustainability-oriented organizations. The company can rectify the legitimacy gap by engaging in "decoupling," which involves the separation of an organization's claims and actual actions without any changes to the basic strategy (Delmas & Burbano, 2011). Decoupling ensures that firms get temporary legitimacy; however, it can generate reputational risk when investors perceive inconsistency between their "green talk" and "green walk" resulting in substantial losses for the firm (Walker & Wan, 2012).

2.1.2 Upper Echelons: Reputational Capital and Monitoring

The "Upper Echelons Theory" states that the characteristics of top decision makers of firm would determine their strategy (Hambrick & Mason, 1984). Board gender diversity in this research is interpreted through the lens of reputational-capital, rather than from an essentialist premise that women inherently possess a greater tendency toward morality. For information-asymmetric settings, female directors could face greater reputation exposure and monitoring pressure especially under a condition that the firm is subject to a greater likelihood of disclosure related controversy (Ryan & Haslam, 2005; Liu *et al*., 2013; Zahid *et al.,* 2023). This may result in more rigorous supervision on environmental disclosure and greater consistency between environmental disclosure and its performance (Lara *et al.,* 2017; Eliwa *et al.,* 2023; Zahid *et al.,* 2023).

2.1.3 Institutional Theory: Regulatory Gaps and Substitutability

According to Institutional Theory, organizational behavior arises out of the "rules of the game" within the environment (Khanna & Palepu, 2010; Mair & Martí, 2005). The sampled countries differ considerably in ESG disclosure maturity, enforcement intensity, ownership structures, and regulatory coordination (Kao *et al.,* 2018; Gunawan, 2016; Su *et al.,* 2016). In the case of North Asia, the deterrent mechanism against greenwashing is in the form of formal rules of law and regulation enforced by the state. However, in the ASEAN markets, where formal oversight is lacking or emerging, governance structures like board diversity act as the complementary governance mechanisms (McGuinness *et al.,* 2017; Birindelli *et al.,* 2024; Zahid *et al.,* 2023). As per the theory, board gender diversity will only serve as a contingent deterrent because of its impact on regions where formal institutions cannot overcome the information asymmetry at banks.

2.1.4 Beyond Tokenism: Gender Balance and the Blau Index

In addition to the emphasis of Critical Mass Theory on "threshold of three," this paper also analyzes the issue of Gender Balance through the use of the Blau Index (Dang *et al.,* 2023; Blau, 1977). The presence of gender evenness on a board result in a governance-credibility effect which surpasses having token quotas (Birindelli *et al.,* 2018). The existence of gender balance in a board indicates an elevated level of cognitive diversity, as well as the capacity to question the management's "green talk" (Arayssi *et al.,* 2020). We contend that gender balance lowers the risk of coordination problems and the tendency of being a "free-rider," especially among large homogeneous boards. In the context of Emerging Asian banks, board gender diversity may be better understood not only through the number of female directors, but also through the balance of gender representation within the board. Critical Mass Theory focuses on having at least three women directors on the board, whereas the Blau Index focuses on the balance of gender representation within the board. A more balanced board composition may support cognitive diversity and discussions among the board members and hence improve monitoring. This is especially significant since boards are expected to assess disclosure issues related to greenwashing (Birindelli *et al.,* 2018; Arayssi *et al.,* 2020; Dang *et al.,* 2023).

2.2 Literature Review

2.2.1 Greenwashing and Financial Performance Perception: Market-Based Performance

The empirical literature on greenwashing suggests that market-based measures may capture investor reactions to disclosure credibility more directly than accounting-based measures. Therefore, this paper focuses on Tobin's Q as the main proxy for bank financial performance because it reflects forward-looking market valuation and investor expectations (Gentry & Shen, 2010; Miralles-Quirós *et al.,* 2018). In emerging-market settings, investors may respond to greenwashing by discounting firm value when environmental disclosures are not supported by underlying performance. Evidence from China, for example, shows greenwashing is negatively associated with market reactions when such practices become visible to the market (Du, 2015). Such a response is consistent with legitimacy-gap arguments, where symbolic environmental disclosure creates reputational and credibility risks (Walker & Wan, 2012; Du, 2015; Birindelli *et al.,* 2024). Hence, greenwashing is expected to reduce market-based financial performance.

2.2.2 Institutional Heterogeneity Across Asian Markets

A major limitation with the current literature in the field pertains to the conceptualization of Emerging Asia as a single entity. The present research argues that the effect of greenwashing and gender diversity on firm value will not be consistent throughout the region. In the case of North Asia, the outcome of ethical surveillance could be constrained by the prevalence of state-dominated governance. However, in ASEAN and South Asia where "institutional voids" prevail, the governance-monitoring role of the board becomes more important (Khanna & Palepu, 2010; Mair & Martí, 2005). Building on the distinction between developed and developing emerging markets, this study shows that the governance-signaling role of female directors will be particularly pronounced in the ASEAN and South Asian clusters. In these specific contexts, the lack of mature capital market institutions heightens information asymmetry, making the composition of the board a vital heuristic for market participants to judge the sincerity of environmental disclosures. In such markets, where transparency cannot be relied upon, the investor is forced to consider the composition of the board as a signifier of disclosure. Therefore, the role of women on boards may vary across institutional settings.

2.3 Hypothesis Development

2.3.1 Greenwashing and Financial Performance

There exists a "legitimacy gap" in which contemporary investors in Emerging Asia are better able to recognize the problem of greenwashing. In case there is a mismatch between green symbolism and actual brown investments by a financial institution, the firm experiences a decline in credibility (Walker & Wan, 2012; Delmas & Burbano, 2011). These inconsistencies point to high agency costs, implying that the managers could be more concerned about maintaining their legitimacy than managing risks associated with sustainability. As such, a negative valuation

association is inflicted on the firm in terms of its Tobin's Q being reduced. Furthermore, this study utilizes Tobin's Q to measure financial performance as it captures the market's forward-looking evaluation and investor confidence. Tobin's Q reflects how the market discounts the firm's value when a 'legitimacy gap' is perceived due to greenwashing (Gentry & Shen, 2010; Miralles-Quirós *et al.,* 2018). Hence, it can be argued:

H1: Greenwashing has a negative effect on bank financial performance, measured by Tobin's Q.

2.3.2 Moderating Effect of Board Gender Diversity

Board gender diversity is expected to moderate the relationship between greenwashing and market-based financial performance because gender-diverse boards may provide stronger governance signals and disclosure oversight. Prior studies suggest that female board representation can be associated with improved monitoring quality, lower information asymmetry, and stronger ESG disclosure credibility (Adams & Ferreira, 2009; Abad *et al.,* 2017; Lara *et al.,* 2017; Eliwa *et al.,* 2023). In the context of greenwashing, investors may interpret gender-diverse boards as a signal that environmental claims are more closely monitored and less likely to remain disconnected from underlying environmental performance (Birindelli *et al.,* 2024; Zahid *et al.,* 2023). For greenwashing context, the board gender diversity, therefore, may weaken the negative market response to disclosure-performance gaps because investors may interpret gender-diverse boards as a signal of stronger internal monitoring. Thus, the negative association between greenwashing and market-based financial performance is expected to be weaker when female board representation is higher. Consequently:

H2: Board gender diversity moderates the relationship between greenwashing and bank financial performance, such that the negative effect of greenwashing on Tobin's Q is weakened when female board representation is higher.

3. Methodology

3.1 Data and Sample Selection

For this investigation, a quantitative approach is used to assess the financial impacts of greenwashing practices as well as the impact of gender diversity on boards as a potential moderator variable in the Emerging Asian banking industry (Yu *et al.,* 2020; Birindelli *et al.,* 2024). The institutional context in which this research takes place is associated with fast-growing economies and high vulnerability to climate transition risks. Therefore, strong governance structures are needed to align environmental disclosure with stakeholder expectations (Yu *et al.,* 2020; Asian Development Bank, 2023). In order to avoid subjectivity and achieve objectivity of measurements related to environmental factors, multi-source data analysis was used. To mitigate information asymmetry and ensure objective measurement, we employed multi-source data (Dempere *et al.,* 2024; Galletta *et al.,* 2024). In particular, the scores for the Environmental Disclosure metric are taken from Bloomberg database (it includes over 800 data points) while for Environmental Performance, financial figures and board level indicators are collected from Refinitiv Eikon, following the bank level audited ledgers (Birindelli *et al.,* 2024; Yu *et al.,* 2020). Global macroeconomic indicators, such as GDP growth, were retrieved from the World Bank and the Asian Development Bank to account for varying national economic cycles and external shocks (Asian Development Bank, 2023; Nizam *et al.,* 2019).

The population at the outset of the study comprised 136 commercial banks that formed part of the MSCI Emerging Markets Asia Index, representing the economies of China, India, Indonesia, Malaysia, the Philippines, South Korea, Taiwan, Thailand, and Vietnam from 2015 to 2024 (MSCI, 2024; Yu *et al.,* 2020). A transparent sample-reduction procedure was employed to reduce potential selection bias (Al-Homaidi *et al.,* 2018; Birindelli *et al.,* 2024). The original panel dataset consisted of 1,360 firm-year data points. The removal of 435 observations is mainly due to the limited availability of ESG disclosure and environmental performance data in Emerging Asian banking markets. Since the Greenwashing Index requires both disclosure and performance information, observations with incomplete ESG data could not be used in the final estimation.

Table 1. Sample Selection Procedure

Criteria	Observations (Firm-Year)
Initial Sample (136 Banks × 10 Years)	**1,360**
Less:	
Observations with missing Greenwashing/ESG scores	435
Observations with missing Board Diversity/Governance data	8
Observations lost due to Lag requirements (Year 2015)	52
Observations with missing LDR and GDP data	114
Final Consistent Sample for Analysis	751

This data loss reflects the uneven development of ESG reporting in emerging markets rather than discretionary sample selection by the authors (Yu *et al.,* 2020; Birindelli *et al.,* 2024). In addition, 8 observations were removed due to missing board diversity or governance. A further 52 observations were excluded because of one-year lag requirement used in robustness and mechanism analyses (Li *et al.,* 2022; Pathan & Faff, 2012). While 114 observations were removed due to missing liquidity and GDP control variables (Nizam *et al.,* 2019; Al-Homaidi *et al.,* 2018).

3.2 Conceptual Framework

The hypothesized relationships, and the moderating role of the monitoring channel are drawn in Figure 1. The theory framework has been derived from Legitimacy theory and Upper Echelons theory in order to explain the association between the environmental signal and the firm's internal control (Suchman, 1995; Hambrick & Mason, 1984).

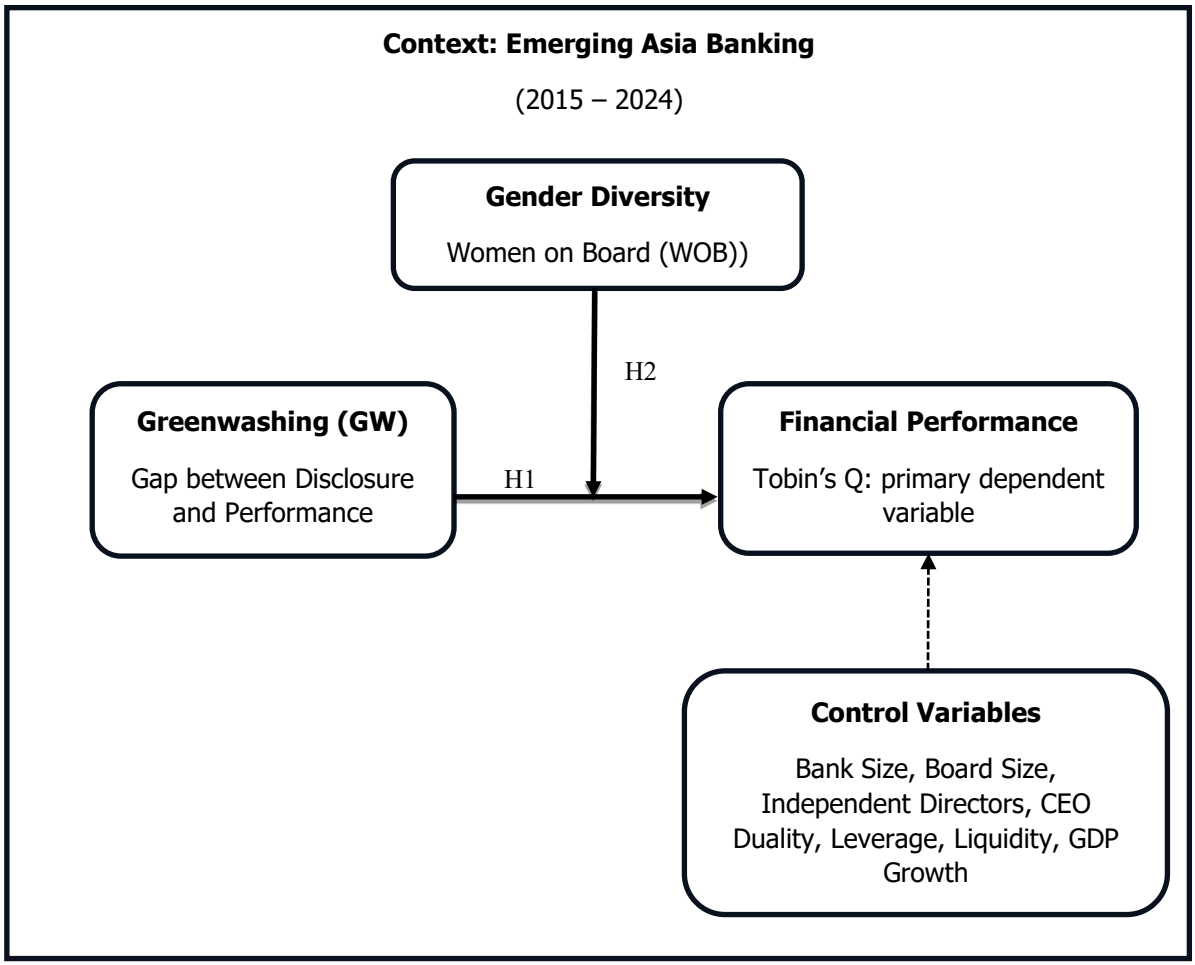

Figure 1. Conceptual Framework.

According to the Legitimacy theory, a certain management practice such as greenwashing will lead to a "legitimacy gap", resulting in large value discount (Walker & Wan, 2012; Berrone *et al.,* 2009). The Upper Echelons theory suggests that certain governance characteristics, namely gender diversity, impacts a firm's strategic decision-making regarding ethical practices and risk-taking behaviors (Hambrick & Mason, 1984; Adams & Ferreira, 2009). Empirical evidence demonstrate that female board members could support in strengthening the governance monitoring mechanisms and lowering information asymmetry (Eliwa *et al.,* 2023; Lara *et al.,* 2017). It is predicted that greenwashing leads to a decrease in the market valuation of the bank (H1), but the board gender diversity could moderate such relationship through the increase in credibility of disclosed information and better internal monitoring mechanisms (H2). In particular, female board representation may help in reducing the negative market response to greenwashing by signaling stronger governance oversight and also closer alignment between environmental disclosure and environmental performance (Birindelli *et al.,* 2024; Zahid *et al.,* 2023).

3.3 Variables and Methods of Measurement

Table 2 reflects a full description of each variable, operational definition and major data sources (Birindelli *et al.,* 2024; Yu *et al.,* 2020). In this study, we use Tobin's Q to represent bank financial performance. The reason for choosing Tobin's Q is that it not only reflects forward-looking valuation, but also captures market and investor confidence in this evaluation, making it suitable to investigate market's response to greenwashing and disclosure credibility in Emerging Asian banking markets (Gentry & Shen, 2010). Independent variable, GW (Greenwashing), is constructed as relative peer index by difference between environmental disclosure and environmental performance of the bank (Yu *et al.,* 2020; Walker & Wan, 2012). GW is measured annually as the gap between a bank's standardized Environmental Disclosure score and its standardized Environmental Performance score each year, higher the values the greater the disclosure-performance gap. The formula is:

$$GW_{it} = \left(\frac{Disc_{it} - \mu_{Disc,t}}{\sigma_{Disc,t}}\right) - \left(\frac{Perf_{it} - \mu_{Perf,t}}{\sigma_{Perf,t}}\right)$$

Where:

i = bank

t = year

Disc = Environmental Disclosure Score

Perf = Environmental Performance Score

μ and σ are the mean and standard deviation within the same year

The moderating variable, Women on Board (WOB), is measured as the percentage of female directors to evaluate their role as monitoring-oriented directors (Adams & Ferreira, 2009; Pathan & Faff, 2012). Finally, a set of controls is utilized to isolate the impact of greenwashing, including Bank Size (natural logarithm of total assets), Leverage, Liquidity, Board Size, CEO Duality, Independent Directors, and GDP Growth (Al-Homaidi *et al.,* 2018; Arayssi *et al.,* 2020).

3.4 Econometric Strategy

3.4.1. Baseline Estimation

A number of diagnostic tests have been conducted on the panel dataset to examine its econometric properties (Petersen, 2008; Wooldridge, 2010). Diagnostic tests indicate the presence of groupwise heteroskedasticity and first-order serial correlation. Therefore, the baseline model employs FGLS with heteroskedastic panels, while fixed-effects models with bank-clustered standard errors are also estimated as sensitivity checks to account for time-invariant bank heterogeneity and to provide inference robust to within-bank serial correlation. This specification is used because market valuation may respond relatively quickly to disclosure-related credibility concerns. To assess sensitivity to timing and simultaneity concerns, additional lagged specifications are examined in the robustness and sensitivity analyses.

Table 2. Variable Description

Variables	Description	Source
Panel A: Dependent Variables		
Tobin's Q	(Market Value of Equity + Liabilities) / Total Assets. This is the primary dependent variable capturing market-based financial performance.	Refinitiv Eikon
Panel B: Independent Variable		
Greenwashing	A peer-relative score calculated as the standardized Environmental Disclosure Score minus the standardized Environmental Performance Score. Standardization is performed within each year to allow annual peer-relative comparison and reduce pooled-sample bias. A higher value indicates a larger disclosure-performance gap. Formula: $GW_{it} = \left(\frac{Disc_{it} - \mu_{Disc,t}}{\sigma_{Disc,t}}\right) - \left(\frac{Perf_{it} - \mu_{Perf,t}}{\sigma_{Perf,t}}\right)$ *Where i and t denote bank and year, respectively. μ and σ represent the annual mean and standard deviation of the corresponding disclosure and performance scores.*	Bloomberg (Disclosure) & Refinitiv Eikon (Performance)
Panel C: Moderating Variables		
Women on Board	The percentage of female directors on the board.	Refinitiv Eikon
Alternative Measures:		
Critical Mass	Dummy = 1 if board has ≥3 female directors; 0 otherwise.	Refinitiv Eikon
Blau Index	A measure of gender diversity calculated as $1 - \Sigma P^2_i$, where P_i is the percentage of board members in each gender category.	Refinitiv Eikon
Panel D: Control Variables		
Bank Size	Natural logarithm of Total Assets.	Refinitiv Eikon
Leverage (Debt to Equity)	Total Debt / Total Equity	Refinitiv Eikon
Liquidity (Liquid Assets Ratio)	Liquid Assets / Total Assets	Refinitiv Eikon
Board Size	Total number of directors on the board.	Refinitiv Eikon
CEO Duality	A dummy variable that equals 1 if the CEO also serves as the Chairman of the board, and 0 otherwise.	Refinitiv Eikon
Independent Directors	The percentage of independent (non-executive) directors on the board.	Refinitiv Eikon
Macroeconomic Control		
GDP Growth	Annual percentage growth rate of Gross Domestic Product (GDP) in the bank's country of domicile.	World Bank and ADB (for Taiwan)

For testing direct and moderated effects, Model (1) and Model (2) were performed separately. The former tests the hypothesis on the direct effect of greenwashing on bank financial performance (H1), while the latter includes the interaction term to examine the governance monitoring channel effect (H2). The following models are estimated:

$$Performance_{i,t} = \alpha + \beta_1 GW_{i,t} + \beta_2 WOB_{i,t} + \gamma Controls_{i,t} + \delta_t + \eta_c + \epsilon_{i,t} \quad (1)$$

$$Performance_{i,t} = \alpha + \beta_1 GW_{i,t} + \beta_2 WOB_{i,t} + \beta_3 (GW_{i,t} \times WOB_{i,t}) + \gamma Controls_{i,t} + \delta_t + \eta_c + \epsilon_{i,t} \quad (2)$$

Where:

- $Performance_{i,t}$ Represents bank financial performance, measured by Tobin's Q, for bank *i* in year *t*.

- $GW_{i,t}$ is the Greenwashing score.
- $WOB_{i,t}$ is is Women on Board.
- $GW \times WOB$ is the interaction between greenwashing and women on board.
- $Controls_{i,t}$ is a vector of bank-specific and macroeconomic control variables.
- δ_t and η_c represent year and country fixed effects, respectively.
- $\in_{i,t}$ is the error term.

Model (1) tests the direct effect of greenwashing (H1), whereas Model (2) incorporates the interaction variable (GW×WOB) to examine the moderating effect of gender diversity (H2). Additional lagged specifications are examined in the robustness and sensitivity analyses to improve temporal ordering and reduce simultaneity concerns.

3.4.2 Robustness Strategy and Institutional Subsample Analysis

A multi-dimensional robustness check is applied in order to confirm the empirical validity and stability of the results of the primary analysis. In terms of the empirical strategy, FGLS method is used as it is most appropriate in the context of contemporary market responses to greenwashing in the highly volatile Emerging Asian banking industry. It enables accurate modelling due to the effective handling of residual dependency and heteroscedasticity issues, thus reflecting market discipline in fast-growing markets (Brahma *et al.,* 2021; Bell & Jones, 2015). Robustness is also confirmed by means of applying the Blau Index as a measure of gender evenness and the "Critical Mass" dummy that is defined as the number of at least three female directors (Konrad *et al.,* 2008; Joecks *et al.,* 2013). This methodology supports the existence of the governance-credibility mechanism and determines if the moderating role of diversity depends on the specified threshold or board balance. Moreover, Institutional Subsample Analysis is conducted to evaluate the validity of Institutional Theory through the distinction between North Asia developed economies and comparatively weaker institutional oversight environments of ASEAN (Khanna & Palepu, 2010; Mair & Martí, 2005). This distinction helps in evaluating if the informal institutional tools, such as boardroom diversity, play an equally important role when formal regulation fails.

3.4.3 Mechanism Analysis (Channel Effect)

Finally, a mechanism analysis is performed to demonstrate the presence of a "Monitoring Channel" by examining the effect of board structure on greenwashing (Eliwa *et al.,* 2023; Yu *et al.,* 2020). The mechanism analysis examines whether board characteristics are associated with lower greenwashing, thereby shifting the focus from market valuation to disclosure monitoring (Zahid *et al.,* 2023; Eliwa *et al.,* 2023). The research model of this channel effect is articulated as:

$$GW_{i,t} = \alpha + \gamma_1 WOB_{i,t-1} + \sum \gamma_k Controls_{i,t-1} + \delta_t + \eta_c + \in_{i,t} \quad (3)$$

The dependent variable used in the model is the Greenwashing Index to reflect the impact of board composition on the disclosure credibility (Eliwa *et al.,* 2023; Lara *et al.,* 2017). In addition, a negative and statistically significant value of γ1 suggests that board gender diversity is linked with decreased opportunistic disclosure behavior regarding the environmental aspect (Yu *et al.,* 2020; Zahid *et al.,* 2023). These estimations provide evidence consistent with the view that women on the board may act as governance monitors (Lara *et al.,* 2017; Zahid *et al.,* 2023). Using the suggested three-step approach, one can ensure that the research moves from performance outcomes to governance mechanisms (Birindelli *et al.,* 2024; Li *et al.,* 2022).

4. Findings and Discussions

The descriptive statistics for the 751 observations in the consistent sample are provided in Table 3, and they offer an extensive description of the finance and governance characteristics of the Emerging Asian banking industry from 2015 through 2024 (Al-Homaidi *et al.,* 2018; Miralles-Quirós *et al.,* 2018). Market performance, measured by Tobin's Q, serves as the primary dependent variable in this study, and it has a mean and a standard deviation of 0.111 and 0.124, respectively (Gentry & Shen, 2010; Miralles-Quirós *et al.,* 2018).

Table 3. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Market Performance (Tobin's Q)	751	0.111	0.124	0.013	0.768
Greenwashing	751	0.132	0.956	-1.990	2.431
Women on Board	751	16.397	11.565	0.000	50.000
Independent Directors (%)	751	45.960	17.622	7.143	90.000
Board Size	751	11.897	3.366	5.000	20.000
CEO Duality	751	0.116	0.320	0.000	1.000
Bank Size (Natural Log)	751	3.237	0.058	3.111	3.376
Leverage	751	1.337	1.060	0.019	4.523
Liquidity	751	0.925	0.051	0.753	0.983
Loans to Deposits Ratio	751	0.850	0.159	0.539	1.434
GDP Growth Rate	751	4.477	3.104	-6.050	9.690

Notes: This table presents the descriptive statistics for the finalized consistent sample of 751 firm-year observations. Table are winsorized at the 1st and 99th percentiles.
Abbreviations: Obs: Observations; Std. Dev.: Standard Deviation; GDP: Gross Domestic Product.

The use of market measures is at the heart of the current study because market valuation serves as the indicator of sensitivity to changes in confidence levels among investors, who are also the judges of the banks' commitment to environmental responsibility (Suchman, 1995; Du, 2015). This volatility in market valuation is characteristic of investors who operate in "Institutional Voids," where they are required to constantly change the valuation criteria on account of governance cues (Khanna & Palepu, 2010; Mair & Martí, 2005). Through its strict concentration on market performance, the paper identifies the effect of greenwashing through pricing, thus providing an anticipatory view of financial ramifications for changing markets (Gentry & Shen, 2010; Zhang, 2022).

On the other hand, the independent variable Greenwashing (GW) yields an average score of 0.132, and exhibits considerable variance ranging from -1.990 to 2.431 (Yu *et al.,* 2020; Birindelli *et al.,* 2024). It captures the difference between what a financial institution says about itself through environmental communications and what is true regarding its environmental performance (Yu *et al.,* 2020; Walker & Wan, 2012). The large variance reflects the existence of two opposing types of banks in the data—substantive banks whose operations match up with their rhetoric and banks with relatively higher disclosure-performance gaps maintaining carbon-intense portfolios (Yu *et al.,* 2020; Galletta *et al.,* 2024). In emerging Asia, where environmental regulation is still being developed, there remains information asymmetry due to banks' greenwashing practices (Kao *et al.,* 2018; Gunawan, 2016). As some financial institutions have high positive GW scores, they appear to display relatively higher environmental disclosure scores compared to underlying performance indicators; the literature suggests, however, that in contemporary societies, such communication strategy is costly because it leads to a valuation discount imposed on the bank (Suchman, 1995; Berrone *et al.,* 2009).

For governance structures, the mean Women on Board (WOB) was 16.40% for the period under study (Wasiuzzaman & Mohammad, 2019; Brahma *et al.,* 2021). Though there is evidence of an upward trajectory, this level remains below the three-women threshold often associated with achieving critical mass in corporate governance (Kramer *et al.,* 2006; Konrad *et al.,* 2008). Within the context of Institutional Theory and the rearticulated Upper Echelons Framework, female directors represent different risk oversight motivations (Khanna & Palepu, 2010; Abatecola & Cristofaro, 2018). By moving away from normative essentialism, it is maintained that female board directors face greater professional reputation risks in the highly monitored finance industry of Emerging Asia, thereby being more cognizant of the dangers associated with misleading environmental disclosures (Ryan & Haslam, 2005; Liu *et al.,* 2013). Moreover, the presence of independent directors (mean 45.96%), along with a low CEO duality ratio of 11.6%, suggests a concerted effort towards oversight within the banking firms (Cui *et al.,* 2018; McGuinness *et al.*, 2017). Nevertheless, in settings where formal laws are relatively lax, the market will place more value on these "informal" governance signals as a form of credibility assurance for doubtful foreign investors (Mustaruddin *et al.,* 2017; Su *et al.,* 2016).

Third, the control variables relating to the banks' condition and the macroeconomic performance provide evidence of the soundness of the sampled banks in terms of capitalization and liquidity, establishing a solid foundation for the further discussion (Al-Homaidi *et al.,* 2018; Didier *et al.,* 2021). On average, the bank size (in natural log) equals 3.237, whereas leverage stabilizes at 1.337, with the liquidity of 0.925, reflecting the relatively high stability of the banks (Al-Homaidi *et al.,* 2018; Nizam *et al.,* 2019). A moderate value of the LDR averaging 0.850 indicates the adoption of rather conservative lending policies by the sampled banks, which is essential in developing markets (Nizam *et al.,* 2019; Asian Development Bank, 2023). Regarding the macroeconomic performance, the average GDP growth of 4.477% reflects the strong growth dynamics of the region's economy, guaranteeing that the impact considered takes into account any financing shock and general economic cycles (Asian Development Bank, 2023; Didier et al., 2021). Thus, through the inclusion of the selected variables, it becomes clear that the negative impact of greenwashing on Tobin's Q does not relate to financial distress or economic volatility factors. Together, these descriptive findings form the basis for conducting econometric analysis on the process of governance-monitoring mechanism in relation to regaining market value in dynamic and changing institutional settings (Eliwa *et al.,* 2023; Birindelli *et al.,* 2024).

4.1 Correlation Analysis

The Pearson Correlation Matrix, shown in Table 4, represents the preliminary associations between the variables and functions as an important diagnostic test to detect any possible multicollinearity among the panel data (Salmerón *et al.,* 2018; Wooldridge, 2010). The correlation matrix is used as an initial diagnostic check for multicollinearity among the explanatory variables (Wooldridge, 2010; Petersen, 2008). The highest correlations are between board size and the percentage of independent directors (-0.414), as well as between board size and bank size (0.395) (Salmerón *et al.,* 2018; Al-Homaidi *et al.,* 2018). These numbers are far lower than the 0.70 benchmark set in financial studies to confirm that there is no bias in estimation and increased standard errors due to collinearity (Salmerón *et al.,* 2018; Adams *et al.,* 2019). In other words, this diagnostic test suggests that multicollinearity is unlikely to materially affect the estimations.

In line with the main research question, greenwashing is negatively correlated with market performance (Tobin's Q) at the significance level of 0.05 (-0.172) (Walker & Wan, 2012; Birindelli *et al.,* 2024). This preliminary evidence indicates that the negative correlation is consistent with the proposed legitimacy-gap argument (Suchman, 1995; Cho & Patten, 2006). In the context of the governance perspective, independent directors are negatively associated with greenwashing (-0.220, $p<0.05$), corroborating the theoretical postulate that formal control mechanisms are indispensable in addressing information asymmetry issues (Mustaruddin *et al.,* 2017; Cui *et al.,* 2018). Moreover, although the preliminary bivariate correlation between WOB and greenwashing is only -0.046, it is in agreement with the theoretical proposition that directors with a high reputation capital have greater motivation to monitor in order to avoid making misleading statements (Ryan & Haslam, 2005; Liu *et al.,* 2013). The inhibiting associations imply that internal oversight is an important prerequisite for ensuring market value protection in developing countries where external disclosure is generally limited (Su *et al.,* 2016; Pathan & Faff, 2012).

Table 5 represents the geographic distribution of samples by countries, providing a fundamental background for institutional diversity of the MSCI Emerging Markets Asia Index during 2015-2024 (MSCI, 2024; Yu *et al.,* 2020). The majority of financial institutions include Chinese (30.1%) and Indian banks (19.1%). The third place goes to Indonesia and Taiwan, each representing 11.8%. It is essential to mention that this structure is interesting from the analytical point of view since it includes different institutional environments starting from relatively well-developed regulations in North Asia to "Institutional Voids" of ASEAN countries in Southeast Asia such as Philippines, Malaysia, and Vietnam (Khanna & Palepu, 2010; Mair & Martí, 2005). In case where formal legislations are not fully established and enforced, informal means of corporate governance become a key factor that affects trust in the market (Khanna & Palepu, 2010; McGuinness *et al.,* 2017). In other words, diversity within the region makes it reasonable to perform Institutional Subsample Analysis due to the geographic nature of the effect of greenwashing that depends on the level of the institutionalization process (Kao *et al.,* 2018; Mustaruddin *et al.,* 2017).

Table 4. Pearson Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Market Performance (Tobin's Q)	1.000										
(2) Greenwashing	-0.172*	1.000									
(3) Women on Board	0.005	-0.046	1.000								
(4) Independent Directors (%)	0.236*	-0.220*	0.043	1.000							
(5) Board Size	-0.309*	0.230*	0.026	-0.414*	1.000						
(6) CEO Duality	-0.042	0.004	-0.056	0.314*	-0.064	1.000					
(7) Bank Size (Natural Log)	-0.297*	0.087*	-0.111*	-0.210*	0.395*	-0.066	1.000				
(8) Leverage	-0.346*	0.109*	-0.174*	-0.023	0.148*	0.103*	0.293*	1.000			
(9) Liquidity	-0.342*	0.116*	0.062	-0.268*	0.346*	-0.073*	0.341*	0.297*	1.000		
(10) Loans to Deposits Ratio	0.201*	-0.144*	0.025	0.411*	-0.222*	0.398*	-0.335*	0.047	-0.061	1.000	
(11) GDP Growth Rate	0.034	-0.016	-0.035	-0.069	0.010	-0.168*	0.077*	0.109*	0.040	-0.175*	1.000

Notes: * $p < 0.05$
Abbreviations: GDP: Gross Domestic Product; CEO: Chief Executive Officer.

Table 5. Sample Distribution by Country (Initial Population)

Country	Number of Banks	Percentage%
China	41	30.1
India	26	19.1
Indonesia	16	11.8
Korea; Republic (S. Korea)	8	5.9
Malaysia	11	8.1
Philippines	7	5.1
Taiwan	16	11.8
Thailand	10	7.4
Vietnam	1	0.7
Total	136	100.0

4.2 Regression Estimation Results

The primary results are estimated using Feasible Generalized Least Squares (FGLS) with heteroskedastic panels and are presented in Table 6 (Petersen, 2008; Salmerón *et al.,* 2018). Diagnosis tests suggest that the groupwise heteroskedasticity and first-order serial correlation is present. Thus, fixed effects models with bank clustered standard errors are also presented as sensitivity analysis to provide inference robust to within-bank serial correlation and heteroskedasticity (Li *et al.,* 2022; Pathan & Faff, 2012). Additional lagged specifications are used in the robustness and mechanism analyses to strengthen temporal ordering and reduce simultaneity concerns. Tobin's Q is used as the primary dependent variable because it captures forward-looking market valuation and may respond more quickly to disclosure-related credibility concerns (Gentry & Shen, 2010; Miralles-Quirós *et al.*, 2018). Therefore, the present research only considers market sanctions in the context of "institutional voids" of Emerging Asia where the significance of signaling is crucial (Khanna & Palepu, 2010; Mair & Martí, 2005).

Table 6. Regression Results

VARIABLES	Direct (1)	Moderation (2)
Greenwashing	-0.004***	-0.014***
	(0.002)	(0.003)
Women on Board	0.000	0.000
	(0.000)	(0.000)
Greenwashing x Women on Board		0.001***
		(0.000)
Independent Directors (%)	0.000***	0.001***
	(0.000)	(0.000)
Board Size	-0.002***	-0.001
	(0.000)	(0.001)
CEO Duality	-0.031***	-0.034***
	(0.005)	(0.006)
Bank Size (Natural Log)	-0.221***	-0.232***
	(0.027)	(0.031)
Leverage	-0.020***	-0.020***
	(0.001)	(0.001)
Liquidity	-0.362***	-0.342***
	(0.036)	(0.033)
Loans to Deposits Ratio	0.078***	0.071***
	(0.013)	(0.014)
GDP Growth Rate	0.004***	0.004***
	(0.001)	(0.001)
Constant	1.100***	1.104***
	(0.083)	(0.093)
Year FE	Yes	Yes
Country FE	Yes	Yes
Observations	751	751
Wald Chi2	1051	949.1

Notes: Coefficients are reported with standard errors in parentheses. Significance levels are indicated by asterisks: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. These results are estimated using Feasible Generalized Least Squares (FGLS) with heteroskedastic panels. Diagnostic tests indicate the presence of first-order serial correlation; therefore, additional fixed-effects models with bank-clustered standard errors are estimated as sensitivity checks. Tobin's Q is used as the market-based financial performance measure. Year and country fixed effects are included in all models.

4.2.1. Greenwashing Effect on Market Performance (Hypothesis 1)

The findings in Model 1 lend credibility to Hypothesis 1. There is a negative relationship between greenwashing and Tobin's Q. The coefficient value of –0.004 is significant at the 1 percent level. This shows that banks with larger disclosure-performance gaps tend to have lower market valuations after considering governance, banking, and macro variables. These results are in agreement with the premise that symbolic environmental disclosures impose costs on banks since it creates inconsistency between environmental claims and the activities of the firm (Walker & Wan, 2012; Du, 2015; Birindelli *et al.,* 2024). For Emerging Asian banks, this suggests that markets may discount environmental disclosures when they are not supported by underlying performance measures, consistent with legitimacy-gap and greenwashing arguments (Walker & Wan, 2012; Du, 2015; Birindelli *et al.,* 2024).

4.2.2 The Moderating Role of Gender Diversity: The Governance-Signaling Effect (Hypothesis 2)

The findings of the interaction analysis are consistent with the role of board composition in negotiating the governance-markets relationship. Our interaction analysis (Model 2) supports that the interaction effect of Greenwashing x Women on Board has a significantly positive coefficient ($\beta=0.001$, $p<0.01$) in relation to Tobin's Q (Brahma *et al.,* 2021; Birindelli *et al.,* 2018). The baseline FGLS result provides support for Hypothesis 2, although the FE-clustered sensitivity analysis suggests that the moderation effect should be interpreted cautiously (Birindelli *et al.,* 2024; Zahid *et al.,* 2023). These results indicate that gender diversity is used as a signaling strategy rather than just an instrument for symbolic compliance. In the context of Emerging Asian markets, where the disclosure of the verification of information is uneven, board gender diversity could suggest superior internal monitoring and lower perceived information risk (Abad *et al.,* 2017; McGuinness *et al.,* 2017; Eliwa *et al.,* 2023).

The mitigation effect sheds more light on the governance-monitoring mechanism proposed by our theoretical model. Instead of the normative essentialism model, we posit that female directors bring about increased awareness of the importance of professional reputation capital (Ryan & Haslam, 2005; Zahid *et al.,* 2023). In addition, female directors in Asia-based financial firms may face stronger incentives for monitoring because of heightened reputational scrutiny (Liu *et al.,* 2013). This is done through aligning the organizational rhetoric with the reality of operations, thus acting as an alternative governance mechanism (Khanna & Palepu, 2010; Eliwa *et al.,* 2023).

Overall, the positive interaction term suggests that investors may interpret board gender diversity as a governance signal associated with lower perceived agency risk and stronger disclosure credibility (Abad *et al.,* 2017; McGuinness *et al.,* 2017; Eliwa *et al.,* 2023). In institutional environments characterized by weaker external oversight, board gender diversity may therefore be associated with more favorable market valuation outcomes when firms face greenwashing concerns (Khanna & Palepu, 2010; Su *et al.,* 2016; Zahid *et al.,* 2023). Importantly, this interpretation is limited to the market-based financial performance measure used in this study, namely Tobin's Q. Therefore, the findings should be read as evidence of market valuation responses rather than as evidence of accounting-profitability effects.

4.2.3 Control Variables and Governance Robustness

Control variables in all the models are quite aligned with the existing body of literature on banking governance (Al-Homaidi *et al.,* 2018; Arayssi *et al.,* 2020). The presence of a positive and statistically significant coefficient for Independent Directors ($p<0.01$) further reiterates the significance of additionality through formal governance mechanism in valuing banks (Cui *et al.,* 2018; McGuinness *et al.,* 2017). CEO Duality and larger Boards appear to be detrimental for market performance in that excessive power and failure to coordinate due to size impede the effectiveness of ethical monitoring (Trinh *et al.,* 2020; Arayssi *et al.,* 2020). Bank-level factors Bank Size and Leverage demonstrate a consistently negative impact, possibly indicating diseconomies of scale and costs arising from financial distress, respectively (Al-Homaidi *et al.,* 2018; Didier *et al.,* 2021). On a macro level, both GDP growth rate and LDR appear to be positively related to Tobin's Q, showing that an economic backdrop and efficient lending activity are crucial for bank valuation in transition economies (Al-Homaidi *et al.,* 2018; Didier *et al.,* 2021). Overall, these findings suggest that the disclosure-credibility interpretation remains observable beyond general economic dynamics (Birindelli *et al.,* 2024; Li *et al.,* 2022).

4.2.4 Economic Magnitude and Threshold Effects

In order to determine whether there is economic materiality in the interplay between greenwashing practices and the composition of boardrooms, we calculate the marginal effects of greenwashing on market value (Tobin's Q) for different values of female directors (Joecks *et al.,* 2013; Brahma *et al.,* 2021). The information summarized in Table 7 and the slope depicted in Figure 2 show that the negative valuation association for engaging in greenwashing is extremely sensitive to the gender balance of the board (Birindelli *et al.,* 2024; Joecks *et al.,* 2013).

Table 7. Marginal Effects of Greenwashing on Tobin's Q

Board Gender Diversity	Marginal Effect (dy/dx)	Std. Err.	z	P>|z|	[95%Conf. Interval]	
0% Women	-0.014	0.003	-4.280	0.000	-0.020	-0.007
10% Women	-0.008	0.002	-4.010	0.000	-0.012	-0.004
20% Women	-0.002	0.002	-1.370	0.172	-0.006	0.001
30% Women	0.003	0.003	1.250	0.212	-0.002	0.008
40% Women	0.009	0.004	2.220	0.026	0.001	0.017
50% Women	0.015	0.006	2.640	0.008	0.004	0.025

Notes: This table reports the marginal effects (dy/dx) of Greenwashing on Tobin's Q based on the FGLS estimation in Table 6, Column 2. Standard errors are calculated using the delta-method. Confidence intervals are reported at the 95% level.

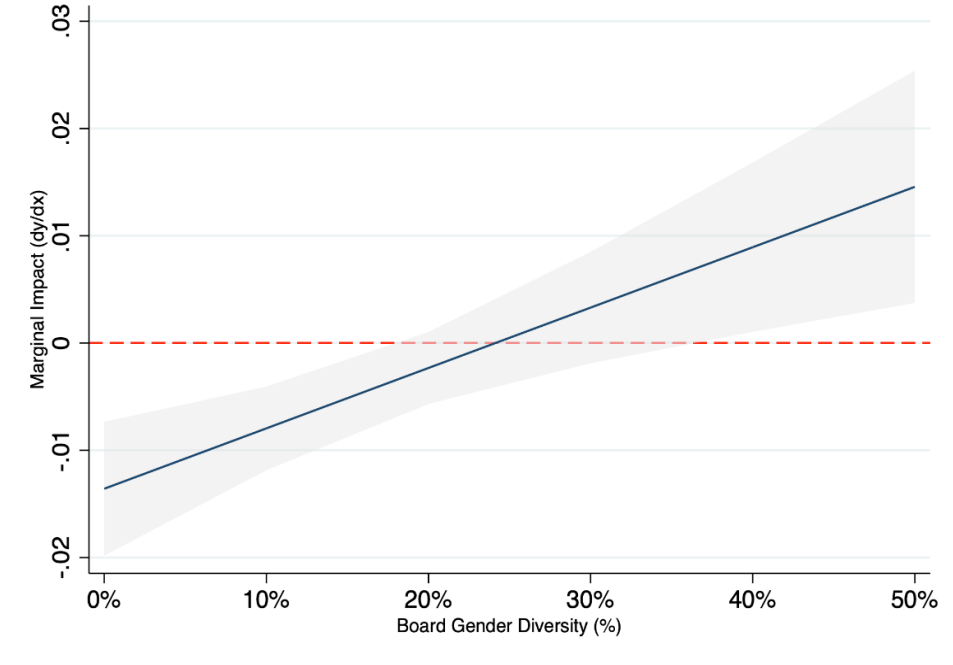

Figure 2. Marginal Effect of Greenwashing on Tobin's Q.

Figure 2 graphically illustrates the marginal effects reported in Table 7, clearly showing the point where gender diversity weakens the negative impact of greenwashing.

The negative valuation association for greenwashing is most acute in banks with low female representation, as evidenced by the significant negative association between the greenwashing index and Tobin's Q in these settings. The marginal effects are −0.014 at 0% representation and −0.008 at 10% representation, both statistically significant at the 1% level. This suggests that when boards are largely homogeneous, investors may interpret greenwashing as a stronger signal of weak disclosure oversight (Joecks *et al.,* 2013; McGuinness *et al.,* 2017; Zahid *et al.,* 2023).

Within the 20–30% range, the marginal effect becomes statistically indistinguishable from zero because the 95% confidence interval includes zero. This result generally conforms to the assumptions of Critical Mass Theory stating that a certain number of women on the board needs to be reached for their effect to become apparent (Kramer *et al.,* 2006; Konrad *et al.,* 2008; Joecks *et al.,* 2013). However, at higher values of board gender diversity, especially from about 40% to 50%, the coefficient is positive and statistically significant. Such an outcome denotes a more favorable valuation reaction associated with the greater level of board gender diversity, implying that the existence of gender-balanced boards could help disclosure credibility and investor confidence when environmental claims are subject to scrutiny (Birindelli *et al.,* 2018; Arayssi *et al.,* 2020; Eliwa *et al.,* 2023; Zahid *et al.,* 2023). From being a negative valuation association to a favorable valuation reaction, such an outcome conforms to the claim that

gender-balanced boards could help signal internal corporate governance in transitional economies (Su *et al.,* 2016; McGuinness *et al.,* 2017).

4.3 Additional Analysis: Institutional Heterogeneity across Emerging Asian Markets

Table 8 presents results from the institutional subsample analysis of ASEAN and South Asian markets. The purpose of using this subsample is to examine whether the greenwashing-valuation association differs in markets where external monitoring mechanisms and ESG disclosure are comparatively less developed. In this moderated specification, the coefficient on greenwashing appears to be more negative in the subsample than in the full-sample model. This suggests that disclosure-performance gaps may be viewed more negatively by investors under weaker institutional conditions (Khanna & Palepu, 2010; Mair & Martí, 2005; Su *et al.,* 2016).

Table 8. Institutional Subsample Analysis

VARIABLES	(1)	(2)
Greenwashing	-0.003	-0.033***
	(0.003)	(0.007)
Women on Board	-0.001***	-0.001***
	(0.000)	(0.000)
Greenwashing x Women on Board		0.001***
		(0.000)
Independent Directors (%)	0.001***	0.002***
	(0.000)	(0.000)
Board Size	-0.006***	-0.007***
	(0.001)	(0.001)
CEO Duality	0.024**	0.013
	(0.011)	(0.013)
Bank Size (Natural Log)	0.365***	0.434***
	(0.080)	(0.089)
Leverage	-0.051***	-0.051***
	(0.005)	(0.006)
Liquidity	-0.273***	-0.316***
	(0.059)	(0.064)
Loans to Deposits Ratio	0.269***	0.272***
	(0.029)	(0.032)
GDP Growth Rate	0.011***	0.008***
	(0.002)	(0.002)
Constant	-1.017***	-1.189***
	(0.256)	(0.291)
Year Fixed Effects	Yes	Yes
Country Fixed Effects	Yes	Yes
Sample	ASEAN & S.Asia	ASEAN & S.Asia
Observations	382	382
Wald Chi2	401.2	341.5

Notes: This table displays the institution subsample results for the ASEAN and South Asian markets (Indonesia, Malaysia, Philippines, Thailand, Vietnam, and India). These countries exclude North Asian markets (China, South Korea, and Taiwan), allowing to test whether the greenwashing-valuation relation holds under a relatively less developed ESG disclosure and monitoring systems. The regression is estimated through FGLS with heteroskedastic panels, standard errors are reported in parentheses.
Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1

The relationship between greenwashing and female board representation remains statistically significant within the subsample regressions as well, however, this result should be interpreted as associative evidence rather than causal proof. This implies that women on boards may offer a stronger governance-signaling role in institutions where external verification mechanisms are limited (McGuinness *et al.* 2017; Zahid *et al.* 2023). In this respect, the subsample analysis reinforces the idea that Emerging Asia should not be treated as one homogeneous institutional category. The effect of internal governance appears to depend on the maturity of formal verification and disclosure systems. This interpretation is also consistent with Upper Echelons Theory by emphasizing monitoring incentives, because female directors have greater reputational incentives to monitor the quality of disclosure in informationally asymmetric contexts (Ryan & Haslam, 2005; Liu *et al.,* 2013). In this context, the role of the monitoring channel becomes particularly relevant, because the internal governance can support disclosure credibility when external oversight is limited (Birindelli *et al.,* 2024; Mair & Martí, 2005).

4.4 Robustness and Sensitivity Analysis

4.4.1 Alternative Gender Diversity Measures

First, the empirical results shown in Table 9 provide additional evidence on the sensitivity of the findings to alternative measures of board gender diversity after showing the lagged structure (t-1) designed to strengthen temporal ordering and address simultaneity issues. As seen in the Model 1 and 2, the coefficients on Lagged Greenwashing are negative and significant ($\beta = -0.018$, $p < 0.01$ in Model 2). Overall, the pattern is in line with the institutional- void perspective of Emerging Asian markets, in which external monitoring mechanisms are less effective, enhancing the reliance on disclosure credibility and governance signals (Khanna & Palepu, 2010). Additionally, the results are consistent with prior studies suggesting that markets may penalize firms engaging in environmental decoupling because such practices weaken corporate legitimacy and investor confidence (Walker & Wan, 2012; Du, 2015).

Table 9. Alternative Gender Diversity Measures

VARIABLES	(1) Crit. Mass	(2) Blau Index
Lagged Greenwashing (t-1)	-0.007*** (0.002)	-0.018*** (0.003)
Lagged Gender Diversity Variable (t-1)	0.006* (0.003)	0.006 (0.012)
Greenwashing x Gender Interaction (t-1)	0.000 (0.003)	0.045*** (0.011)
Lagged Independent Directors (t-1)	0.000*** (0.000)	0.000*** (0.000)
Lagged Board Size (t-1)	-0.002*** (0.000)	-0.001*** (0.000)
Lagged CEO Duality (t-1)	-0.029*** (0.005)	-0.028*** (0.005)
Lagged Bank Size (t-1)	-0.289*** (0.028)	-0.287*** (0.029)
Lagged DER (t-1)	-0.019*** (0.001)	-0.018*** (0.001)
Lagged LAR (t-1)	-0.309*** (0.036)	-0.339*** (0.037)
Lagged LDR (t-1)	0.072*** (0.012)	0.064*** (0.012)
Lagged GDP (t-1)	0.003*** (0.001)	0.003*** (0.001)
Constant	1.275*** (0.088)	1.297*** (0.090)

Year Fixed Effects	Yes	Yes
Country Fixed Effects	Yes	Yes
Observations	751	751
Wald Chi2	1399	994.1

Notes: This table provides robustness tests by alternative measurements of board gender diversity (Critical Mass dummy, Blau Index). The independent and control variables are one-year lagged (t-1) so that to enhance the temporal order and reduce simultaneity concerns. The models are estimated by Feasible Generalized Least Squares (FGLS) with heteroskedastic panels. Standard errors are reported in parentheses.
Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1

An important theoretical implication gave insight of the difference between the two specifications. For Model 1, it can be seen that the Critical Mass and Greenwashing interaction is not significant. This suggesting that simply fulfilling the numerical threshold that there are three or more women directors on the board may not necessarily mean that board monitoring is enhanced in cases where there is greenwashing. This finding implies that numerical representation alone may not always translate into substantive governance influence when disclosure credibility becomes a concern.

In contrast, for Model 2, there is a positive significant Greenwashing X Blau Index interaction (= 0.045, p < 0.01). The positive Blau Index interaction from the Upper Echelons Theory predicts that diverse gender composition could enable a broader range of perspective and analytical skills on the board (Hambrick & Mason, 1984; Abatecola & Cristofaro, 2018). Under Signaling Theory perspective (Su *et al.,* 2016), a higher Blau Index could also represent true governance quality not just symbolic governance quality, thereby helping reduce information asymmetry and strengthen disclosure discipline (Abad *et al.,* 2017; Mustaruddin *et al.,* 2017). Also, an increased disclosure discipline could mitigate the negative impact of a legitimacy gap on firm value.

This is basically consistent with Joecks *et al.* (2013) and Brahma *et al.* (2021) arguments that the governance effects of board gender diversity occur when there is 'real' heterogeneity than not simply tokenism. Overall, the robustness analysis suggests that balanced board structure may contribute to stronger disclosure credibility and more favorable market valuation outcomes, especially when environmental claims are subject to investor scrutiny. The results, however, should be interpreted cautiously and as associative rather than causal (Lara *et al.,* 2017; Birindelli *et al.,* 2018; Zahid *et al.,* 2023; Birindelli *et al.,* 2024).

4.4.2 Fixed Effects Models with Bank-Clustered Standard Errors

For further sensitivity analysis, this paper also provides the results of fixed effects models, with clustering at the bank level for standard errors, to account for any issues arising from heterogeneous banks and serial correlation of observations within each bank. The specification of fixed effects takes into account the time-invariant differences among banks that might affect the banks' disclosure and valuation practices an indispensable consideration since, in "institutional voids," bank governance acts as a substitute for the lack of regulatory supervision (Khanna & Palepu, 2010). Although clustering at the firm level allows for robust inference against heteroskedasticity and autocorrelation, the FE-clustered estimates are weaker than the baseline FGLS estimates (Table 10).

In particular, Greenwashing still exhibits negative signs in both the direct and moderation models. This implies that gaps in disclosure-performance still tend to be related to low valuation of firms, an outcome that is explained by legitimacy theory (Suchman, 1995; Walker & Wan, 2012; Berrone *et al.,* 2009). Notably, such coefficients now fall short of attaining any meaningful level of statistical significance in the FE-clustered models. Likewise, the interaction effect of Greenwashing and Women on Board loses its statistical significance. In terms of signaling theory (Su *et al.,* 2016), though gender diversity may be considered a reliable indicator of high-quality monitoring, such a variable may lose statistical significance because of the very nature of board-related variables.

The finding indicates that although the effect of greenwashing and market value has consistency in their directional association, it will be unstable once we use only the within-bank variations to analyze the effect.

Table 10. FE - Cluster Sensitivity Analysis

VARIABLES	(1) FE-Cluster Direct	(2) FE-Cluster Moderation
Greenwashing	-0.002 (0.002)	-0.006 (0.004)
Women on Board	-0.000 (0.000)	-0.000 (0.000)
Greenwashing × Women on Board		0.000 (0.000)
Independent Directors (%)	-0.000 (0.000)	-0.000 (0.000)
Board Size	-0.002* (0.001)	-0.002* (0.001)
CEO Duality	-0.012 (0.017)	-0.013 (0.017)
Bank Size (Natural Log)	-0.428 (0.796)	-0.460 (0.813)
Leverage	-0.012* (0.007)	-0.012* (0.007)
Liquidity	0.065 (0.156)	0.064 (0.156)
Loans to Deposits Ratio	0.021 (0.051)	0.019 (0.050)
GDP Growth Rate	0.001 (0.001)	0.001 (0.001)
Constant	1.459 (2.567)	1.564 (2.621)
R-squared	0.133	0.136
Bank FE	Yes	Yes
Year FE	Yes	Yes
Clustered SE	Bank level	Bank level
Country FE	Absorbed by Bank FE	Absorbed by Bank FE
Obs	751	751
R-squared within	0.133	0.136

Notes: This table reports fixed-effects estimations with standard errors clustered at the bank level. The specification controls for time-invariant bank heterogeneity while providing inference robust to within-bank serial correlation and heteroskedasticity. Year fixed effects are included in all models. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

This is not unusual for any corporate governance panel data study since the traits of boards of directors, especially gender, tend to be "sticky," resulting in low levels of within-bank variations from year to year (Adams & Ferreira, 2009; Joecks *et al.,* 2013). Indeed, upper echelon theory states that the cognitive diversity of the board impacts strategies, but this is why the FE approach provides a conservative estimate relative to models using cross-sectional differences. However, the loss of statistical significance in the FE-clustered coefficients emphasizes the importance of interpreting the findings as associative rather than causal. On the other hand, the negative value of the greenwashing parameter reveals the unfavorable perception of stakeholders due to their worries related to information asymmetries (Abad *et al.,* 2017; Mustaruddin *et al.,* 2017). Nevertheless, the directional consistency of the greenwashing coefficient supports the use of Tobin's Q as a market-based measure of investor confidence, while also showing that statistical significance depends on the estimation approach.

4.5 Mechanism Analysis – Channel Effect

The results for mechanism analyses is presented in Table 11 with Greenwashing Index being the dependent variable. This model test whether board structure has an association with reducing disclosure-performance gap. It found that lagged Women on Board with negative coefficient provides support to the view that a higher proportion

of women on boards may also affect monitoring by directors, rather than only influence investors' perceptions after greenwashing occurs (Lara *et al.* 2017; Yu *et al.* 2020; Eliwa *et al.* 2023; Zahid *et al.* 2023). To enhance the temporal ordering, the selected governance and control variables are presented with a one-year lag ($t-1$) (Li *et al.,* 2022; Pathan & Faff, 2012). By shifting the focus from market valuation to the Greenwashing Index itself, the analysis provides evidence consistent with a monitoring channel, in which board characteristics help reduce disclosure-performance gaps before they are reflected in market valuation (Adams & Ferreira, 2009; McGuinness *et al.,* 2017; Birindelli *et al.,* 2024).

Table 11. Channel Effect Analysis

VARIABLES	(1) Channel
Lagged Women on Board (t-1)	-0.009*** (0.002)
Lagged Independent Directors (%)	-0.006*** (0.001)
Lagged Board Size	0.058*** (0.007)
Lagged CEO Duality	0.149** (0.074)
Lagged Bank Size (Natural Log)	-1.975*** (0.434)
Lagged DER (Debt-to-Equity)	0.105*** (0.022)
Lagged Loans to Deposits Ratio	-0.717*** (0.147)
Lagged GDP Growth Rate	-0.008 (0.010)
Constant	6.791*** (1.386)
Year Fixed Effects	Yes
Country Fixed Effects	Yes
Observations	751
Wald Chi2	216.5

Notes: This table presents the mechanism analysis (channel effect), where the Greenwashing Index is the dependent variable. The model is estimated using Feasible Generalized Least Squares (FGLS) to account for panel heteroscedasticity. The selected governance and control variables are lagged by one year (t−1) to improve temporal ordering and reduce simultaneity concerns. Standard errors are reported in parentheses below the coefficients. Consistent with the primary analysis, this model utilizes the finalized sample of 751 firm-year observations.

Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1

4.5.1 Governance Channels: Reputational Capital and Monitoring Incentives

It is evident from the analysis of governance channels that the composition of the board is an important determinant of the credibility of a bank's environmental signals (Cho & Patten, 2006; Walker & Wan, 2012). As indicated in Table 11, the lagged Women on Board variable has a negative and statistically significant coefficient (β=−0.009, p<0.01), thus providing evidence consistent with the proposed monitoring channel (Yu *et al.,* 2020). Shifting our focus from the conventional Upper Echelons approach, this suggests that such a phenomenon occurs owing to reputation-based incentives, not moral superiority norms (Ryan & Haslam, 2005; Liu *et al.,* 2013). Specifically, female directors in Emerging Asia are exposed to greater professional scrutiny (Ryan & Haslam, 2005; Zahid *et al.,* 2023).

In this context, these directors may serve as governance monitors by strengthening the rigor of monitoring to guard against environmental claims that are not supported by underlying performance, thus safeguarding the market valuation of the bank over time (Eliwa *et al.,* 2023; Lara *et al.,* 2017). By ensuring that disclosures are anchored in operational reality, they provide a governance buffer that is essential for maintaining investor confidence in volatile markets (Miralles-Quirós *et al.,* 2018; Gentry & Shen, 2010). Moreover, other control processes like Independent Directors show a statistically significant negative association with greenwashing activities (β=−0.006, p<0.01) (Cui *et al.,* 2018; McGuinness *et al.,* 2017). This is consistent with Agency Theory suggesting that independent oversight may reduce information asymmetries and the ability of managers to seek symbolic, rather than material environmental change (Hillman & Dalziel, 2003; Yu *et al.,* 2020). With regard to the governance buffer of Emerging Asia, where external regulation is still in its infancy, such internal controls act as the first line of defense for the bank's market legitimacy (Khanna & Palepu, 2010).

On the other hand, the size of the Board (0.058, p<0.01) and CEO Duality (0.149, p<0.05) are positively related to the occurrence of greenwashing (Trinh *et al.,* 2020; Arayssi *et al.,* 2020). In other words, the presence of overly large boards causes coordination inefficiencies and the "free rider" problem, while excessive concentration of authority in the hands of CEOs contributes to the establishment of an environment where deceptive behavior becomes more difficult to detect (Trinh *et al.,* 2020; Galletta *et al.,* 2024). Overall, it may be said that the findings highlight the governance relevance of board composition in disclosure-intensive industries (Su *et al.,* 2016; Birindelli *et al.,* 2024). The overall, the analysis of mechanism has provided support for a disclosure monitoring. It is evident that lagged Women on Board is negatively correlated with Greenwashing Index, implying that women on the board may help to reduce the disclosure-performance gap. This supports the argument that governance credibility is built through monitoring incentives and reputational accountability rather than symbolic board representation alone.

5. Conclusion

This study explores the impact of greenwashing on market valuation for Emerging Asian banks, and whether the relation between greenwashing and market valuation is affected by the gender diversity of the board of directors. The empirical results show that larger disclosure-performance gap leads to lower market valuations, using Tobin's Q as proxy. The findings indicate that investors may discount environmental disclosure when it is not supported by underlying environmental performance. In addition, empirical evidence shows board gender diversity may play a moderating role in the relation between greenwashing and market valuation. The negative association weakens as female board representation increases and becomes statistically indistinguishable from zero around the 20-30% range. When board gender diversity is higher than certain proportion, marginal valuation response turns out to be positive (FGLS main specification). Moreover, the results of the mechanism analysis reveal a negative association between female board representation and the Greenwashing Index. These results require careful interpretation. The research relies on observational data from a panel and secondary environmental, social and governance data and, hence, is associative rather than causal. Nevertheless, the evidence suggests that board composition may be an important factor for disclosure credibility in these markets.

5.1 Theoretical and Practical Implications

The results of this paper have important implications both for theory and policy in the domain of corporate governance and finance in Emerging Asia. On the theoretical level, this research contributes to Institutional Theory by providing evidence that board-level processes can serve as a substitute mechanism of corporate governance in an institutional setting lacking robust formalized control mechanisms. Where effective regulation fails to address the issue, gender diversity on the board acts as a substitute mechanism facilitating better information exchange between the bank and its stakeholders (Khanna & Palepu, 2010; Mair & Martí, 2005). Through revisiting Upper Echelons Theory, this study redirects the attention of scholars from the issue of normative essentialism towards the reputational concerns of directors (Hambrick & Mason, 1984; Ryan & Haslam, 2005; Liu *et al.,* 2013). In a practical sense, the results indicate that board structure can impact the way investors evaluate the credibility of information disclosures in situations where information asymmetry is high. In particular, stronger female representation on boards may enhance governance signaling and disclosure oversight in sustainability-related reporting.

5.2 Study Limitations

Nevertheless, despite its strong methodological approach, a number of limitations need to be noted in order to better understand the implications of the results. The first limitation arises from the use of an unbalanced panel framework that poses some challenges due to the specifics of the research on emerging economies where there can be inconsistencies in the availability of data on the environment and governance under different regulatory frameworks. Even though the researchers apply a finalized consistent sample of 751 observations, the levels of transparency differ drastically between developed countries and emerging clusters. Therefore, this suggests that even though the core results are valid for the given region, it might require some consideration for application elsewhere, depending on the level of institutional maturity in particular emerging economies. Finally, the greenwashing index is based on ratings by third parties who employ different variables which do not fully reflect the nuances of greenwashing within banks.

The third limitation pertains to the present status of gender diversity within the region. While it is clear that progress is being made, the mean percentage representation of women in the sample remains at 16.40% and is far below the neutralization level identified. Many of the banks in Emerging Asia consider gender diversity as a mere token gesture rather than as a serious governance issue. As such, more favorable valuation outcomes associated with higher levels of board diversity should still be interpreted as an emerging trend within the region. Further studies should look into the contributions of female directors in specialized board committees to distinguish between the symbolic and actual influences of gender diversity on corporate governance. Moreover, it is interesting to examine the relationship between climate rules and board oversight as regional structures evolve. Additionally, because the study is observational and based on secondary ESG measures, the findings should be interpreted as associative rather than definitively causal.

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Author Contribution Statement

Marcelly: Conceptualization, Methodology, Data Curation, Formal Analysis, Writing – Original Draft. Rafaella Stephanie Leonard: Investigation, Methodology, Formal Analysis, Writing – Original Draft. Triasesiarta Nur: Supervision, Validation, Writing – Review & Editing, Project Administration. All the authors have read and agreed to the published version of the manuscript.

Generative AI Declaration

The authors acknowledge the use of Grammarly and ChatGPT during the preparation of this manuscript. These tools were used only for language refinement, proofreading, stylistic improvement, and limited technical assistance in checking Stata syntax and commands. All AI-assisted outputs were reviewed, edited, and verified by the authors. The authors take full responsibility for the research design, data analysis, methodological decisions, interpretation of findings, and final conclusions. No generative AI tool was used to create original data, independently conduct statistical analysis, or formulate the theoretical framework.

Does this article screen for similarity?

Yes

Data Availability Statement

The data supporting the findings of this study are not publicly available, as access requires licensed subscriptions. Environmental Disclosure scores were obtained from Bloomberg (licensed database). Environmental Performance scores, board governance indicators, and bank-level financial data were sourced from Refinitiv Eikon (licensed database). Macroeconomic indicators (GDP growth) were retrieved from the World Bank Open Data (https://data.worldbank.org) and the Asian Development Bank (ADB) for Taiwan-specific data (https://data.adb.org).

Conflict of Interest

The authors have no conflicts of interest to declare. There is also no financial interest to report. The author certifies that the submission is original work and is not under review at any other publication.

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Marcelly, Rafaella Stephanie Leonard, Triasesiarta Nur, Greenwashing, Female Directors, and Financial Performance in Emerging Asian Banks, Asian Journal of Interdisciplinary Research, 9(2), (2026) 356-381. https://doi.org/10.54392/ajir26220