

## Can Board Gender Diversity Strengthen ESG's Role in Preventing Financial Fraud in ASEAN-5?

Fairuz<sup>1</sup>, Rofikoh Rokhim<sup>2</sup>

Universitas Indonesia, Indonesia<sup>1,2</sup>

Email: fairuz31@ui.ac.id<sup>1</sup>, rofikoh.rokhim@ui.ac.id<sup>2</sup>

### ABSTRACT

*This study focuses on analyzing the effect of Environmental, Social, and Governance (ESG) performance on financial fraud indication probability in publicly listed companies in ASEAN-5 Countries, with board gender diversity as a moderating variable. This research utilizes panel data from ASEAN-5 non-financial listed companies during the period of 2019-2023, and applies logistic regression methods to test the hypotheses, using The Beneish M-Score to assess the level of financial statement fraud. Our results shows that higher ESG score can reduce the probability of financial fraud significantly, while the female board prove to strengthen the negative impact between ESG performance and Financial Fraud, also intensify the performance of E and G in inhibiting the probability of financial fraud indication. Furthermore, this paper provides new insights into how ESG performance can contribute to reducing financial fraud, with the moderation of board gender diversity. Also, by developing and enforcing the regulation regarding corporate governance and information disclosure, regulators and policy makers can mitigate the risk of financial fraud in ASEAN-5 country.*

### KEYWORDS

ESG, Financial Fraud, Gender Diversity, Beneish M-Score



*This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International*

## INTRODUCTION

Financial fraud remains a persistent and significant challenge to the stability of financial markets globally, with Southeast Asia being no exception. The Association of Certified Fraud Examiners (ACFE, 2019). estimates global financial fraud losses to exceed US\$3.6 billion annually, averaging 5% of company revenues. This form of fraud, often characterized by deliberate misrepresentation of financial data, is employed to mislead stakeholders for managerial preservation or corporate survival. Methods of manipulation include inflating revenues, concealing expenses, and deviating from accounting standards (Carmichael, 2018). The prevalence of information asymmetry, where management holds more financial knowledge than stakeholders, exacerbates this issue, leading to suboptimal investment decisions and inefficient resource allocation (Su et al., 2024). To mitigate these risks, enhancing corporate transparency and governance through robust *Environmental, Social, and Governance* (ESG) performance has been identified as a vital strategy (He et al., 2022).

The heightened focus on corporate transparency and ethical practices aligns with growing concerns over financial fraud, particularly regarding ESG performance. The Global Sustainable Investment Alliance (GSIA, 2021) reported that assets under management incorporating ESG factors reached US\$35.3 billion, reflecting increasing investor attention to ESG issues. Moreover, strong ESG performance has been found to deter corporate fraud effectively (Li et al., 2024), highlighting its role in fostering sustainable practices and enhancing market stability.

There are various methods to detect financial fraud, with the Beneish M-Score being one widely recognized tool. Developed to identify potential financial statement manipulation, the M-Score examines financial ratios to detect red flags such as increased receivables or decreasing gross margins. Its focus on quantitative indicators allows for objective measurement over time, making it more effective than subjective audit approaches. Research indicates that the M-Score outperforms other fraud detection models like Altman's Z-Score and the Sloan Accrual Model, making it a reliable detection tool.

Early detection of financial fraud is crucial for preventing economic harm and ensuring transparent business environments. Misleading financial statements distort market accuracy, misguide stakeholders, and undermine corporate governance (ACFE, 2019). Studies show that financial statement manipulation is a primary form of fraud, especially in firms with weak governance. (Beneish et al. (2013)). found around 10% of sampled firms potentially manipulating reports, and Dechow et al. (2011) linked misstatements to managerial efforts to meet earnings benchmarks or inflate stock prices, underscoring the need for reliable detection methods.

Board gender diversity plays a significant moderating role in the relationship between *Environmental, Social, and Governance* (ESG) performance and corporate fraud. Studies indicate that companies with greater female representation on their boards tend to exhibit stronger corporate governance and ethical decision-making, reducing the likelihood of fraudulent activities (Chu et al., 2023). A strong positive correlation between gender diversity on boards and ESG disclosure suggests that companies with gender-diverse boards inform stakeholders and the public about more ESG challenges in global markets (Alkhawaja et al., 2023). This is largely attributed to the risk-averse nature of women, who are generally more cautious and empathetic, leading them to emphasize transparency and long-term sustainability over short-term gains. Consequently, firms with higher board gender diversity tend to see an amplification of the positive impact of ESG performance in deterring corporate fraud.

The ASEAN-5 countries, consisting of Indonesia, Malaysia, Thailand, Singapore, and the Philippines, have experienced rapid economic growth and increasing globalization. Alongside these developments, there has been an increasing emphasis on sustainable business practices and corporate governance, particularly regarding *Environmental, Social, and Governance* (ESG) performance. Regulatory bodies across the region, such as Indonesia's Financial Services Authority (*Otoritas Jasa Keuangan - OJK*), Malaysia's Securities Commission, and Monetary Authority of Singapore (*MAS*), have begun to mandate or encourage ESG disclosures from publicly listed companies to enhance corporate transparency and accountability. Despite these efforts, the implementation of ESG practices across ASEAN-5 remains uneven, posing challenges for fraud detection and prevention.

Research on the role of ESG performance in reducing corporate fraud has grown popular globally, yet studies focusing on ASEAN-5 remain scarce. Previous research, such as that conducted by Li et al. (2024). and Chu et al. (2023), has primarily focused on companies in regions like China, where regulatory environments and market dynamics differ significantly from those in ASEAN. The distinct regulatory frameworks and varying levels of ESG adoption across the ASEAN-5 countries make it essential to investigate whether ESG performance contributes to fraud prevention in this context. Moreover, the region's unique economic conditions, such as diverse corporate governance practices, legal systems, and socio-cultural factors, may influence the relationship between ESG performance and corporate fraud.

This study focuses on addressing this gap by examining the impact of ESG performance on fraud prevention across ASEAN-5. The inclusion of ASEAN-5 as the research object allows for a broader, more comparative analysis that accounts for regional differences, providing valuable insights into the role of ESG in both emerging and developed economies within Southeast Asia. Additionally, the study will investigate the moderating effect of gender diversity on boards of directors, further contributing to the understanding of how corporate governance practices can enhance the effectiveness of ESG in preventing fraud. By focusing on ASEAN-5, this research will provide a comprehensive view of how ESG initiatives are being adopted and their efficacy in preventing corporate fraud in a rapidly evolving economic landscape. Therefore, our research questions focus on assessing whether improved ESG performance effectively mitigates corporate fraud within ASEAN-5 and examining how board gender diversity may strengthen this relationship. By investigating these questions, this study

aims to provide insights into effective corporate governance practices, inform regional policymakers and corporate managers on the value of ESG initiatives, and contribute to developing more transparent, accountable business environments across ASEAN-5. The findings from this research are expected to enhance the body of knowledge on corporate fraud prevention strategies and underscore the importance of fostering robust ESG practices tailored to the specific needs of Southeast Asian economies.

## RESEARCH METHOD

This quantitative study focuses on public companies listed in the ASEAN-5 countries (Indonesia, Malaysia, Thailand, Singapore, and the Philippines) from 2019 to 2023. Using purposive sampling, companies were selected based on having an ESG score during this period and operating in the non-financial sector. The sample, presented as unbalanced panel data, includes a diverse yet comparable group of sectors to assess the role of ESG performance in fraud prevention within ASEAN's regulatory environment. Financial data were sourced from Thomson Reuters Eikon (Refinitiv-Eikon), Capital IQ, and annual reports.

The study employs logistic regression to analyze the influence of ESG performance on the likelihood of fraud, using secondary data on ESG scores, fraud detection, and control variables. The dependent variable is the probability of fraud, identified through the Beneish M-Score, which flags companies at high risk of financial statement manipulation. The independent variable is the ESG performance score from Refinitiv-Eikon, ranging from 0 to 100, with higher scores indicating better performance. Board gender diversity serves as a moderating variable, measured by a dummy indicating the presence or absence of women on the board.

## RESULT AND DISCUSSION

### Descriptive Statistics Analysis

**Table 1. Descriptive statistical analysis**

Variable	Obs	Mean	Std. Dev.	Min	Max
Fraud*	1760	.286	.452	0	1
ESG Score	1760	49.265	15.27	10.14	90.72
E Score	1760	42,98	20,68	7,52	87,00
S Score	1760	53,52	18,12	15,23	88,90
G Score	1760	50,22	20,26	11,02	89,07
WOB	1760	.909	.288	0	1
Size	1760	20.929	1.694	16.07	25.34
Growth	1760	.022	.152	-.52	.59
ROA	1760	.049	.063	-.13	.29
LEV	1760	.457	.189	.08	.91
OCF	1760	1.301	3.344	-13.4	15.62
INDEP	1760	48.467	13.394	15.38	90.91
SOE	1760	.048	.214	0	1
GDP	1760	3.048	3.98	-9.52	9.69

Source : Author's Own (2024)

The descriptive analysis results presented in Table 1 provide critical insights into the dataset's central tendencies and variability. Among the ASEAN-5 companies analyzed, 28.6% were identified as committing financial fraud, as indicated by the M-Score threshold methodology. This aligns with the findings in Table 2, where the majority (71.4%) of companies demonstrated compliance in their financial reporting practices. The average ESG

score for the sample was 49.27, reflecting moderate adherence to sustainability and governance standards, with notable variance across companies. Disaggregating this, the average scores for the Environmental (E), Social (S), and Governance (G) dimensions were 42.98, 53.52, and 50.22, respectively. The Social dimension showed the highest mean, possibly indicative of regional emphasis on social programs, such as labor rights and community engagement. The Women on Boards (WOB) variable in samples revealed that 90.85% of the firms had gender-diverse boards, with at least one female director, reflecting increasing awareness of the importance of gender diversity in the region.

Expanding on the regional analysis of ESG performance presented in Table 2, Indonesia accounted for 11% of the sample with a skewness of 2.43, Malaysia 40% with a skewness of 0.39, the Philippines 6% with a skewness of 3.61, Singapore 14% with a skewness of 2.08, and Thailand 28% with a skewness of 0.97. Among these, Singapore recorded the highest average Environmental (E) score of 51.44, while Thailand had the highest average Social (S) score of 59.01. The Philippines also demonstrated a relatively high Social (S) score of 54.01. In contrast, Indonesia and Malaysia exhibited more balanced performance across the ESG pillars, with average Governance (G) scores of 48.16 and 51.31, respectively. This distribution suggests significant variability in ESG practices across countries, likely influenced by national policies, economic structures, and the size of their capital markets.

**Table 2. Descriptive Analysis of ESG Performance Per ASEAN-5 Countries**

Country	Variable	Obs	Mean	Std. Dev.	Min	Max
<b>Indonesia</b>	ESG Score	200	48.88	16.57	18.55	85.13
	E Score	200	42.14	21.16	7.52	87.00
	S Score	200	53.29	17.06	15.23	88.90
	G Score	200	48.16	21.46	11.02	89.07
<b>Malaysia</b>	ESG Score	709	46.47	15.26	20.52	87.62
	E Score	709	37.32	19.98	7.52	87.00
	S Score	709	50.28	18.67	15.23	88.90
	G Score	709	51.31	20.02	11.02	89.07
<b>Philippina</b>	ESG Score	110	48.64	13.48	20.15	83.61
	E Score	110	44.56	16.86	7.52	83.99
	S Score	110	54.01	14.59	21.46	88.90
	G Score	110	46.6	22.21	11.02	89.07
<b>Singapore</b>	ESG Score	246	51.71	14.15	19.21	87.36
	E Score	246	51.44	20.62	7.52	87.00
	S Score	246	51.81	16.66	15.23	88.90
	G Score	246	51.61	19.56	11.02	89.07
<b>Thailand</b>	ESG Score	495	52.35	14.92	10.14	90.72
	E Score	495	46.86	19.99	7.52	87.00
	S Score	495	59.01	17.92	15.23	88.90
	G Score	495	49.62	19.87	11.02	89.07

Source: Author's Own (2024)

Several factors contribute to the differences in the proportion of companies per country in the sample. First, the size of each country's capital market influences the number of public companies available for analysis. Malaysia, with a relatively large capital market, contributed the most observations, while the Philippines, with a smaller market, contributed the least (Claessens & Yurtoglu, 2013). Second, the availability and transparency of corporate governance data play a crucial role. Countries with better governance practices and stricter disclosure policies are more likely to provide reliable data, increasing their representation in the sample (IFC, 2020). Lastly, the dominant industrial sectors within each country also affect

their ESG performance distribution. For example, Thailand's dominance in manufacturing may explain its higher emphasis on social responsibility initiatives . (Deloitte FRC, 2022).

### Logistic Regression Result

The logistic regression analysis conducted in this study serves as the cornerstone for understanding the relationship between ESG performance (and each of ESGs pillar), financial fraud indication using Beneish M-Score, and the moderating role of board gender diversity in ASEAN-5 public companies. By employing a dataset of 1,760 observations, this analysis evaluates the probability of financial fraud occurrence based on Environmental, Social, and Governance scores, totally and individually, and the interaction effects with board gender diversity.

The model incorporates a range of control variables, such as firm size, leverage, profitability, and operational cash flow, to ensure a comprehensive examination of the determinants of financial fraud. The results not only reveal significant insights into the role of ESG in reducing fraud risk but also highlight the amplifying effect of gender diversity on board governance in mitigating unethical practices. These findings align with theoretical frameworks, including agency theory and stakeholder theory, emphasizing the interplay between transparency, accountability, and leadership diversity in fostering ethical corporate behavior.

### ESG Performance and Financial Fraud Indication

Table 3 describes the model 1 logistic regression which presented the relationship between ESG performance and financial fraud indication and the marginal effect to know the probabilities for the occurrence of financial fraud. Companies with higher ESG scores generally exhibited lower incidences of fraud. The top quartile of firms by ESG score (scores above 70) reported significantly lower fraud incidences (12%) compared to firms in the bottom quartile (scores below 30), which had fraud incidences exceeding 40%.

The findings of this study align with prior research, reinforcing the notion that higher ESG performance is significantly correlated with a reduced likelihood of financial fraud (Li et al., 2024; Su et al., 2024). The regression analysis confirms that ESG performance significantly inhibits financial fraud with a probability reduction of 0.18%, supporting Hypothesis 1 (H1). This aligns with Jensen & Meckling (1976) agency theory, suggesting that ESG practices reduce principal-agent conflicts by enhancing transparency and accountability. Additionally, this finding corroborates signaling theory, which posits that improved ESG disclosures minimize information asymmetry, reducing opportunities for unethical behavior. Stakeholder theory (Freeman, 2010). further supports these results, emphasizing the role of ESG in meeting diverse stakeholder interests, fostering trust, and discouraging short-term manipulative actions.

**Table 3. Model 1 Logistic Regression**

Fraud	Expected Sign	Coef.	dy/dx (mfx)	Z	P >   z	Sig
ESG Score	-	- 0,0093	- 0,00183	- 2,35	0,019	**
Size	+	- 0,0394	- 0,00777	- 1,04	0,298	
Growth	+	23,1530	0,45594	5,95	0,000	***
ROA	+	- 12,1990	- 0,24023	- 1,28	0,201	
LEV	+	- 0,4825	- 0,09501	- 1,48	0,139	
OCF	+	- 0,1429	- 0,02815	- 7,53	0,000	***
INDEP	+	0,0062	0,00122	1,47	0,141	
SOE	+	- 0,7543	- 0,12426	- 2,93	0,003	***
GDP	+/-	- 0,0073	- 0,00144	- 0,51	0,608	
Cons		0,4612		0,61	0,539	**



\*0,01, \*\*0,05, \*\*\*0,1

Source: Author's Data (2024)

The study also highlights that robust ESG practices cultivate a culture of ethical governance and decision-making, prioritizing long-term sustainability over immediate gains. Enhanced stakeholder engagement and transparency emerged as pivotal mechanisms through which ESG mitigates fraudulent activities. Interestingly, while public companies are audited by reputable firms, some still engage in financial fraud due to pressures such as unrealistic growth targets or financial strain. Fraud Triangle Theory explains this phenomenon, attributing fraud occurrences to pressure, opportunity, and rationalization. Weak internal controls, collusion, and the inherent limitations of audit sampling methods contribute to these risks. Additionally, studies like (Archanti & Rohman (2024) suggest that even audits by large firms may fail to detect fraud, underscoring the need for enhanced risk-based audit training and stronger ethical frameworks.

Control variables also provide significant insights. Growth showed a positive and significant relationship with financial fraud, indicating that high-growth companies face greater fraud risks due to performance pressures. In contrast, variables like Size, ROA, and LEV were not significant, implying that profitability and leverage do not directly impact fraud probability in this model. Operating Cash Flow (OCF) and macroeconomic conditions (GDP), however, were significant, suggesting that poor cash flow and challenging economic environments exacerbate fraud risks. Interestingly, state-owned enterprises (SOEs) demonstrated a significantly lower probability of fraud, attributed to stricter governmental oversight, although this finding may vary under different political or regulatory contexts.

The results also indicate that the proportion of independent directors (INDEP) had no significant impact on fraud probability, with a p-value of 0.139. This raises questions about the actual effectiveness of independent boards, particularly if their independence is more formal than functional. The findings imply that while agency theory highlights the importance of independent oversight, other factors such as director competence and active governance practices are critical in mitigating fraud.

### Performance of E, S, and G and Probability of Financial Fraud Indication

The logistic regression analysis for Model 1a, which shown by Tabel 6, examined the impact of Environmental, Social, and Governance (ESG) performance on the probability of financial fraud indications. The results show that none of the ESG pillars—Environmental ( $dy/dx = -0.0006253$ ,  $p = 0.397$ ), Social ( $dy/dx = 0.0009004$ ,  $p = 0.267$ ), or Governance ( $dy/dx = -0.0002474$ ,  $p = 0.688$ )—had a statistically significant effect. This suggests that individual ESG pillars, while aligned with theoretical expectations, are insufficient on their own to significantly reduce fraud probability.

Among control variables, Growth showed a significant positive relationship with fraud probability ( $dy/dx = 0.458293$ ), indicating that high-growth firms face greater fraud risks due to performance pressures. Operating Cash Flow (OCF) had a significant negative impact ( $dy/dx = -2.82\%$ ,  $p < 0.001$ ), highlighting the importance of financial stability in reducing fraud likelihood. Size, independent board composition (INDEP), and GDP were not significant predictors.

**Table 4. Model 1a Logistic Regression**

Fraud	Expected Sign	Coef.	$dy/dx$ (mfx)	Z	$P >  z $	Sig
<i>E Score</i>	-	- 0,0032	- 0,00063	- 0,85	0,397	
<i>S Score</i>	-	- 0,0046	- 0,00090	- 1,11	0,267	

<i>G Score</i>	-	- 0,0013	- 0,00025	- 0,43	0,668	
<i>Size</i>	+	- 0,0366	- 0,00721	- 0,94	0,349	
<i>Growth</i>	+	2,3271	0,45829	5,96	0,000	***
<i>ROA</i>	+	- 1,2527	- 0,24670	- 1,31	0,189	
<i>LEV</i>	+	- 0,4830	- 0,09512	- 1,48	0,138	
<i>OCF</i>	+	- 0,1433	- 0,02823	- 7,55	0,000	***
<i>INDEP</i>	+	0,0057	0,00111	1,31	0,191	
<i>SOE</i>	+	- 0,7558	- 0,12447	- 2,93	0,003	***
<i>GDP</i>	+/-	- 0,0077	- 0,00151	- 0,54	0,590	
<i>Cons</i>		0,4167		0,53	0,594	

\*0,01, \*\*0,05, \*\*\*0,1

Source : Author's Own (2024)

State-owned enterprises (SOEs) were associated with a significantly lower likelihood of fraud ( $dy/dx = -12.45\%$ ,  $p = 0.003$ ), reflecting the effectiveness of stricter government oversight. These findings highlight the importance of implementing a comprehensive governance framework that combines ESG practices with robust internal controls and active oversight mechanisms. While ESG initiatives alone may not significantly reduce the likelihood of financial fraud, integrating these practices with strong internal control systems, effective risk management processes, and independent oversight can enhance their efficacy (Freeman, 2010). Such a framework ensures that ESG commitments are not merely symbolic but are strategically aligned with corporate governance to improve transparency, accountability, and ethical decision-making, thereby effectively mitigating the risk of financial fraud.

### Moderation Effect of Board Gender Diversity

Table 5 presents the analysis of the interaction effect between ESG performance and Women on Boards (WOB), assessing its significance in moderating the association between ESG performance and financial fraud. The logistic regression analysis for Model 2 revealed that the inclusion of WOB as a variable significantly enhanced the impact of ESG performance on reducing fraud probability. The marginal effect of ESG Score increased from -0.0018 in Model 1 to -0.0258 in Model 2, indicating that firms with higher ESG performance experienced a 2.58% reduction in fraud probability compared to 0.18% in the absence of gender diversity.

The interaction term (WOB\_ESG) showed a marginal effect of 0.0045 with a p-value of 0.086, indicating that gender-diverse boards significantly moderate the relationship between ESG performance and fraud reduction at the 10% significance level. Furthermore, WOB itself exhibited a strong negative impact on fraud probability, with a marginal effect of -0.3871 ( $p = 0.002$ ), confirming that gender diversity on boards reduces fraud probability by 38.71%.

The findings align with stakeholder theory (Freeman, 2010), which emphasizes the importance of gender diversity in fostering ethical governance and addressing stakeholder concerns. Similarly, agency theory (Jensen & Meckling, 1976) supports the role of diverse leadership in enhancing oversight, reducing information asymmetry, and mitigating conflicts between management and stakeholders. Gender-diverse boards, often associated with ethical and risk-averse decision-making, strengthen the integrity of corporate governance, particularly in emerging markets like ASEAN-5, where regulatory systems are evolving.

Control variables provided additional insights. Growth remained a significant positive predictor of fraud probability (45.22%), while OCF retained its negative significance (-0.0279), demonstrating the importance of operational cash flow in reducing financial strain and fraud risks. SOE status continued to have a significant negative effect (-0.1370), indicating that state-owned enterprises benefit from stricter regulatory oversight. Variables such as Size, ROA,

LEV, and INDEP remained insignificant, suggesting limited direct impact on fraud probability in this model.

These findings highlight the synergistic role of ESG performance and board gender diversity in mitigating fraud risks. Companies with gender-diverse boards and strong ESG practices are better equipped to foster ethical decision-making, enhance transparency, and reduce opportunities for unethical behavior, supporting the argument for integrating diversity initiatives with sustainability strategies in corporate governance.

**Table 5. Model 2 Logistic Regression**

Fraud	Expected Sign	Coef.	dy/dx (mfx)	Z	P >   z	Sig
<i>ESG Score</i>	-	- 0,0258	- 0,0051	- 1,99	0,046	**
<i>WOB</i>	-	- 1,6733	- 0,3871	- 3,06	0,002	*
<i>WOB ESG</i>	+	0,0230	0,0045	1,71	0,086	***
<i>Size</i>	+	- 0,0628	- 0,0123	- 1,63	0,103	
<i>Growth</i>	+	2,3033	0,4523	5,87	0,000	***
<i>ROA</i>	+	- 1,3246	- 0,2601	- 1,38	0,167	
<i>LEV</i>	+	- 0,4455	- 0,0875	- 1,36	0,174	
<i>OCF</i>	+	- 0,1419	- 0,0279	- 7,43	0,000	***
<i>INDEP</i>	+	0,0067	0,0013	1,59	0,111	
<i>SOE</i>	+	- 0,8575	- 0,1370	- 3,42	0,001	***
<i>GDP</i>	+/-	- 0,0094	- 0,0018	- 0,65	0,513	
<i>Cons</i>		2,1956		2,39	0,017	**

\*0,01, \*\*0,05, \*\*\*0,1

Source: Author's Data (2024)

### **Moderating Board Gender Diversity on the Relationship between E, S, and G and Financial Fraud**

The logistic regression analysis for Model 2a, as presented in Table 8, examines the moderating effect of board gender diversity (WOB) on the relationship between the individual Environmental, Social, and Governance (ESG) pillars and the probability of financial fraud. Financial fraud indications were measured using the Beneish M-Score, yielding several noteworthy findings.

The Environmental Score (E Score) demonstrated a significant negative relationship with fraud probability, with a marginal effect (dy/dx) of -0.004409 (p-value = 0.053). This indicates that gender diversity on the board strengthens the negative impact of environmental performance on fraud probability, reducing it by 0.44% at a 10% significance level. Similarly, the Governance Score (G Score) exhibited a significant negative relationship, with a marginal effect of -0.0038402 (p-value = 0.038), suggesting that gender-diverse boards enhance corporate governance practices, further reducing fraud probability.

In contrast, the Social Score (S Score) did not exhibit a significant relationship with fraud probability (p-value = 0.235), indicating that gender diversity on the board does not significantly enhance the influence of social performance on fraud reduction. This finding is consistent with Model 1, which also showed no significant effect of social performance in reducing fraud probability.

The WOB variable itself demonstrated a significant negative marginal effect of -0.35138 (p-value = 0.009), indicating that gender-diverse boards reduce fraud probability by 35.14%. This supports prior findings in Model 2 and aligns with Chu et al. (2023), who suggest that higher female representation on boards leads to stronger oversight and lower fraud risks due to a more ethical and socially-oriented governance approach.



The interaction variables further underscore the moderating role of gender diversity. WOB\_E (interaction of WOB with Environmental Score) and WOB\_G (interaction of WOB with Governance Score) were significant, with p-values of 0.080 and 0.023, respectively, highlighting that gender diversity amplifies the effects of environmental and governance performance in reducing fraud probability. However, WOB\_S (interaction with Social Score) was not significant (p-value = 0.159), indicating that gender diversity does not meaningfully moderate the social performance-fraud relationship.

Control variables provided additional insights. Firm size (Size) remained insignificant ( $dy/dx = -0.01058$ , p-value = 0.174), while Growth showed a significant positive relationship with fraud probability ( $dy/dx = 0.45540$ , p-value < 0.001), consistent with findings that high-growth companies face greater fraud risks due to performance pressures. Operating Cash Flow (OCF) maintained its significant negative relationship ( $dy/dx = -0.02792$ , p-value < 0.001), confirming that healthy cash flow reduces financial fraud risks by alleviating financial pressures.

These findings partially support Hypothesis 2a, demonstrating that board gender diversity significantly moderates the influence of Environmental and Governance performance on fraud probability. These results are consistent with agency theory, emphasizing the role of strong governance in mitigating conflicts of interest, and stakeholder theory (Freeman, 2010), which highlights the value of environmental policies in enhancing transparency and stakeholder trust, thereby reducing fraud risks.

**Table 6. Model 2a Logistic Regression**

Fraud	Expected Sign	Coef.	$dy/dx$ (mfx)	Z	$P >  z $	Sig
<i>E Score</i>	-	- 0,0225	- 0,00441	- 1,93	0,053	***
<i>S Score</i>	-	0,0164	0,00321	1,19	0,235	
<i>G Score</i>	-	- 0,0196	- 0,00384	- 2,07	0,038	**
<i>WOB</i>	-	- 1,5202	- 0,35138	- 2,63	0,009	*
<i>WOB E</i>	+	0,0213	0,00418	1,75	0,080	***
<i>WOB S</i>	+	- 0,0203	- 0,00399	- 1,41	0,159	
<i>WOB G</i>	+	0,0225	0,00441	2,28	0,023	
<i>Size</i>	+	- 0,0539	- 0,01058	- 1,36	0,174	
<i>Growth</i>	+	2,3215	0,45540	5,88	0,000	*
<i>ROA</i>	+	- 1,2720	- 0,24952	- 1,32	0,186	
<i>LEV</i>	+	- 0,4518	- 0,08863	- 1,37	0,169	
<i>OCF</i>	+	- 0,1423	- 0,02792	- 7,43	0,000	*
<i>INDEP</i>	+	0,0065	0,00128	1,49	0,135	
<i>SOE</i>	+	- 0,9167	- 0,14406	- 3,69	0,000	*
<i>GDP</i>	+/-	- 0,0113	- 0,00222	- 0,78	0,433	
<i>Cons</i>		1,8505		1,96	0,05	**

\*0,01, \*\*0,05, \*\*\*0,1

Source: Author's Data (2024)

### Classification Test

Based on classification test shown in Table 7, Model 1 achieved an overall accuracy of 72.73%, while Model 2 demonstrated a slightly higher accuracy of 73.12%, indicating that Model 2 is more effective in correctly classifying observations. In terms of sensitivity (the ability to detect fraud), Model 1 recorded a sensitivity of 12.13%, whereas Model 2 performed better with a sensitivity of 14.71%. This suggests that Model 2 is more capable of identifying fraud indications, particularly when moderated by board gender diversity. However, regarding

specificity (the ability to detect non-fraud), Model 1 outperformed Model 2, with specificity values of 96.98% and 96.50%, respectively.

These findings highlight that both models have relatively high overall accuracy and are reasonably effective in distinguishing between fraud and non-fraud cases. Model 2's improved sensitivity underscores its enhanced ability to identify fraud risks when gender diversity in the board is considered. However, this improvement comes at the cost of slightly reduced specificity compared to Model 1 in detecting non-fraud cases.

**Table 7. Classification Test**

	<b>Model 1</b>		<b>Model 1a</b>		<b>Model 2</b>		<b>Model 2a</b>	
<b>Prediksi Respon</b>	<i>Fraud</i>	<i>Non-Fraud</i>	<i>Fraud</i>	<i>Non-Fraud</i>	<i>Fraud</i>	<i>Non-Fraud</i>	<i>Fraud</i>	<i>Non-Fraud</i>
<i>Fraud</i>	61	38	61	36	74	44	73	47
<i>Non-Fraud</i>	442	1.219	442	1.221	429	1.213	430	1.210
<i>Sensitivity</i>	12,13%		12,13%		14,71%		14,51%	
<i>Specificity</i>	96,98%		97,14%		96,50%		96,26%	
<i>Correctly Classified</i>	72,73%		72,84%		73,12%		72,90%	

\*0,01, \*\*0,05, \*\*\*0,1

Source: Author's Data (2024)

### Additional Analysis

#### Linear Regression Test of each Beneish M-Score indicator

A sensitivity analysis using linear regression was conducted on individual indicators of the Beneish M-Score, such as Days Sales in Receivables Index (DSRI), Gross Margin Index (GMI), and other components, to evaluate the impact of ESG performance on each financial fraud indicator. This approach aimed to identify which Beneish M-Score components are most influenced by ESG performance, thereby offering deeper insights into the relationships between variables in the primary model.

The results, presented in Table 10, reveal varying effects of ESG performance across the individual Beneish M-Score components. For DSRI and GMI, ESG Score showed no significant impact ( $p\text{-value} > 0.05$ ), indicating that ESG performance is not directly associated with manipulations related to receivables or gross margins. However, for the Asset Quality Index (AQI), ESG Score had a significant negative effect (coefficient = -0.005,  $p\text{-value} < 0.10$ ), suggesting that firms with strong ESG performance tend to have higher asset quality and are less likely to conceal problematic assets.

Similarly, for the Sales Growth Index (SGI) and Depreciation Index (DEPI), ESG Score did not demonstrate significant influence, indicating no direct effect of ESG practices on risks related to sales growth or asset depreciation. Conversely, for the Leverage Index (LI), ESG Score exhibited a significant negative relationship (coefficient = -0.001,  $p\text{-value} < 0.05$ ), implying that firms with better ESG performance tend to maintain healthier debt structures. Additionally, the Total Accruals to Total Assets Index (TATAI) revealed a significant negative effect (coefficient = -0.002,  $p\text{-value} < 0.01$ ), reflecting that firms with strong ESG practices produce more transparent financial statements with reduced accounting manipulation.

These findings highlight the critical role of ESG performance in enhancing the quality of financial reporting. The significant results for AQI, LI, and TATAI support the notion that

firms with robust ESG practices demonstrate higher transparency, better asset management, and lower risks of financial reporting manipulation. These outcomes align with agency theory, which underscores the importance of reducing conflicts between management and stakeholders through improved governance, and stakeholder theory, which emphasizes the value of transparency and accountability in building stakeholder trust (Li et al., 2024).

**Table 8. Effect of ESG Performance on each indicator of Beneish M-Score**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DSRI	GMI	AQI	SGI	DEPI	SGAI	LI	TATAI
<b>ESG</b>	-0,002 (0,002)	0,001 (0,004)	-0,005* (0,003)	-0,000 (0,000)	-0,000 (0,001)	0,002 (0,004)	0,001 (0,000)	-0,000*** (0,000)
<b>Size</b>	-0,008 (0,016)	-0,054 (0,037)	0,009 (0,029)	0,002 (0,004)	-0,011 (0,008)	0,008 (0,042)	-0,016*** (0,005)	0,003*** (0,001)
<b>Growth</b>	-0,611*** (0,164)	-0,691* (0,374)	0,144 (0,289)	1,490*** (0,044)	0,021 (0,084)	-0,270 (0,427)	0,210*** (0,048)	0,056*** (0,010)
<b>ROA</b>	-0,535 (0,407)	0,230 (0,926)	-1,475** (0,716)	-0,205* (0,109)	-0,012 (0,208)	-1,506 (1,056)	-0,667*** (0,118)	0,115*** (0,024)
<b>LEV</b>	0,038 (0,138)	0,206 (0,313)	-0,240 (0,242)	0,014 (0,037)	0,067 (0,070)	-0,098 (0,357)	0,155*** (0,040)	-0,024*** (0,008)
<b>OCF</b>	-0,020*** (0,007)	-0,003 (0,016)	-0,006 (0,012)	0,000 (0,002)	-0,005 (0,004)	-0,023 (0,018)	-0,004** (0,002)	-0,005*** (0,000)
<b>INDEP</b>	-0,000 (0,002)	0,004 (0,004)	0,001 (0,003)	0,001 (0,000)	-0,001 (0,001)	0,006 (0,005)	-0,000 (0,001)	0,000 (0,000)
<b>SOE</b>	0,009 (0,111)	0,109 (0,254)	-0,107 (0,196)	-0,017 (0,030)	0,008 (0,057)	-0,135 (0,289)	-0,015 (0,032)	-0,031*** (0,007)
<b>GDP</b>	-0,013** (0,006)	0,004 (0,014)	0,009 (0,011)	0,005*** (0,002)	0,005 (0,003)	-0,007 (0,016)	-0,006*** (0,002)	0,000 (0,000)
<b>N</b>	1.760	1.760	1.760	1.760	1.760	1.760	1.760	1.760
<b>R<sup>2</sup></b>	0,021	0,004	0,006	0,423	0,006	0,004	0,047	0,137

\*0,01, \*\*0,05, \*\*\*0,1

Source: Author's Data (2024)

### Logistic Regression Test for each ASEAN-5 country

Table 8 presents the logistic regression results analyzing the impact of ESG performance on the probability of financial fraud indications across ASEAN-5 countries (Indonesia, Malaysia, Singapore, Thailand, and the Philippines). This analysis aims to assess the sensitivity of ESG performance in various national contexts, considering the economic, cultural, and regulatory characteristics of each country. The dependent variable is financial fraud, measured using the Beneish M-Score, while the ESG Score serves as the primary independent variable. Control variables, including Size, Growth, ROA, LEV, OCF, INDEP, SOE, and GDP, are included to provide a comprehensive analysis.

The results reveal significant variations in the influence of ESG performance on fraud probability across the ASEAN-5 nations. In Indonesia, ESG Score exhibits a significant negative effect on fraud probability (marginal effect = -0.003, p-value < 0.1), indicating that stronger ESG performance reduces the likelihood of financial fraud in Indonesian firms. Similarly, in Thailand, ESG Score also shows a significant negative impact (marginal effect = -0.004, p-value < 0.05). However, in Malaysia and Singapore, ESG Score is not significant, suggesting no direct effect of ESG performance on fraud risk in these countries. In the Philippines, no significant relationship was found between ESG Score and fraud probability.

Among the control variables, firm size (Size) demonstrates a significant negative effect in Indonesia and Malaysia (marginal effects = -0.049 and -0.029, respectively), suggesting that

larger firms in these countries are less likely to engage in financial fraud. Conversely, in Thailand, Size shows a significant positive effect (marginal effect = 0.042, p-value < 0.05), implying that larger firms may face increased fraud risks, potentially due to higher operational complexity. Growth displays a consistent positive and significant relationship with fraud probability in Indonesia, Malaysia, and Singapore, indicating that high-growth firms are more vulnerable to fraud, possibly due to performance pressures.

Operating Cash Flow (OCF) consistently shows a significant negative effect in Malaysia, Singapore, and Thailand, underscoring the importance of liquidity in reducing fraud probability. Strong cash flow provides financial stability, reducing the need for fraudulent behavior. For the SOE variable (state-owned enterprises), a significant negative effect is observed in Indonesia and Thailand, reflecting that state-owned firms in these countries face lower fraud risks, likely due to stricter government oversight. In the Philippines, SOE was excluded from the analysis as the sample did not include state-owned companies.

These findings highlight that the impact of ESG performance and control variables on financial fraud probability is highly influenced by the national context. Differences in regulatory systems, corporate cultures, and governance mechanisms across ASEAN-5 countries shape the effectiveness of ESG initiatives and other factors in mitigating fraud risks. This underscores the need for policymakers and corporate managers to consider local regulatory and cultural factors when designing ESG strategies, sustainability initiatives, and governance practices to effectively reduce financial fraud risks.

**Table 9. Logistic Regression Test for each ASEAN-5 country**

	(1) IND	(2) MAS	(3) SING	(4) THAI	(5) PHIL
<b>ESG</b>	-0,003*	-0,001	-0,002	-0,004**	0,003
<b>Score</b>	(0,002)	(0,001)	(0,002)	(0,002)	(0,004)
<b>Size</b>	-0,049**	-0,029**	-0,016	0,042**	-0,032
	(0,025)	(0,014)	(0,028)	(0,017)	(0,058)
<b>Growth</b>	0,379**	0,613***	0,630**	0,102	0,208
	(0,193)	(0,114)	(0,288)	(0,145)	(0,706)
<b>ROA</b>	-0,566	-0,385	-0,814	0,590	-1,243
	(0,437)	(0,282)	(0,701)	(0,408)	(1,429)
<b>LEV</b>	-0,264*	-0,138	-0,236	0,046	-0,563
	(0,149)	(0,103)	(0,178)	(0,144)	(0,467)
<b>OCF</b>	-0,014	-0,031***	-0,019**	-0,031***	-0,031
	(0,010)	(0,006)	(0,009)	(0,008)	(0,028)
<b>INDEP</b>	-0,000	0,001	-0,002	0,006***	-0,004
	(0,003)	(0,002)	(0,002)	(0,002)	(0,006)
<b>SOE</b>	-0,115*	0,117	-0,128	-0,277***	No SOE
	(0,059)	(0,137)	(0,092)	(0,040)	
<b>GDP</b>	-0,005	-0,000	0,011	0,021**	-0,013*
	(0,011)	(0,005)	(0,007)	(0,009)	(0,007)

\*0,01, \*\*0,05, \*\*\*0,1

IND = Indonesia; MAS = Malaysia; SING = Singapura; THAI = Thailand; PHIL = Philippine  
Source: Author's Data (2024)

## CONCLUSION

This study examines the impact of Environmental, Social, and Governance (ESG) performance on the likelihood of financial fraud in public companies across ASEAN-5 countries, highlighting the moderating effect of board gender diversity. Results show that overall ESG performance significantly reduces fraud risk, supporting agency and signalling

theories that emphasize transparency and accountability, while none of the individual ESG pillars alone were sufficient to mitigate fraud. Gender diversity on boards not only directly lowers fraud probability but also enhances the fraud-preventing effect of ESG, particularly in the Environmental and Governance dimensions. Future research should consider alternative fraud detection models tailored to ASEAN-5 contexts, expand samples to include financial sectors, and explore additional governance factors such as auditor independence and audit quality. Longitudinal studies investigating causal links between gender diversity, organizational culture, governance commitment, and internal controls would further strengthen understanding. The findings have broad implications for academia, corporate governance, policymaking, and societal trust, underscoring the value of integrated ESG strategies and diverse leadership in fostering sustainable, transparent markets.

## REFERENCES

- Acfе. (2019). *Survei fraud Indonesia*. [Report year noted as 2019, published 2020].
- Archanti, A. R., & Rohman, A. (2024). Addressing the factors causing financial statement fraud: A systematic literature review and bibliometric analysis. *Eduvest-Journal of Universal Studies*, 4(6), 5487–5499. <http://eduvest.greenvest.co.id>
- Association of Certified Fraud Examiners. (2020). *Report to the nations: 2020 global study on occupational fraud and abuse*. <https://www.acfe.com/report-to-the-nations/2020/>
- BDO. (2023). *ASEAN corporate fraud landscape 2023*. [https://www.bdo.co.id/getattachment/abf22541-097e-4978-b278-052298d5e070/ASEAN-Corporate-Fraud-Landscape\\_BDO.pdf](https://www.bdo.co.id/getattachment/abf22541-097e-4978-b278-052298d5e070/ASEAN-Corporate-Fraud-Landscape_BDO.pdf)
- Beneish, M. D., Lee, C. M. C., & Nichols, D. C. (2013). Earnings manipulation and expected returns. *Financial Analysts Journal*, 69(2). <https://doi.org/10.2469/faj.v69.n2.1>
- Carmichael, D. R. (2018). Audit versus fraud examination: What's the real difference? *The CPA Journal*, 88(2).
- Chu, S., Oldford, E., & Wang, J. (2023). Corporate social responsibility and corporate fraud in China: The perspective of moderating effect of board gender diversity. *International Review of Economics and Finance*, 88, 1582–1601. <https://doi.org/10.1016/j.iref.2023.07.062>
- Claessens, S., & Yurtoglu, B. B. (2013). Corporate governance in emerging markets: A survey. *Emerging Markets Review*, 15. <https://doi.org/10.1016/j.ememar.2012.03.002>
- Dechow, P. M., Ge, W., Larson, C. R., & Sloan, R. G. (2011). Predicting material accounting misstatements. *Contemporary Accounting Research*, 28(1). <https://doi.org/10.1111/j.1911-3846.2010.01041.x>
- Deloitte FRC. (2022). *US-OTACA-July*.
- Freeman, E. (2010). Stakeholder theory - Edward Freeman. In T. Morphy.
- GSIA. (2021). *Global sustainable investment review 2020*. [www.robeco.com](http://www.robeco.com)
- He, F., Du, H., & Yu, B. (2022). Corporate ESG performance and manager misconduct: Evidence from China. *International Review of Financial Analysis*, 82. <https://doi.org/10.1016/j.irfa.2022.102201>
- Li, D., Ma, C., Yang, J., & Li, H. (2024). ESG performance and corporate fraud. *Finance Research Letters*, 62. <https://doi.org/10.1016/j.frl.2024.105212>
- Nguyen, T. D., Pham, H. C., & Tran, K. N. (2022). Corporate governance, financial statement fraud, and market reactions: Evidence from Vietnam. *Journal of Asian Business and Economic Studies*, 29(1), 18–31. <https://doi.org/10.1108/JABES-06-2021-0080>



- Rognone, L., Tanzilli, F., & Tiscini, R. (2020). Corporate governance and ESG disclosure: A review of global research and Italian evidence. *Corporate Governance: The International Journal of Business in Society*, 20(2), 231–251. <https://doi.org/10.1108/CG-10-2018-0310>
- Sheveleva, G. I. (2022). Corporate governance in generating companies of the Russian electric power industry in the context of ESG agenda. *Global Energy Interconnection*, 5(5), 512–523. <https://doi.org/10.1016/j.gloi.2022.10.005>
- Stiglitz, J. E. (2000). The contributions of the economics of information to twentieth century economics. *Quarterly Journal of Economics*, 115(4). <https://doi.org/10.1162/003355300555015>
- Su, F., Guan, M., Liu, Y., & Liu, J. (2024). ESG performance and corporate fraudulence: Evidence from China. *International Review of Financial Analysis*, 93. <https://doi.org/10.1016/j.irfa.2024.103180>
- Wang, et al. (2022). Gender diversity and financial statement fraud. *Journal of Financial Crime*. <https://doi.org/10.1108/JFC-12-2018-0136>
- Wang, et al. (2024). Corporate social responsibility and corporate fraud: The mediating effect of analyst attention. *Journal of Financial Crime*. <https://doi.org/10.1108/JFC-07-2021-0163>