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ESG and Financial Risk in ASEAN-5: Mediating Role of Financial Constraints

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Abstract

This study investigates the influence of Environmental, Social, and Governance (ESG) scores, both in aggregate and by individual pillars (Environmental, Social, and Governance) on financial risk, and examines the mediating role of financial constraints measured using the SA Index. The analysis uses 595 firm-year observations from 119 non-financial publicly listed companies in ASEAN-5 countries (Indonesia, Malaysia, the Philippines, Thailand, and Singapore) during the period 2019–2023. Financial risk is proxied by the Altman Z-Score, and the model is estimated using panel data regression with the Two-Stage Least Squares (2SLS) method, Driscoll-Kraay standard errors to address potential endogeneity and heteroskedasticity, and Random Effects model. The results show that only the Social (S) pillar has a significant and positive direct effect on the Altman Z-Score, indicating a reduction in financial risk, while aggregate ESG, Environmental (E), and Governance (G) scores show no significant direct impact. However, all ESG components are significantly negatively associated with financial constraints, implying that better ESG performance improves internal financial conditions. Mediation analysis using the coefficient-based approach and Sobel Test confirms that financial constraints significantly mediate the relationship between ESG and financial risk. These findings emphasize the importance of ESG integration in financial management as a strategy to mitigate bankruptcy risk in developing economies.

Keywords: *ESG Scores, Financial Risk Risk, Financial Constraints.*

INTRODUCTION

Environmental and social sustainability has emerged as a critical global concern amid escalating climate change, environmental degradation, social inequality, and recurring economic disruptions. In response, the United Nations introduced the Sustainable Development Goals (SDGs) 2030, aiming to eradicate poverty, preserve environmental resources, and ensure inclusive global prosperity. While governments are the primary drivers of these goals, the private sector, especially corporations, has become a crucial partner in advancing sustainability initiatives (Adams, 2017). One key framework to guide and evaluate corporate sustainability efforts is the Environmental, Social, and Governance (ESG) framework, which has evolved from a non-financial metric into a strategic tool for managing long-term risk and improving stakeholder value (Amor-Esteban, 2019).

In Southeast Asia, ESG adoption has gained momentum and is reflected in regional policy initiatives such as the 37th ASEAN Summit. Evidence from the Asian Development Bank Institute (2020) shows that companies integrating ESG principles report higher net profit margins

on average, suggesting that sustainability-oriented practices may yield financial benefits. As ESG becomes increasingly embedded in investment and regulatory frameworks, understanding its real impact on firm-level financial outcomes, particularly in risk management, becomes essential.

Despite growing attention, the effectiveness of ESG in mitigating financial risk remains under debate. Some studies suggest that ESG contributes to firm resilience and lower bankruptcy risk (Baek & Song, 2024), while others argue that ESG practices are often superficial and insufficiently embedded within corporate governance structures to yield risk reduction (Dorfleitner & Grebler, 2022; Papangkorn et al., 2022). These inconsistent findings underscore the need to explore ESG's role in firm risk within specific institutional and regional contexts, especially in emerging markets where structural limitations and financial constraints may inhibit effective ESG implementation.

Recent studies suggest that the ESG–risk relationship may be non-linear. For instance, Anwer et al. (2023) propose that ESG engagement only reduces financial risk once it reaches a certain threshold. This is particularly relevant in ASEAN-5 countries (Indonesia, Malaysia, the Philippines, Thailand, and Singapore), where regulatory disparities, infrastructure gaps, and limited ESG awareness present challenges. A significant constraint is financial: ESG adoption requires substantial capital investment, which is difficult for firms burdened by debt or lacking liquidity. Although good ESG performance has been linked to improved access to capital (An et al., 2025; Wang & Yao, 2024), firms facing financial constraints may not fully realize these benefits.

Between 2019 and 2023, the corporate debt of listed firms in ASEAN-5 rose from USD 908.63 billion to USD 1.368 trillion. While sustainable finance instruments, such as green bonds, have expanded—with USD 120 billion outstanding by 2024 (Asian Development Bank, 2025)—access to affordable funding remains uneven, particularly for MSMEs. Countries like Indonesia and the Philippines face persistent issues in MSME credit access, while others such as Malaysia and Thailand struggle with cost barriers and limited ESG readiness (Benoit & Partners, 2023; InCorp Asia, 2023). Even Singapore, a regional ESG leader, remains exposed to external financial shocks (Elite Asia, 2023).

At the firm level, increasing debt burdens signal growing financial fragility. For example, Indonesia's average debt-to-equity ratio (DER) surged from 1.7 (2019–2022) to 15.88 in 2023, underscoring elevated bankruptcy risk (Altman & Hotchkiss, 2010; Huang, 2006; Myers, 2001). These trends highlight the importance of assessing how ESG engagement interacts with a firm's financial position to influence solvency.

While much of the ESG-risk literature focuses on developed markets with mature financial systems and robust regulatory environments (Bannier et al., 2019; Khoruzhy et al., 2022), studies

addressing the ESG–financial risk relationship in ASEAN-5 are limited. Furthermore, existing research tends to overlook possible indirect mechanisms—particularly the mediating role of financial constraints—in the ESG–risk link. Only a few studies suggest that better ESG performance may reduce risk by easing access to financing or boosting investor confidence (Habib & Mourad, 2024).

In addition, ESG is often treated as a composite index, which may obscure the differential effects of its individual components. In emerging markets, analyzing each pillar (Environmental, Social, and Governance) separately can yield more accurate insights, given varying levels of relevance and impact across countries (ESGpedia, 2024; Krastev & Lueg, 2018).

This study aims to fill these gaps by examining how overall ESG performance and its individual pillars affect financial risk, proxied by the Altman Z-Score, within the ASEAN-5 context. It further explores whether financial constraints, measured by the SA index, mediate this relationship. Specifically, the study contributes by: (1) extending ESG–risk research to the underexplored ASEAN-5 context; (2) testing the mediating role of financial constraints; and (3) disaggregating ESG into its pillars to identify which dimensions drive financial risk outcomes.

Using panel data from 595 firm-year observations across 119 non-financial publicly listed companies between 2019 and 2023, this study applies a Two-Stage Least Squares (2SLS) regression with Driscoll-Kraay standard errors to address endogeneity and heteroskedasticity. Data are obtained from Refinitiv-Thomson Reuters, and financial firms are excluded due to their distinct reporting structures. The results reveal that the Social pillar is positively associated with the Altman Z-Score, suggesting improved financial health. Additionally, all ESG components are significantly and negatively related to financial constraints, and mediation analysis confirms the mediating role of financial constraints in the ESG–Z-Score relationship.

By providing a focused and context-specific analysis of ESG's relationship with financial risk in ASEAN-5, this study contributes to the broader literature on sustainable finance and offers practical insights for firms and policymakers aiming to align ESG integration with financial stability.

LITERATURE REVIEW

The theoretical framework of this study draws from a combination of perspectives to explore the relationship between ESG performance, financial risk, and financial constraints. At its core, the agency-information perspective integrates Agency Theory (Meckling & Jensen, 1976) and Asymmetric Information Theory (Myers & Majluf, 1984), which jointly explain the conflicts of interest and information asymmetries between managers and shareholders. Agency problems arise

when managers pursue personal interests rather than shareholder value, leading to agency costs such as excessive risk aversion or over-leveraging (Ross et al., 2010). In the ESG context, these conflicts can manifest through symbolic or superficial practices—such as greenwashing—that obscure a firm's actual commitment to sustainability and increase financial opacity (Yu et al., 2020).

According to Myers & Majluf (1984), firms suffering from high information asymmetry face increased financing costs and limited access to external capital, discouraging long-term investments like ESG initiatives. These problems are particularly salient in emerging markets, where investor protections and disclosure requirements are relatively weak. Scholars argue that improved ESG disclosure serves as a non-financial governance mechanism, helping reduce investor uncertainty and align managerial actions with broader stakeholder interests (Dhaliwal et al., 2012; Dhaliwal et al., 2014).

Complementing this view, Stakeholder Theory (Freeman, 2010) and Signaling Theory (Spence, 1978) explain how ESG can improve firm reputation and stakeholder trust. Stakeholder Theory posits that firms must address the interests of diverse groups—including regulators, communities, and employees—to ensure long-term legitimacy (Parmar et al., 2010). Signaling Theory highlights how credible ESG disclosures can serve as positive signals to the capital market, conveying responsible management practices and lowering perceived risk, which can in turn ease access to funding and reduce capital costs (Hur et al., 2014; Gallego-Álvarez et al., 2011). However, discrepancies in ESG rating methodologies may weaken the signaling effect and reduce the clarity of investor perceptions (Bofinger et al., 2022).

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The ESG framework comprises three pillars—environmental, social, and governance—which jointly reflect a company's sustainability profile. The environmental pillar emphasizes resource efficiency, emissions management, and innovation in clean operations (Elkington, 1998; Bai et al., 2022). The social dimension includes labor practices, diversity, and community engagement (Freeman, 2010), while the governance pillar covers board structure, ethical behavior,

and internal controls, which have direct implications for investor confidence and financial discipline (Bai et al., 2022).

In the ASEAN-5 region, ESG implementation remains uneven due to variations in regulatory enforcement and market maturity. Singapore leads with mandatory ESG reporting aligned with global standards (ESGpedia, 2024), while Malaysia has promoted ESG through the SRI roadmap and enhanced climate disclosure initiatives (Slaughter and May, 2024). Indonesia's POJK 51 requires sustainability disclosures, while Thailand and the Philippines are gradually enhancing mandatory reporting frameworks (Renoir Consulting, 2024; Bangkok Post, 2023; Inquirer, 2024). These differences create heterogeneity in ESG effectiveness, especially in influencing firm-level financial outcomes.

Financial risk, in this study, refers to a firm's vulnerability to insolvency and bankruptcy, typically proxied by the Altman Z-Score. Elevated debt levels, unstable cash flows, and liquidity shortages contribute to financial distress, and these are particularly relevant in emerging economies with weak capital markets (Altman & Hotchkiss, 2010). In ASEAN-5, corporate debt rose significantly between 2019 and 2023, exposing firms to solvency risk (Asian Development Bank, 2025). Understanding how ESG mitigates such risks is critical, as effective ESG strategies can improve transparency, governance quality, and investor trust—thereby enhancing access to funding and financial resilience (Albuquerque et al., 2019; Godfrey, 2005).

In this context, financial constraints emerge as a key mediating factor. Defined as obstacles that restrict a firm's ability to secure external financing, financial constraints force companies to rely on internal cash flows, limiting their ability to invest in long-term strategic initiatives like ESG (Cheng et al., 2014; Kaplan & Zingales, 1997). These constraints are amplified by information asymmetries and weak investor confidence. However, credible ESG practices can help alleviate these constraints by signaling sound management and reducing perceived risk, especially in capital-scarce environments (Liu et al., 2025; Hao & Wu, 2024).

The Effect of ESG Scores and Their Pillars on Financial Risk

A growing body of research highlights that strong ESG performance may reduce financial risk by improving governance quality, capital access, and strategic alignment. High ESG scores are often associated with improved financial discipline, lower default probabilities, and stronger debt management capabilities (He et al., 2023; Bao et al., 2024). However, this relationship is not universally consistent and may vary depending on firm characteristics such as ownership type, industry, and the credibility of ESG scores.

Signaling Theory suggests that ESG ratings convey firm quality to external stakeholders, thus lowering perceived insolvency risk. Stakeholder Theory adds that a firm's efforts to engage with key constituencies may build goodwill, enhance stability, and reduce financing uncertainty (Freeman, 2010). Yet, ESG performance can also be distorted through managerial opportunism or inconsistencies in rating systems, which may reduce its reliability as a signal (Bao et al., 2024).

Each ESG pillar may have differentiated effects on financial risk. The environmental pillar can reduce regulatory fines and operational costs through better resource management (Wang & Yao, 2024). The social pillar may lower workforce-related disruptions and enhance productivity. The governance pillar is critical for reducing agency problems and ensuring financial accountability (Li et al., 2025). Given these distinctions, analyzing ESG in disaggregated form is necessary to identify which dimensions contribute most effectively to financial risk mitigation.

Thus, the following hypotheses are proposed:

H1a: Aggregate ESG score is associated with financial risk.

H1b: The Environmental (E) pillar is associated with financial risk.

H1c: The Social (S) pillar is associated with financial risk.

H1d: The Governance (G) pillar is associated with financial risk.

The Mediating Role of Financial Constraints in the ESG–Financial Risk Relationship

Financial constraints represent a firm's limited ability to obtain affordable and sustainable external financing. High ESG performance may help alleviate these constraints by increasing transparency, signaling responsible management, and lowering capital costs (Wang & Yao, 2024; Dhaliwal et al., 2011). This improved access to financing, in turn, enables firms to reduce financial risk by enhancing their liquidity and investment capacity. Mechanistically, ESG affects financial constraints through several channels. First, it signals the firm's trustworthiness to capital providers. Second, it reduces information asymmetry, which lowers the risk premium demanded by investors. Third, it strengthens relationships with investors and creditors by demonstrating long-term commitment and sound governance practices. Firms experiencing financial stress often lack the resources to invest in ESG initiatives, perpetuating a cycle of constrained funding and elevated financial risk. Conversely, firms with better capital access are more likely to implement ESG strategies effectively and benefit from the associated reduction in financial risk.Accordingly, the following mediation hypotheses are proposed:

H2a: Financial constraints mediate the relationship between aggregate ESG score and financial risk.

H2b: Financial constraints mediate the relationship between the Environmental (E) pillar and financial risk.

H2c: Financial constraints mediate the relationship between the Social (S) pillar and financial risk.

H2d: Financial constraints mediate the relationship between the Governance (G) pillar and financial risk.

METHODS

Data, Sample, and Variable Measurement

This study utilizes secondary data obtained from the Refinitiv (Thomson Reuters – ASSET4 Datastream) database, covering the period from 2019 to 2023. The population comprises all publicly listed, non-financial firms operating in ASEAN-5 countries—namely Indonesia, Malaysia, Singapore, Thailand, and the Philippines. Financial institutions are excluded due to structural differences in their financial reporting standards, which may affect the comparability of key financial indicators. The sample is selected using purposive sampling with the following criteria: (i) companies must have complete annual and sustainability reports from 2019 to 2023, (ii) companies must have ESG Scores and financial data available in Refinitiv, and (iii) firms must have complete data across all variables required for the regression analysis. Based on these criteria, the final dataset consists of 595 firm-year observations from 119 unique firms.

This research adopts a quantitative explanatory design to examine the causal relationships among ESG performance, financial risk, and financial constraints. The descriptive phase presents summary statistics of the sample, while the explanatory phase employs panel regression techniques to test the proposed hypotheses, including the mediating role of financial constraints.

The independent variable is ESG performance, measured using both the aggregate ESG score and disaggregated scores for the Environmental (E), Social (S), and Governance (G) pillars. These scores reflect a firm's sustainability practices and corporate responsibility, compiled from over 500 standardized ESG indicators extracted from annual reports, sustainability disclosures, regulatory filings, and verified media sources by Refinitiv.

The dependent variable, financial risk, is measured using the Altman Z-Score, a widely used indicator of bankruptcy risk and financial distress. The Altman Z-Score is calculated as follows:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999Xs$$

Where : X_1 = Working Capital / Total Assets ; X_2 = Retained Earnings / Total Assets ; X_3 = EBIT / Total Assets ; X_4 = Market Value of Equity / Book Value of Total Liabilities ; X_5 = Sales / Total Assets.

A lower Z-Score indicates higher financial risk and a greater probability of distress, while a higher Z-Score suggests greater financial stability.

The mediating variable is financial constraints, measured using the SA Index developed by Hadlock and Pierce (2010), which evaluates a firm's difficulty in accessing external financing based on firm size and age. The formula is as follows:

$$\text{SA Index} = -0.737 \times \text{Size} + 0.043 \times \text{Size}^2 - 0.040 \times \text{Age}$$

Where *Size* is the natural logarithm of total assets, and *Firm Age* is the number of years since the firm's founding. A higher SA Index value indicates more severe financial constraints.

To control for additional firm-level and macroeconomic influences, the study includes six control variables: Firm Size (natural log of total assets), Board Size (number of directors), Asset Utilization Efficiency (CATO), measured as operating revenue divided by average current assets; Quick Ratio (QR), calculated as (current assets minus inventories) over current liabilities; Market Value (natural log of market capitalization at year-end); and GDP Growth, which captures country-level economic performance.

This comprehensive variable structure ensures the analysis can account for both internal firm characteristics and external economic factors that may influence firm-level risk.

Empirical Model

The empirical strategy applies panel regression with Two-Stage Least Squares (2SLS) estimation and Driscoll-Kraay standard errors to address heteroskedasticity, autocorrelation, and cross-sectional dependence. An additional model using Random Effects with clustered standard errors is employed as a robustness estimator for comparison.

To test the direct effect of ESG on financial risk, the following models are estimated:

Model 1: Direct effect of aggregate ESG on financial risk

$$RISK_{i,t} = \alpha_0 + \alpha_1 ESG_{i,t} + \sum_{j=2}^{6} \alpha_j Controls_{i,t} + \varepsilon_{1i,t}$$

Model 1a–1c: Replace ESG with E, S, and G pillars respectively.

To evaluate the mediating role of financial constraints, this study adopts a multi-step regression approach following Preacher & Hayes (2008):

Step 1 – Direct effect of ESG and its pillars on firm risk:

$$RISK_{i,t} = \alpha_0 + \alpha_1 ESG_{i,t} + \sum_{j=2}^{6} \alpha_j Controls_{i,t} + \varepsilon_{1i,t}$$

Step 2 – Effect of ESG and its pillars on financial constraints (proxied by the SA index):

$$SA_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \sum_{j=2}^{6} \beta_j Controls_{i,t} + \varepsilon_{2i,t}$$

Step 3 – Joint effect of ESG, financial constraints, and controls on firm risk:

$$RISK_{i,t} = \gamma_0 + \gamma_1 ESG_{i,t} + \gamma_2 SA_{i,t} + \sum_{j=3}^{7} \gamma_j Controls_{i,t} + \varepsilon_{3i,t}$$

These models are also run using the E, S, and G pillars individually.

Mediation is confirmed when ESG significantly affects SA (β_1), and SA significantly affects financial risk (γ_2), even if the direct effect of ESG on financial risk (α_1 or γ_1) becomes insignificant. As long as the indirect effect is statistically significant, partial or full mediation is validated (Preacher & Hayes, 2008; Zhao et al., 2010).

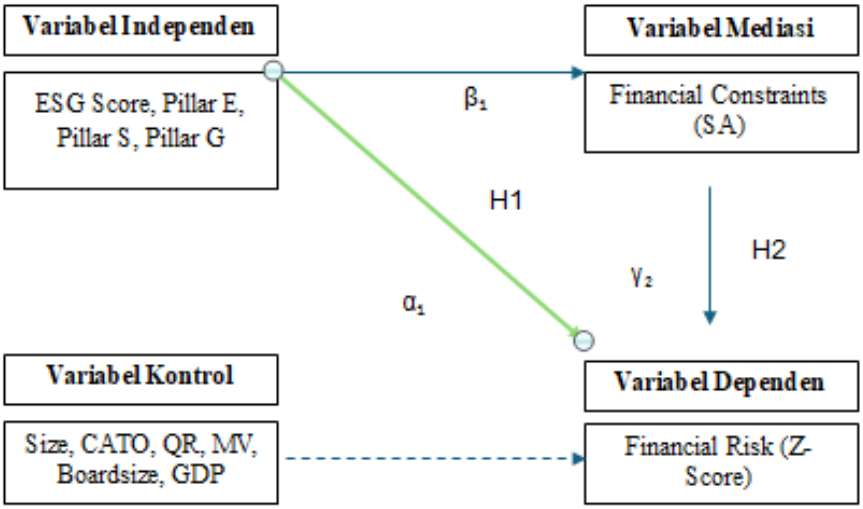

Figure 1. Research Model

RESULTS AND DISCUSSION
RESULT

Descriptive Statistics

The descriptive analysis of 119 non-financial publicly listed firms across ASEAN-5 countries from 2019 to 2023 offers a comprehensive overview of the dataset's structure, dispersion, and firm-level characteristics. The mean ESG score is 59.87 (SD = 15.66), with values ranging from 3.03 (Com7 PCL, Thailand, 2019) to 91.97 (Delta Electronics Thailand PCL, 2020), indicating substantial variation in ESG adoption among firms. Among the ESG components, the Environmental (E) score averages 56.27, with a wide range from 0.00 to 97.15, showing that while some firms lack environmental disclosures, others report robust environmental commitments. The Social (S) pillar shows a higher mean of 65.08, while the Governance (G) score averages 56.19, spanning from 2.43 to 97.58, reflecting diverse governance practices.

Financial risk is measured using the Altman Z-Score, a proxy for bankruptcy risk and overall financial stability. The Z-Score in the sample ranges from 0.26 to 26.87, with a mean of 3.65 (SD = 3.73), indicating significant heterogeneity in firm solvency levels across the region. A lower Z-Score signals a higher probability of financial distress, while higher scores suggest stronger financial health.

The mediating variable, financial constraints—measured using the SA Index—has a mean value of 3.45, with a minimum of –0.33 (PT Unilever Indonesia Tbk, 2023) and a maximum of 8.05 (PTT PCL, 2022), suggesting varied levels of firms' ability to access external financing. Higher SA values reflect more severe financial constraints, often experienced by smaller or younger firms.

This study also incorporates several control variables to capture both firm-level and macroeconomic influences: firm size (natural logarithm of total assets), board size (number of directors), market value (log of market capitalization), current asset turnover (CATO), quick ratio (QR), and GDP growth. While firm size and market value show relatively low variance, CATO, QR, and GDP growth exhibit broader distributions, indicating significant differences in liquidity, operational efficiency, and economic environments among firms in the sample.

To enhance the reliability of the regression analysis and reduce the influence of outliers, selected variables namely Altman Z-Score, CATO, and QR underwent winsorization at the 1st and 99th percentiles. This process successfully minimized the impact of extreme values while preserving the underlying data structure, thereby improving the robustness of panel regression estimates.

Table 1. Descriptive Statistic

Variable	Mean	Std. Dev.	Min	Max
ESG	59.87	15.66	3.03	91.97
E	56.27	21.75	0.00	97.15
S	65.08	17.69	4.93	98.03
G	56.19	21.24	2.43	97.58
Z	3.65	3.73	0.26	26.87
SA	3.45	1.54	-0.33	8.05
Size	21.99	1.31	18.56	25.33
gdp	0.02	0.04	-0.10	0.10
BoardSize	10.41	3.18	4.00	20.00
CATO	0.33	0.35	-0.46	2.31
QR	1.16	0.98	-1.02	8.74
MV	21.85	1.09	18.77	24.47
Z_w	3.630	3.606	0.555	20.186
CATO_w	0.329	0.334	-0.192	1.528

QR_w	1.146	0.911	0.094	5.150

Regression and Hypothesis Testing

This study employs panel data regression to examine the impact of ESG performance—both aggregate and disaggregated into Environmental, Social, and Governance pillars—on firm financial risk, measured by the Altman Z-Score. Financial constraints, represented by the SA Index, are tested as a mediating variable in the ESG–risk relationship. The Hausman test results indicate that Fixed Effects (FE) models are appropriate for most specifications involving financial risk, while Random Effects (RE) models are preferred for estimations where SA is the dependent variable due to the absence of significant firm-level fixed effects.

Diagnostic testing confirms that multicollinearity is not a concern, as all Variance Inflation Factor (VIF) values are below the threshold of 10 and correlation coefficients fall within acceptable ranges. Heteroskedasticity is present across all models; accordingly, Driscoll-Kraay standard errors are applied in FE estimations, and clustered standard errors are used in RE models. Endogeneity tests using the Durbin-Wu-Hausman method reveal that ESG variables are exogenous in the Z-Score models, while the financial constraints variable (SA Index) is endogenous when mediating the relationship between ESG and Z-Score. In response, Two-Stage Least Squares (2SLS) estimation is employed to address endogeneity in these models. Autocorrelation is also detected in Z-Score models, further supporting the use of robust standard error corrections to ensure the validity of inference.

This diagnostic-informed modeling approach ensures that the estimated results are robust, statistically sound, and suitable for analyzing the dynamics of ESG, financial constraints, and financial risk in ASEAN-5 listed firms.

The regression results demonstrate a nuanced relationship between ESG performance, financial constraints, and financial risk. In terms of direct effects, the aggregate ESG score has a marginally significant positive effect on the Altman Z-Score ($p = 0.089$), indicating that overall ESG engagement may reduce bankruptcy risk, although the statistical strength is limited. Among the ESG pillars, only the Social pillar (S) exhibits a statistically significant and positive relationship with the Z-Score ($p = 0.041$), suggesting that firms with stronger social responsibility practices tend to exhibit greater financial resilience. The Environmental (E) and Governance (G) pillars do not show significant effects on financial risk in this model.

Regarding control variables, firm size (Size) shows a negative and significant association with the Altman Z-Score, implying that larger firms may face heightened financial complexity or risk exposure in the ASEAN context. Conversely, asset utilization (CATO), liquidity (Quick Ratio), and market valuation (MV) all demonstrate positive and statistically significant effects,

underscoring their importance in supporting financial stability and reducing the likelihood of distress.

Overall, the findings support the theoretical proposition that ESG, particularly the Social dimension, can contribute to lowering financial risk in emerging markets. Furthermore, the results highlight the importance of firm-level financial indicators and internal efficiency in shaping solvency outcomes.

Table 2. Direct effect of ESG on financial risk

Variabel	Coeff./ *P-value*			
	Model 1 & 2 (ESG)	**Model 1a & 2a (E)**	**Model 1b & 2b (S)**	**Model 1c & 2c (G)**
ESG	0.0024908* 0.089			
E		0.0006594 0.516		
S			0.0102802** 0.041	
G				-0.0052941 0.143
Size	-2.154528*** 0.001	-2.14148*** 0.001	-2.214165*** 0.000	-2.095501*** 0.001
GDP	-0.1448327 0.860	-0.088883 0.916	-0.4206344 0.749	0.0652951 0.947
BoardSize	-0.0329187 0.348	-0.0337216 0.332	-0.0296492 0.362	-0.0376102 0.309
CATO	1.566794*** 0.000	1.567614*** 0.001	1.601016*** 0.001	1.592738*** 0.001
QR	0.2890368** 0.020	0.2904561** 0.020	0.2729668*** 0.003	0.2897686** 0.020
MV	2.779797*** 0.000	2.775088*** 0.001	2.794507*** 0.000	2.752006*** 0.001
R-squared	0.4440	0.4439	0.4474	0.4453

The regression results indicate that ESG scores, both in aggregate and across the individual pillars of Environmental, Social, and Governance, significantly reduce financial constraints as measured by the SA Index, with all coefficients being negative and statistically significant at the 1 percent level. The Environmental and Social pillars have stronger effects than Governance. These results suggest that better ESG performance improves firms' access to external financing, supporting signaling theory in the ASEAN-5 context.

Table 3. Effect of ESG and its pillars on financial constraints

Model	Variable	Coeff.	t-Statistik	*P-value*	F-Statistik	Prob > F	R-Squared
Model 3 (ESG)	ESG	-0.003283	-9.81	0.000	2493.03	0.0000	0.8073
Model 3a (E)	E	-0.002463	-9.92	0.000	2339.29	0.0000	0.8052
Model 3b (S)	S	-0.002401	-8.44	0.000	2212.61	0.0000	0.8056
Model 3c (G)	G	-0.000927	-2.75	0.006	2197.17	0.0000	0.8038

Furthermore, the study explores the mediating role of financial constraints (proxied by the SA Index) using a three-equation mediation model and the Two-Stage Least Squares (2SLS) method. The findings indicate that financial constraints significantly mediate the relationship between ESG performance and financial risk as measured by the Altman Z-Score. Specifically, the overall ESG score, as well as the Environmental and Social pillars, exhibit partial mediation—meaning that while financial constraints serve as an indirect channel, the direct effects of these ESG components on financial risk remain statistically significant. In contrast, the Governance pillar shows evidence of full mediation, as its influence on financial risk operates entirely through its impact on reducing financial constraints. These results suggest that financial constraints function as an important transmission mechanism through which ESG practices enhance firm-level financial stability and reduce bankruptcy risk.

Table 4. Effect of ESG on Financial Risk through Financial Constraints

Model	Variable	Coeff.	t-Statistik	*P-value*	F-Statistik	Prob > F	R-Squared
Model 4 (ESG)	ESG	0.022474	3.07	0.002	477.24	0.0000	0.6913
	SA	-0.2566719	-2.31	0.021	477.24	0.0000	0.6913
Model 4a (E)	E	0.0140294	2.71	0.007	482.27	0.0000	0.6898
	SA	-0.2991422	-2.82	0.005	482.27	0.0000	0.6898
Model 4b (S)	S	0.0159396	2.77	0.006	477.53	0.0000	0.6890
	SA	-0.2912862	-2.63	0.009	477.53	0.0000	0.6890
Model 4c (G)	G	0.0043942	0.95	0.340	494.19	0.0000	0.6852
	SA	-0.3317549	-2.92	0.004	494.19	0.0000	0.6852

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Table 5. Mediating Role of SA

	α_1	β_1	γ_1	γ_2	**Conclusion**
ESG	0.002491* 0.089	-0.003283*** 0.000	0.022474*** 0.002	-0.2566719** 0.021	Partial Mediation
E	0.000659 0.516	-0.002463*** 0.000	0.0140294*** 0.007	-0.2991422*** 0.005	Partial Mediation
S	0.010280** 0.041	-0.002401*** 0.000	0.0159396*** 0.006	-0.2912862*** 0.009	Partial Mediation
G	-0.005294 0.143	-0.000927*** 0.006	0.0043942 0.340	-0.3317549*** 0.004	Full Mediation

In summary, the results provide strong support for the theoretical argument that ESG performance, particularly the governance dimension, plays a critical role in enhancing financial stability by alleviating financial constraints and reducing the likelihood of bankruptcy. While environmental and social initiatives are ethically and socially important, their direct impact on financial risk appears less consistent compared to governance-related practices. These findings align with previous studies suggesting that in developing countries, ESG implementation may sometimes be symbolic, but strong governance structures are essential for achieving tangible improvements in a firm's financial risk profile (Broadstock et al., 2021; La Porta et al., 2000; Velte, 2017).

DISCUSSION

This study aimed to investigate the effect of Environmental, Social, and Governance (ESG) performance on corporate financial risk, proxied by the Altman Z-Score, and to assess the mediating role of financial constraints (SA Index) among publicly listed firms in ASEAN-5 countries. By integrating both direct and indirect effects within a panel regression framework and addressing key econometric issues such as endogeneity, heteroskedasticity, and autocorrelation, this study provides a robust empirical analysis of ESG's influence on firm-level financial risk.

The findings reinforce the relevance of ESG as a strategic mechanism for financial risk mitigation. Among the ESG dimensions, the Social (S) pillar is found to have a statistically significant and positive relationship with the Z-Score, indicating that strong social responsibility practices contribute to improved financial resilience. The Environmental (E) and Governance (G) pillars do not show direct effects on financial risk. However, the Governance pillar exhibits a full mediation effect through financial constraints, suggesting that it enhances financial health primarily by improving access to capital and reducing funding frictions. Meanwhile, the Environmental and

Social pillars demonstrate partial mediation, indicating both direct and indirect contributions to reducing bankruptcy risk.

These results are consistent with the theoretical foundations of agency theory (Meckling & Jensen, 1976), which emphasizes the role of governance in mitigating managerial opportunism and financial inefficiency. Similarly, signaling theory (Spence, 1978) is supported, as ESG practices—particularly in governance—serve as credible signals of firm quality, enhancing stakeholder confidence and facilitating financing. Stakeholder theory (Freeman & Phillips, 2002) is also validated, especially in the role of social responsibility in strengthening corporate legitimacy and long-term viability.

From a managerial perspective, these findings suggest that firms in ASEAN-5 should prioritize ESG strategies not only for ethical compliance or reputation but also as a means of reducing financial distress. Strengthening governance and social initiatives can yield tangible improvements in a firm's solvency and financial structure. Moreover, alleviating financial constraints appears to be a critical pathway through which ESG performance contributes to financial stability.

CONCLUSION

This study examined the direct and indirect effects of ESG performance on financial risk among non-financial publicly listed firms in ASEAN-5, with financial constraints (SA Index) serving as a mediating variable. Using panel data from 119 firms over the period 2019–2023, the findings reveal that the Social pillar has a significant direct effect in improving financial stability, while the Governance pillar exerts its influence indirectly through the alleviation of financial constraints. The Environmental pillar shows partial mediation but lacks a statistically significant direct effect.

The results validate the theoretical relevance of agency theory, stakeholder theory, and signaling theory in the context of emerging markets, where improving governance and social responsibility can meaningfully reduce default risk. These findings suggest that ESG strategies are not merely symbolic; they can play a substantive role in enhancing financial health, especially when firms face limited access to external financing.

While this research makes meaningful contributions to the ESG–risk literature, particularly within Southeast Asia, its generalizability remains limited to non-financial public firms with available ESG data. The study highlights the strategic value of ESG integration in strengthening internal financial structures and reducing bankruptcy risk.

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