

ESG Performance, Firm Size, and Profitability: Evidence from listed non-financial firms in Indonesia and Singapore

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Abstract

Purpose: This study examines whether Environmental, Social, and Governance (ESG) performance is associated with Return on Equity (ROE), whether firm size moderates the ESG–ROE relationship, and whether this differs between listed non-financial firms in Indonesia and Singapore during 2021–2024, integrating resource-based, agency, stakeholder, legitimacy, and signaling perspectives in a comparative panel framework.

Research Methodology: This study uses a quantitative panel-data design with 130 firm-year observations from 48 listed non-financial firms in Indonesia and Singapore over 2021–2024 (from 208 potential observations, excluding 78 incomplete cases). Firm size is the log of total assets in U.S. dollars from Bloomberg. Hypotheses are tested with firm fixed-effects models and clustered standard errors, with Driscoll–Kraay errors, leverage controls, and winsorization as robustness checks.

Results: The analysis yields robust null results across specifications; neither ESG performance, firm size, nor their interaction predicts ROE. Supplementary analysis, however, points to a marginally significant, more positive ESG–profitability relationship among Indonesian firms than Singaporean peers.

Conclusions: These results caution against assuming favorable global ESG-financial performance evidence transfers to this ASEAN panel, offering standard-setters, investors, and managers evidence on whether firm size is a precondition for ESG performance to pay off.

Limitations: The sample is restricted to publicly listed, non-financial firms with disclosed ESG scores, so findings do not extend to private or small unlisted firms.

Contributions: The study provides standard-setters, investors, and managers in Indonesia and Singapore evidence on whether firm size conditions ESG performance payoffs, informing how ASEAN regulators tailor disclosure rules across firms of different sizes.

Keywords: *ESG Performance, Firm Size, Indonesia, Profitability, Singapore*

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1. Introduction

Environmental, Social, and Governance (ESG) performance has become an increasingly important dimension of corporate evaluation as investors, regulators, and other stakeholders place greater emphasis on sustainability, transparency, and responsible corporate behavior. Beyond its normative importance, ESG performance is increasingly examined as a potential determinant of corporate financial outcomes. Firms that effectively manage environmental and social risks, maintain sound governance structures, and respond to stakeholder expectations may strengthen their reputation, reduce information asymmetry, improve stakeholder relationships, and enhance financial performance ([Freeman, 1984](#); [Friede, Busch, & Bassen, 2015](#)). Several studies document positive relationships between ESG performance, profitability, and firm value ([Alareeni, & Hamdan, 2020](#); [Aydoğmuş, Gülay, & Ergun, 2022](#); [Dinarjito, & Wibowo, 2026](#)). However, other studies report weak, insignificant, negative, or dimension-specific effects ([Al-Jalahma, Al-Fadhel, Al-Muhanadi, & Al-Zaimoor, 2020](#); [Helhel, Akgun, & Helhel, 2024](#)). These mixed findings suggest that the financial consequences of ESG performance may depend on firm-specific and institutional conditions rather than being universal across firms and markets.

This issue is particularly relevant in Southeast Asia, where sustainability reporting and ESG-related capital-market practices have developed within different institutional environments. Indonesia and Singapore provide a theoretically meaningful comparative setting because they are geographically proximate and economically interconnected, yet differ in regulatory quality, disclosure practices, investor sophistication, stakeholder pressures, and capital-market development. Regional evidence suggests that ESG practices can affect financial performance, although their effects vary across Southeast Asian firms and markets ([Le, 2024](#); [Yoshida, Xie, Managi, & Yamadera, 2024](#)). Moreover, regulatory quality and government effectiveness can influence the extent to which ESG performance generates financial benefits in Association of Southeast Asian Nations (ASEAN) countries ([Handoyo & Anas, 2024](#)). Rather than treating Indonesia and Singapore merely as two geographic groups, this study considers them distinct institutional settings in which similar ESG performance may be interpreted and rewarded differently.

Legitimacy Theory and Signaling Theory explain why the ESG–profitability relationship may vary across the two countries. From a legitimacy perspective, firms undertake sustainability activities and disclose non-financial information partly to demonstrate conformity with societal expectations and maintain access to critical resources ([Deegan, 2002](#)). Differences in regulatory requirements, stakeholder expectations, disclosure norms, and enforcement may therefore influence both the incentives to engage in ESG practices and the economic benefits obtained from them. Signaling Theory provides a complementary explanation: credible and standardized ESG information can reduce information asymmetry and communicate management quality, risk awareness, corporate responsibility, and long-term organizational capability to investors ([Spence, 1973](#)). However, the economic value of these signals depends on disclosure credibility, investor characteristics, and the broader information environment. Thus, comparing Indonesia and Singapore provides a theoretically grounded test of whether institutional context conditions the financial consequences of ESG performance rather than merely offering a descriptive cross-country comparison.

A further unresolved issue concerns the role of firm size. Firm size is commonly included in ESG–financial performance models as a control variable because larger firms generally possess more resources, broader market access, greater public visibility, and stronger organizational capabilities. Nevertheless, these characteristics also suggest that firm size may influence how effectively ESG investments are transformed into profitability. Under the Resource-Based View, differences in firm resources and capabilities determine their ability to generate sustained economic value ([Barney, 1991](#)). Larger firms may possess greater financial slack, specialized sustainability personnel, stronger information systems, technological capabilities, financing access, and managerial expertise. They may also spread the fixed costs of ESG implementation across a broader operating base and integrate ESG considerations more effectively into operations, risk management, supply-chain management, and strategic decision-making. Previous studies support the possibility that firm size conditions the

financial consequences of sustainability and ESG practices ([Abdi, Li, & Càmara-Turull, 2022](#); [Fathihani, Santoso, Sulistiyowati, & Veronica, 2025](#); [Risal, Mustaruddin, & Afifah, 2024](#)).

In contrast, smaller firms may face tighter financial and managerial constraints, causing ESG initiatives to represent a relatively larger expenditure and compete with investment in core operating activities. Consequently, the financial benefits of improved ESG performance may take longer to materialize or may not offset implementation costs within a short observation period. However, Agency Theory offers a competing explanation for the role of firm size. Although larger firms possess greater resources, these resources can increase managerial discretion and create opportunities for symbolic ESG activities, excessive sustainability expenditure, or initiatives that provide reputational benefits without proportional financial returns ([Jensen & Meckling, 1976](#)). Greenwashing may further weaken the credibility and financial value of ESG activities ([Hadaming & Rayyani, 2026](#)). Accordingly, a positive ESG $\times$ Firm Size effect would support the resource-based explanation, whereas a negative effect would be more consistent with agency costs. An insignificant effect could indicate that resource advantages and agency costs offset each other.

Existing empirical evidence reinforces this theoretical ambiguity. Some studies find that firm size significantly moderates the relationship between ESG disclosure and corporate performance, whereas others report weak, negative, or insignificant moderating effects ([Dihardjo, & Hersugondo, 2023](#); [Fathihani et al., 2025](#)). Research has also questioned whether firm size may confound the relationship between corporate social and financial performance. Furthermore, some studies find that only particular ESG dimensions, especially governance, significantly affect corporate outcomes, while environmental and social dimensions do not consistently generate financial benefits ([Alareeni & Hamdan, 2020](#)). Indonesian evidence similarly reports varying relationships among ESG disclosure, profitability, and firm value ([Bella, Syafitri, & Pebriani, 2026](#); [Dinarjito and Wibowo, 2026](#)). Although regional studies identify positive ESG effects, pooling heterogeneous ASEAN markets may obscure differences in the regulatory, disclosure, investor, and stakeholder environments of individual countries.

These limitations leave two related research problems unresolved: whether organizational scale represents a genuine boundary condition for ESG value creation and whether the financial consequences of ESG performance differ between Indonesia and Singapore after controlling for firm-specific characteristics. To address these issues, this study examines listed non-financial firms in Indonesia and Singapore during 2021–2024 and uses Return on Equity (ROE) as the measure of profitability. The empirical framework distinguishes three conceptually different relationships: the direct association between ESG performance and ROE, the moderating effect of firm size through an ESG $\times$ Firm Size interaction, and the cross-country difference through an ESG $\times$ Indonesia interaction. The country interaction is therefore not an alternative test of firm-size moderation but a separate assessment of institutional heterogeneity. This study contributes by treating firm size as an active moderator, comparing Indonesia and Singapore as theoretically distinct institutional environments, and integrating stakeholder, legitimacy, signaling, resource-based, and agency perspectives to explain why ESG performance may generate different financial consequences across firms and markets.

2. Literature Review and Hypotheses Development

2.1 Theoretical Foundations

Stakeholder Theory provides the primary foundation for the expected relationship between ESG performance and profitability. Firms depend on stakeholders including employees, customers, suppliers, regulators, communities, and investors for resources, legitimacy, and organizational continuity ([Freeman, 1984](#)). Strong ESG performance can address stakeholder expectations, reduce conflict and reputational costs, and strengthen employee commitment, customer trust, and investor confidence. These benefits may support stable revenues and improved financial outcomes. Therefore, higher ESG performance is expected to increase ROE, providing the theoretical basis for H_1 .

Legitimacy Theory and Signaling Theory explain why the financial effects of ESG performance may differ across countries. Firms use ESG activities and disclosures to demonstrate conformity with prevailing social and institutional expectations, thereby maintaining access to legitimacy and resources ([Deegan, 2002](#)). ESG performance can also signal management quality, risk awareness, long-term orientation, and corporate responsibility while reducing information asymmetry ([Spence, 1973](#)). However, the value of legitimacy and ESG signals depends on regulatory expectations, disclosure credibility, investor sophistication, and market institutions. Differences in these conditions between Indonesia and Singapore may cause ESG performance to produce different financial outcomes, providing the theoretical basis for H_4 .

The Resource-Based View (RBV) explains why firm size is treated as a moderator rather than merely as a control variable. Firms differ in their resources and capabilities, which affect their ability to generate economic value ([Barney, 1991](#)). Larger firms may more easily absorb ESG implementation costs, distribute them across a broader operating base, and use specialized personnel, information systems, financing access, and managerial capacity to integrate ESG into operations and strategy. Smaller firms, by contrast, may face tighter resource constraints, making ESG initiatives relatively more costly and potentially diverting resources from core activities. RBV therefore predicts that firm size strengthens the marginal effect of ESG performance on ROE.

Agency Theory offers a competing explanation. Although larger firms possess greater resources, these resources may increase managerial discretion and encourage symbolic ESG activities, excessive sustainability expenditure, or initiatives that do not generate proportional shareholder returns ([Jensen & Meckling, 1976](#)). Firm size may therefore weaken, rather than strengthen, the ESG–profitability relationship. Accordingly, firm size represents an empirically testable boundary condition: a positive and significant ESG $\times$ Firm Size coefficient supports the RBV mechanism, a negative and significant coefficient supports the agency-cost explanation, and an insignificant coefficient suggests that resource advantages and agency costs may offset each other. These competing predictions provide the theoretical basis for H_3 .

2.2 ESG Performance and Profitability

The relationship between corporate sustainability and financial outcomes has been the subject of extensive empirical scrutiny. The most comprehensive meta-analysis in this field, synthesizing results from over 2,000 primary studies, points to a non-negative association in approximately ninety percent of cases, with positive correlations holding across most asset classes and regions ([Friede, Busch, & Bassen, 2015](#)). Beyond Southeast Asia, empirical research frequently confirms this positive trajectory. For instance, strong ESG performance is associated with enhanced corporate value and profitability among S&P 500 constituents by [Alareeni and Hamdan \(2020\)](#), as well as within specialized sectors such as the European food industry and the global aviation sector, where the profitability-enhancing effects of sustainability are particularly pronounced among larger, more mature firms ([Abdi, Li, & Càmara-Turull, 2022](#); [Aydoğmuş, Gülay, & Ergun, 2022](#)). ESG performance has similarly been linked to higher firm value more broadly by [Quintiliani \(2022\)](#), though this relationship appears conditional on the materiality of the specific ESG issues disclosed rather than the composite score alone, and financial performance itself has been shown to mediate the path from ESG performance to firm value ([Rayis, Juanda, & Wicaksono, 2025](#); [Ben, & Kooli, 2025](#)).

However, empirical findings from the Indonesian capital market are significantly more fragmented. Within the Indonesian banking sector, researchers find that ESG disclosures enhance Return on Assets (ROA) far more effectively for large-scale institutions than for smaller banks, lending support to the resource-based view ([Fathihani, Santoso, Sulistiyowati, & Veronica, 2025](#)). By contrast, evidence from the energy sector suggests that while ESG scores and company size independently influence firm value, their interactive term remains statistically insignificant, with the positive link between ESG and firm value being moderated solely by standalone accounting returns ([Dorothy & Endri, 2024](#)). Furthermore, manufacturing-sector studies demonstrate that composite ESG scores often obscure divergent, pillar-level effects, as governance disclosures frequently drive firm value while environmental and social metrics yield negligible direct impacts ([Bella, Syafitri, & Pebriani, 2026](#);

[Dinarjito, & Wibowo, 2026](#)). This governance-centric pattern recurs elsewhere in the Indonesian literature: corporate governance quality is found to moderate the profitability payoff of both ESG disclosure and green innovation ([Ayu, Pujiati, & Dewi, 2026](#)), and firm value more broadly responds to governance quality through the strategic changes it enables ([Bagh, Hunjra, & Corbet, 2025](#)). At the same time, evidence from Indonesian manufacturing firms warns that greenwashing symbolic rather than substantive ESG activity can erode rather than enhance financial performance and profitability by [Hadaming and Rayyani \(2026\)](#), even as firms that pursue a genuinely sustainable green strategy are found to improve their financial performance ([Sukiranto, Suhariyanto, & Sumaryo, 2025](#)). Most notably, some Indonesian evidence using moderated regression designs reveals a negative direct relationship between ESG disclosure and ROA, which is only partially offset by organizational scale a pattern that contradicts global consensus and emphasizes the need for a direct comparative analysis between different ASEAN regulatory regimes ([Risal, Mustaruddin, & Afifah, 2024](#)).

Regional comparative studies across ASEAN add further complexity. While some multi-country panel analyses identify a positive relationship between one-year lagged ESG scores and financial returns, others find that once country-level regulatory quality and government effectiveness are controlled, only the governance pillar exerts a statistically significant effect on firm performance ([Handoyo, & Anas, 2024](#); [Le, 2024](#)). This governance-dominant pattern is echoed in neighboring Thailand, where governance is found to moderate the ESG-firm performance relationship more strongly than the environmental or social pillars ([Charoensuk, Pholkaew, & Dampitakse, 2026](#)). Similarly, broader Asian studies demonstrate that the financial returns to sustainability are highly contingent upon country-level institutional development, with wealthier and more transparent markets like Singapore expected to yield a more robust ESG-profitability link than emerging regulatory environments like Indonesia ([Yoshida, Xie, Managi, & Yamadera, 2024](#)).

2.3 Firm Size and Profitability

Organizational scale remains one of the most consistent determinants of profitability, typically through economies of scale, bargaining power, cheaper credit, and risk diversification ([Chandra, Wijaya, Angelia, & Hayati, 2020](#); [Radja, Artini, & Gede, 2020](#)). Indonesian manufacturing evidence confirms that size enhances value independently of capital structure, and cross-border Indonesia–Malaysia evidence shows larger firms disclose more, suggesting scale is a prerequisite for implementing and reporting sustainability programs ([Radja et al., 2020](#); [Zulfikar, 2021](#)). Firm size also conditions how specific environmental disclosures translate into profitability ([Lee, & Suhendah, 2026](#); [Putra, Zoraya, & Usman, 2026](#)). Classical methodological warnings caution that omitting size interactions can confound results, since larger firms are simultaneously more visible to regulators, better resourced for ESG, and more profitable for unrelated reasons ([Orlitzky, 2001](#)). This direct size–profitability relationship is conceptually distinct from the moderation mechanism above, such as H_2 concerns whether size is directly associated with ROE, while H_3 concerns whether size changes the marginal ESG effect on ROE.

2.4 ESG–Firm Size Interaction and Country Context

Our research design deviates from the existing literature in two significant ways. First, the majority of Indonesian studies treat company size solely as a standard control variable rather than an active moderator of the ESG-profitability slope; where interactive models have been estimated, the results remain highly contradictory in terms of both sign and statistical significance for instance, firm size has been reported to moderate the ESG-firm value relationship in one Indonesian sample yet not in others ([Iskandar Dan & Handayani, 2025](#)). Second, most cross-border ASEAN studies rely on aggregated panel data, thereby losing the ability to isolate the specific institutional dynamics of the Indonesia–Singapore matched pair. This is a critical omission, as prior research indicates that geographic and institutional context alters the relationship between corporate sustainability disclosures and financial returns, highlighting the need to account for exchange-specific regulatory landscapes and investor behaviors ([Risal, Giriati, Wendy, & Malini, 2023](#)).

2.5 Hypothesis Development

Drawing on the theoretical perspectives and empirical evidence discussed above, this study examines the relationship between ESG performance and firm profitability, while considering the moderating role of firm size and differences between the Indonesian and Singaporean contexts. Accordingly, the study proposes four hypotheses to assess the direct effects of ESG performance and firm size, the moderating effect of firm size on the ESG–profitability relationship, and whether this relationship varies across the two markets:

H₁: ESG performance is positively associated with the profitability of listed firms in Indonesia and Singapore

H₂: Firm size is positively associated with the profitability of listed firms in Indonesia and Singapore

H₃: Firm size positively moderates the relationship between ESG performance and profitability, such that the ESG–profitability relationship is stronger among larger firms

H₄: The ESG–profitability relationship differs in strength between Indonesia-listed and Singapore-listed firms

3. Research Methodology

3.1 Research Design

This study employs a quantitative, explanatory panel-data design to examine the relationships between Environmental, Social, and Governance (ESG) performance, firm size, and profitability. Following established comparative methodologies in Asian markets ([Yoshida, Xie, Managi, & Yamadera, 2024](#)), the design isolates and compares two distinct sub-panels: companies listed on the Indonesia Stock Exchange (IDX) and those listed on the Singapore Exchange (SGX). This comparative setup allows the study to account for unique market-level institutional contexts ([Risal, Giriati, Wendy, & Malini, 2023](#)). The analysis is first executed on the individual sub-panels and subsequently pooled in a joint specification incorporating a country-interaction term to formally test regional variations in the ESG-profitability slope ([Handoyo & Anas, 2024](#)).

3.2 Population and Sample

The starting dataset contains 52 eligible non-financial firms: 12 Indonesian firms and 40 Singaporean firms. With four fiscal years for each firm, the starting frame contains 208 potential firm-year observations. The key explanatory variable, ESG performance, is not available for all potential firm-years. Rather than replacing missing ESG scores mechanically, the baseline analysis uses only observations for which all variables required by the model are observed. This approach avoids introducing artificial variation into the key explanatory variable.

The screening sequence is deliberately reported in chronological order. First, the 208 potential firm-year observations were identified from the 52 firms. Second, 78 firm-year observations with incomplete required data principally missing ESG scores were excluded. This left 130 complete firm-year observations: 36 from 12 Indonesian firms and 94 from 36 Singaporean firms. Third, an outlier diagnostic based on the 1.5×IQR rule was applied to the complete sample. The diagnostic flagged 16 unique observations across ROE, leverage, and current ratio, but these observations were not deleted from the principal estimation sample. The final analytical sample therefore remains 130 observations. This distinction is important, such as the outlier procedure is reported as a diagnostic and sensitivity exercise, not as an unexplained deletion step.

Table 1. Chronological sample screening and final observation count

Screening stage	Indonesia	Singapore	Total
Eligible firms in starting frame	12	40	52
Potential firm-year observations (4 years)	48	160	208
Incomplete observations excluded	12	66	78
Complete observations after data screening	36	94	130

Screening stage	Indonesia	Singapore	Total
Firms represented in final analytical sample	12	36	48
Unique observations flagged by 1.5×IQR diagnostic	5	11	16
Observations removed solely because of outlier flag	0	0	0
Final analytical observations	36	94	130

Table 1 clarifies the change in sample size requested during the review process. The reduction from 208 to 130 observations is driven by incomplete required data, particularly the availability of ESG scores. The subsequent outlier diagnostic does not reduce the final sample because the flagged observations are retained in the principal analysis. This presentation prevents the common ambiguity in which a paper reports both outlier deletion and an unchanged observation count.

3.3 Variable Measurement

The variables used in this empirical framework are operationalized and supported by established corporate finance and sustainability literature. Profitability, as the dependent variable, is proxied by Return on Equity (ROE), calculated as net income divided by total equity, which is widely used to evaluate how effectively management generates earnings from shareholders' investment (Bella et al., 2026; Risal et al., 2024). ESG performance, as the independent variable, is measured using the firm's composite ESG score for each fiscal year, with standardized third-party scores ensuring comparability across international exchanges and reducing the subjective bias associated with self-constructed disclosure indices (Le, 2024; Yoshida et al., 2024). Firm size, as the moderating variable, is operationalized as the natural logarithm of total assets, reflecting the resources and organizational capacity required to convert ESG activities into valuable capabilities rather than mere cost burdens (Barney, 1991), while its inclusion as a moderator addresses the potential confounding effect of size on the ESG–financial performance relationship (Orlitzky, 2001). Liquidity is included as a control variable and measured using the Current Ratio, calculated as current assets divided by current liabilities (Radja et al., 2020).

Table 2. Variable definitions and measurement

Variables	Role	Operational definition	Data treatment
ROE	Dependent	Net income / shareholders' equity	Observed annual value
ESG performance	Independent	Composite ESG score	Observed annual score; missing observations excluded
Firm size	Moderator	ln(total assets)	Total assets recalculated from Bloomberg U.S.-dollar data
ESG × Firm size	Interaction	Mean-centered ESG × mean-centered firm size	Constructed after centering
Current ratio	Control	Current assets / current liabilities	Observed annual value
Leverage	Robustness control	Debt / total assets	Added only in sensitivity specification

Table 2 summarizes how each variable is operationalized and treated in the analysis, distinguishing the dependent, independent, moderating, and control variables and clarifying which measures were reconstructed during the revision (notably firm size, recalculated from Bloomberg U.S.-dollar total-asset data) versus which were used as originally observed. Firm size is the natural logarithm of total assets. For Indonesia, total-asset values are taken from columns P–S; for Singapore, from columns H–K. The same U.S.-dollar basis is used before transformation, so cross-country differences in the resulting size measure are not generated by different reporting currencies. ESG and firm size are mean-centered before their interaction is formed, which does not change the fitted values but makes the main effects interpretable at the sample mean and reduces non-essential multicollinearity between the interaction and its component terms.

3.4 Data Analysis Technique

The study estimates panel-data regression models to test the proposed hypotheses. Model selection follows a sequential statistical procedure involving Pooled Ordinary Least Squares (POLS), Random Effects (RE), firm Fixed Effects (FE), and correlated random effects (CRE/Mundlak). First, the Chow-type/F test compares POLS with panel-data models by testing the joint significance of firm-specific effects. A significant result indicates that firm-specific heterogeneity is present, making POLS inappropriate. Otherwise, POLS is retained as the more parsimonious specification.

Second, the Hausman test compares RE and FE. Its null hypothesis assumes that individual effects are uncorrelated with the explanatory variables, meaning that RE is consistent and more efficient. Thus, a significant result supports FE, whereas a non-significant result indicates that RE cannot be rejected. Third, because the Hausman test may have limited power in short and unbalanced panels, the Mundlak CRE approach is used as an additional diagnostic. This model adds firm-level means of time-varying explanatory variables to the RE specification. Jointly significant Mundlak terms indicate that unobserved firm effects are correlated with the regressors, supporting an FE interpretation. Conversely, insignificant terms provide no evidence against the conventional RE assumption.

The results are interpreted jointly. The Chow-type test identifies significant firm-specific heterogeneity and rules out POLS. Although the Hausman test does not reject RE, the FE specification is retained because the study focuses on within-firm changes in ESG performance and firm size. This choice is also evaluated using RE/CRE specifications, Driscoll–Kraay standard errors, leverage controls, and 1% winsorization. For H_3 , Moderated Regression Analysis (MRA) is incorporated into the FE framework:

$$ROE_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3(ESG \times SIZE)_{it} + \beta_4 CR_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

Equation 1 shows the model used to examine whether firm size moderates the relationship between ESG performance and ROE. Here, i denotes the firm, t denotes the year, μ_i represents firm-specific effects, and λ_t represents year effects. The coefficient β_3 tests H_3 . A positive and significant coefficient supports the RBV-based prediction that larger firms obtain greater profitability benefits from ESG performance. A negative and significant coefficient supports the agency-cost explanation that greater resources may encourage managerial discretion and ESG overinvestment.

H_4 is tested separately by adding an interaction between ESG performance and the Indonesia indicator:

$$ROE_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3(ESG \times SIZE)_{it} + \beta_4 CR_{it} + \beta_5 Indonesia_i + \beta_6(ESG \times Indonesia_i) + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

Equation 2 shows the country-interaction model used to determine whether the ESG–ROE relationship differs between Indonesian and Singaporean firms. The coefficient β_6 captures the difference in the ESG–ROE slope between the two countries. Therefore, this model specifically tests H_4 and does not replace the firm-size moderation test for H_3 .

4. Results and Discussions

4.1 Descriptive Statistics

Table 3 reports descriptive statistics for the core study variables by country. Indonesian firms have a mean ROE of 15.21%, compared with 6.03% for Singaporean firms, and a higher mean ESG score (35.81 versus 17.24). These are descriptive differences and should not be interpreted as causal country effects because the two sub-panels differ in composition and observation counts.

Table 3. Descriptive statistics by country, 2021–2024

Variables	Indonesia Mean (SD)	Singapore Mean (SD)	Indonesia Min-Max	Singapore Min-Max
ROE	0.1521 (0.0813)	0.0603 (0.0433)	0.0160-0.4337	-0.0718-0.2212
ESG score	35.8125 (6.7498)	17.2418 (6.9041)	23.0500-50.6400	8.4700-42.6300
Firm size, ln(USD total assets)	7.6408 (0.0486)	9.3315 (0.1439)	7.5595-7.7596	8.7217-9.5499
Current ratio	2.1064 (0.9461)	2.0929 (3.1383)	1.2300-4.4500	0.0851-23.6377
Leverage	0.3575 (0.1105)	0.3757 (0.1379)	0.1455-0.5583	0.0278-0.8382
N	36	94	-	-

The firm-size measure has a mean of 7.64 in Indonesia and 9.33 in Singapore. Because the underlying total assets are placed on a common U.S.-dollar basis before the logarithmic transformation, the cross-country comparison is interpretable on a common monetary scale; the relatively narrow Indonesian size range reflects the particular firms retained in the sample, while the Singaporean observations display a wider range. Liquidity has nearly identical means across the two markets (2.11 in Indonesia and 2.09 in Singapore), but Singapore exhibits substantially greater dispersion. Leverage is also similar in mean terms, with somewhat greater dispersion in Singapore.

4.2 Correlation Analysis

Table 4. Pairwise correlations among study variables

Variables	ROE	ESG	Firm size	Current ratio	Leverage
roe	1.000	0.585	-0.599	-0.038	-0.036
esg	0.585	1.000	-0.776	0.169	-0.154
size	-0.599	-0.776	1.000	-0.006	0.054
cr	-0.038	0.169	-0.006	1.000	-0.547
lev	-0.036	-0.154	0.054	-0.547	1.000

Table 4 presents the pairwise correlations among the study variables. The results show a moderate positive correlation between ESG performance and ROE ($r = 0.585$), indicating that firms with higher ESG scores tend to report higher profitability at the bivariate level, while firm size is negatively correlated with ROE ($r = -0.599$), suggesting that larger firms tend to exhibit lower ROE in the sample. ESG performance and firm size also have a strong negative correlation ($r = -0.776$), indicating substantial overlap between the two variables and the need to assess potential multicollinearity using VIF and tolerance values. The current ratio has a negligible correlation with ROE ($r = -0.038$), while leverage is also weakly correlated with ROE ($r = -0.036$). Since firm size is specified as a moderating variable, ESG performance and firm size should be centered before constructing the interaction term to facilitate interpretation and reduce non-essential multicollinearity between the interaction term and its constituent variables; however, centering does not eliminate the underlying correlation between ESG and firm size. Overall, these correlations are descriptive and do not establish causal relationships or account for firm-specific heterogeneity, time effects, and the panel structure of the data, which must therefore be addressed through the appropriate panel regression model.

4.3 Diagnostic Tests and Model Selection

Table 5. Diagnostic and model-selection tests

Test	Statistic	p-value	Conclusion
Breusch–Pagan heteroskedasticity	LM = 12.451	0.014	Detected
Wooldridge-style serial correlation	$\rho = -0.525$	0.799	Not detected
Pesaran cross-sectional dependence	CD = 1.091	0.275	Not detected
Firm FE vs pooled OLS	$F = 5.989$	< .001	Firm effects relevant
Hausman FE vs RE	$\chi^2 = 1.546$	0.818	RE not rejected
Mundlak joint test	$\chi^2 = 3.754$	0.440	No correlated-effects evidence

Table 5 presents the diagnostic and model-selection tests used to determine the appropriate estimation approach. The results indicate significant heteroskedasticity, while the tests for serial correlation and cross-sectional dependence are not statistically significant. The firm-effects test strongly rejects pooled OLS ($p < 0.001$), confirming the presence of firm-specific heterogeneity, whereas the Hausman and Mundlak tests do not reject the random-effects structure. Nevertheless, firm fixed effects are retained as the principal within-firm specification, with the diagnostic and model-selection results reported transparently to justify the estimation strategy rather than implying that a single estimator is uniquely determined by the tests.

4.4 Main Regression Results: Hypothesis 1 – Hypothesis 3

Table 6. Principal firm fixed-effects regression with firm-clustered standard errors

Variables	Coefficient	Clustered SE	p-value
ESG (centered)	0.002038	0.001419	0.151
Firm size (centered)	-0.034293	0.098488	0.728
ESG $\times$ Firm size	0.001108	0.002110	0.600
Current ratio	-0.000783	0.001080	0.469
Firm fixed effects	Yes		
Observations	130		
Firms	48		

As Table 6 shows, the ESG coefficient is positive ($\beta = 0.002038$) but statistically insignificant ($p = .151$), a failure to detect a statistically reliable short-run association between ESG performance and ROE rather than proof that ESG has no economic value; the positive sign remains directionally consistent with stakeholder, legitimacy, and signaling arguments, but the estimate is not sufficiently precise to support a positive profitability effect. Firm size is negative and statistically insignificant ($\beta = -0.034293$, $p = .728$), not supporting H_2 's expectation of a positive direct size–profitability association; size may simultaneously capture complexity, asset intensity, and organizational structures that do not translate automatically into higher ROE. The ESG $\times$ firm-size coefficient is positive ($\beta = 0.001108$) but insignificant ($p = .600$), so H_3 is not supported in the principal specification; the positive coefficient is directionally consistent with the RBV argument that larger firms may better absorb ESG costs, but the data do not provide sufficient evidence that the marginal ESG–ROE relationship strengthens with firm size.

Table 7. Marginal ESG effect at alternative firm-size levels

Firm-size level	Marginal ESG coefficient	Interpretation
Low (−1 SD)	0.001185	Positive numerical effect; not statistically confirmed
Mean	0.002038	Positive numerical effect; not statistically confirmed
High (+1 SD)	0.002891	Positive numerical effect; not statistically confirmed

Table 7 illustrates this pattern numerically: the marginal ESG effect increases from approximately 0.00119 at one standard deviation below mean firm size to 0.00289 at one standard deviation above the mean. This pattern is consistent with the positive interaction coefficient but should not be described as statistically confirmed moderation, since the interaction term itself is not significant.

4.5 Country Difference in the ESG–ROE Slope (Hypothesis 4)

Table 8. Supplementary country-interaction model for H4

Variables	Coefficient	Clustered SE	p-value
ESG (centered)	-0.003145	0.002718	0.247
Firm size (centered)	-0.145112	0.115438	0.209
ESG × Firm size	0.011171	0.004971	0.025
Current ratio	-0.000707	0.001016	0.486
ESG × Indonesia	0.017980	0.008739	0.040
Observations	130		
Firms	48		

As Table 8 shows, the ESG × Indonesia coefficient is positive and statistically significant at the 5% level ($\beta = 0.017980$, $p = .040$); conditional on the model covariates, the ESG–ROE slope for Indonesian firms is estimated to be more positive than for Singaporean firms, a finding materially different from the earlier manuscript's interpretation because firm size has now been recalculated from common-currency Bloomberg inputs. The result should nevertheless be interpreted with care: H_4 is a supplementary cross-market comparison rather than the primary moderation hypothesis, the same table shows a significant ESG × firm-size coefficient ($p = .025$) in this specification, and when leverage is added the ESG × Indonesia coefficient falls to $p = .059$. The most defensible conclusion is that the revised data provide evidence of country heterogeneity in the main specification, but the strength of that evidence is sensitive to additional model conditioning. The positive country interaction is consistent with Legitimacy and Signaling Theory, if institutional and information environments differ between markets, the economic meaning of a common third-party ESG score may also differ, so the result is better understood as evidence of contextual heterogeneity than proof that one country is inherently superior in ESG management.

4.6 Driscoll–Kraay Robustness and Sensitivity Analysis

Table 9. Firm fixed-effects model with Driscoll–Kraay standard errors

Variables	Coefficient	DK SE	p-value
ESG (centered)	0.002038	0.000637	0.002
Firm size (centered)	-0.034293	0.109785	0.756
ESG × Firm size	0.001108	0.001451	0.449
Current ratio	-0.000783	0.000434	0.078
Observations	130		

As Table 9 shows, ESG becomes statistically significant under the DK covariance estimate ($p = .002$), while firm size ($p = .756$) and the ESG × firm-size interaction ($p = .449$) remain insignificant, and current ratio remains insignificant at the 5% level ($p = .078$). The point estimate for ESG is unchanged

because it comes from the same fixed-effects specification; what changes is the estimated covariance structure. The principal conclusion about H_3 is therefore comparatively stable, while the direct ESG inference is estimator-sensitive; because the panel has only four annual periods, the Driscoll–Kraay (DK) result is treated as a sensitivity result rather than a reason to replace the principal clustered specification. The revised diagnostics do not show significant Pesaran cross-sectional dependence, so DK is reported as an additional sensitivity estimator rather than a correction required by a confirmed dependence problem, which is more consistent with the revised data than the earlier manuscript, which had reported significant cross-sectional dependence.

4.7 Leverage and Outlier Sensitivity

Table 10. Robustness and sensitivity specifications

Specification	ESG $\times$ Firm size β	p-value	ESG $\times$ Indonesia β	p-value
Principal FE + clustered SE	0.001108	0.600	0.017980	0.040
FE + leverage + clustered SE	0.001329	0.553	0.019248	0.059
1% winsorized FE + clustered SE	0.000389	0.803	-	-

Table 10 reports additional robustness and sensitivity specifications. Adding leverage does not change the substantive conclusion for H_3 : the ESG $\times$ firm-size coefficient remains positive but insignificant ($\beta = 0.001329$, $p = .553$), while leverage itself is insignificant, and the country interaction remains positive but becomes marginal rather than conventionally significant ($\beta = 0.019248$, $p = .059$), suggesting the H_4 finding is less robust to additional capital-structure controls than the null moderation result. The 1% winsorized sensitivity test in Table 10 also preserves the substantive conclusion for H_3 : the interaction coefficient falls to 0.000389 with $p = .803$, indicating that the lack of statistically supported moderation is not driven by a small number of extreme observations. Overall, the sensitivity analysis supports a cautious conclusion: firm size does not emerge as a statistically reliable boundary condition for the ESG–ROE relationship in this sample.

4.8 Discussion

4.8.1 Hypothesis 1: ESG Performance and Profitability

The principal model produces a positive but statistically insignificant association between ESG performance and ROE ($\beta = 0.002038$, $p = .151$); H_1 is not supported. From a Stakeholder Theory perspective, this does not necessarily challenge the proposition that effective stakeholder management creates economic value; rather, potential benefits from reputation, employee commitment, customer relationships, and risk reduction may require more time to materialize than this four-year panel captures. The finding also qualifies Legitimacy and Signaling Theory, such as financial benefits from legitimacy or credible signaling may depend on institutional environment, information credibility, and time horizon, and a composite ESG score aggregates dimensions whose financial materiality differs across firms and industries. The result is consistent with prior studies reporting insignificant or context-dependent ESG effects, contributing a qualification to the literature that favorable global evidence should not automatically be assumed to hold in every institutional setting.

An important qualification is statistical power: the analysis rests on only 130 firm-year observations from 48 firms, with only eight firms observed across all four years, and 78 of 208 potential observations were excluded for incomplete data. These characteristics make it difficult to distinguish a genuinely negligible effect from a modest effect the sample is underpowered to detect, so the null H_1 finding should be read as insufficient evidence rather than evidence of no relationship.

4.8.2 Hypothesis 2: Firm Size and Profitability

Firm size is negative and statistically insignificant ($\beta = -0.034293$, $p = .728$); H_2 is not supported. This distinguishes the direct effect of size from its proposed moderating role, such as larger firms may possess greater resources and bargaining power, but these advantages may be offset by asset intensity, organizational complexity, and managerial costs. From RBV, the absence of a significant direct effect suggests that resource availability alone does not guarantee superior profitability. Resources must be

deployed through valuable, well-coordinated capabilities, so the insignificant H_2 result qualifies rather than rejects RBV. This distinction matters for interpreting H_3 , whose theoretical relevance concerns whether the marginal profitability effect of ESG differs with firm size, not whether large firms are simply more profitable.

4.8.3 Hypothesis 3: Firm Size as a Moderator

The ESG $\times$ Firm Size interaction is positive but statistically insignificant ($\beta = 0.001108$, $p = .600$); H_3 is not supported. The positive coefficient is directionally consistent with the RBV prediction that larger firms convert ESG activity into value more effectively, through financial slack, specialized personnel, stronger information systems, and greater managerial capacity for absorbing ESG implementation costs, but the absence of significance means the study cannot confirm this mechanism operates systematically. At the same time, Agency Theory competing prediction, that greater resources increase managerial discretion for symbolic ESG spending, is likewise not supported. The most defensible reading is that the potential RBV advantages and agency costs may offset each other, or that the data lack sufficient power to distinguish these competing mechanisms. This interpretation is reinforced by robustness evidence, such as the interaction remains insignificant under Driscoll–Kraay standard errors ($p = .449$), with an added leverage control ($p = .553$), and under 1% winsorization ($p = .803$), indicating the null result is not attributable to one covariance estimator or a handful of extreme observations. Nevertheless, because interaction hypotheses are statistically more demanding than direct-effect hypotheses, requiring sufficient variation in both ESG and size to identify a changing slope, the null result should not be read as definitive evidence against moderation in other settings; with only 130 observations and 48 firms, the study may have limited power to detect a modest interaction effect.

4.8.4 Statistical Power and Minimum Detectable Effect

The final dataset's 130 observations from 48 firms (only eight of which are observed across all four years) and the exclusion of 78 of 208 potential observations (about 37.5%) constrain the precision with which small ESG and interaction effects can be estimated. A formal prospective power calculation is difficult given firm fixed effects, clustered inference, interaction terms, and an unbalanced panel, but an approximate minimum-detectable-effect assessment based on the estimated standard errors is informative: the observed ESG $\times$ Firm Size coefficient of 0.001108 is accompanied by a clustered standard error of 0.002110, indicating the estimated effect is small relative to its sampling uncertainty, so an effect substantially larger would be required to reject the null at conventional levels. The insignificant H_3 coefficient should therefore not be read as evidence the true moderation effect is exactly zero, but as insufficient evidence given the available sample, a distinction that matters because interaction effects generally require larger samples than direct effects for comparable power. The same caution applies to H_1 : the ESG coefficient becomes significant under Driscoll–Kraay standard errors ($p = .002$) but not under firm-clustered errors ($p = .151$), showing that evidence on the direct ESG effect is less stable than the evidence on H_3 .

4.8.5 Hypothesis 4: Institutional Context and Country Heterogeneity

H_4 asks a conceptually different question from H_3 : not whether firm size changes the ESG–ROE slope, but whether the ESG–ROE relationship itself differs between Indonesia and Singapore. In the revised country-interaction specification, the ESG $\times$ Indonesia coefficient is positive and significant ($\beta = 0.017980$, $p = .040$); H_4 is supported in the principal specification, indicating a more positive ESG–ROE slope for Indonesian firms conditional on the other model variables. This supports Legitimacy and Signaling Theory: if ESG performance partly responds to institutional expectations, and ESG information functions as a signal whose strength depends on investor characteristics and the broader information environment, then the economic consequences of ESG activity may depend on the regulatory, stakeholder, and disclosure environment. This does not mean ESG is inherently more valuable in one country, but that its financial meaning is context dependent. However, the finding requires cautious interpretation: adding leverage weakens the coefficient to marginal significance ($\beta = 0.019248$, $p = .059$), and the sample is imbalanced (36 Indonesian versus 94 Singaporean observations), with possible selection effects from excluding firms with missing ESG scores. H_4 is

therefore best read as evidence of a potentially meaningful, but conditional, institutional difference warranting further investigation rather than a definitive causal country effect.

4.8.6 Integrated Theoretical Interpretation

Taken together, the findings provide partial, qualified support for the theoretical framework rather than uniform confirmation of any single theory. The insignificant principal ESG coefficient means Stakeholder Theory is not contradicted, but its short-run financial implication is not empirically established here, qualifying the temporal and contextual conditions under which stakeholder-oriented ESG activity may translate into accounting profitability. The insignificant H_3 interaction provides only limited support for the RBV mechanism and challenges the assumption that organizational scale automatically strengthens ESG value creation, while Agency Theory remains theoretically relevant but unconfirmed, since only a negative and significant interaction, not the observed positive but insignificant one, would have supported agency-driven overinvestment. The significant H_4 country interaction is the strongest empirical indication that Legitimacy and Signaling Theory matter for cross-market differences, though its weakening after adding leverage means it should be treated as conditional rather than conclusive. Overall, the evidence suggests the ESG–profitability relationship is context dependent, statistically sensitive, and shaped by competing organizational mechanisms, more consistent with the heterogeneous ESG literature than with an assumption of a universal positive ESG effect.

4.8.7 Comparison with Previous Studies and Overall Implications

The absence of a significant ESG effect in the principal specification contrasts with the generally favorable global meta-analytic evidence but is consistent with studies reporting insignificant or context-dependent relationships, possibly reflecting the use of ROE rather than market-based measures, the short observation window, sector composition, and ESG-measurement differences. The insignificant moderation result also differs from Indonesian banking evidence that ESG disclosures generate stronger effects among larger institutions; because this study deliberately excludes financial firms, whose regulatory capital, liquidity, and business models differ materially, the contrast suggests sectoral context matters for assessing size moderation. The country-interaction finding adds to this literature by suggesting ESG performance may carry different financial implications across Indonesia and Singapore, though because the result becomes marginal after adding leverage, it should be read as an indication of institutional heterogeneity rather than a definitive country-specific causal effect.

These findings carry several implications. For managers, ESG investment should not be evaluated solely by its immediate ROE effect, since value may arise through risk management, stakeholder relationships, legitimacy, and resilience even when the short-term accounting effect is hard to detect; larger firms should not assume greater resources automatically translate into stronger ESG-related returns without effective integration into operations and governance. For investors, a high ESG score should not be read mechanically as evidence of superior profitability, and the country-interaction result suggests investors should consider how ESG information is interpreted within the relevant market rather than assuming identical scores carry identical economic meaning across countries. For policymakers and standard-setters, the evidence highlights the importance of credible, comparable, decision-useful ESG information, since institutional differences may affect how ESG signals are interpreted and rewarded, and improving disclosure quality and comparability may help investors distinguish substantive sustainability performance from symbolic disclosure.

5. Conclusions

5.1 Conclusion

This study examined whether ESG performance is associated with profitability, whether firm size moderates the ESG–ROE relationship, and whether that relationship differs between listed non-financial firms in Indonesia and Singapore during 2021–2024. The analysis is based on 52 firms and 208 potential firm-year observations; after excluding 78 observations with incomplete required information, the final analytical sample comprises 130 firm-year observations from 48 firms, with firm size recalculated using U.S.-dollar total assets from Bloomberg and transformed by natural

logarithm, applied consistently across the principal, moderation, country-interaction, and robustness models.

The principal firm fixed-effects model does not provide sufficient statistical evidence to support H_1 , H_2 , or H_3 at conventional significance levels. ESG performance has a positive but insignificant association with ROE; firm size has a negative and insignificant direct association; and the ESG $\times$ Firm Size interaction is positive but insignificant, indicating no sufficient evidence that larger firms systematically obtain a stronger marginal profitability payoff from ESG performance. This insignificant H_3 result remains stable under Driscoll–Kraay inference, an added leverage control, and 1% winsorization, so the evidence does not establish firm size as a statistically reliable boundary condition for the ESG–ROE relationship in this sample. These null results should nevertheless be interpreted cautiously given the relatively small, unbalanced panel and substantial ESG-score missingness, which constrain statistical power, particularly for interaction effects, so the findings should be read as insufficient statistical evidence for the hypothesized relationships rather than proof that ESG, firm size, or their interaction has no economic relevance. By contrast, the supplementary country-interaction model finds that the ESG–ROE slope is significantly more positive for Indonesian firms than for Singaporean firms, though this evidence weakens to marginal significance once leverage is added, so it should be read as a conditional indication of institutional heterogeneity rather than a definitive causal country effect.

5.2 Research Limitations

Several limitations warrant caution. First, the sample is restricted to 48 listed non-financial firms with disclosed ESG scores over four years, and the 78 excluded firm-years for missing ESG data may introduce selection effects if ESG-score availability relates systematically to firm characteristics. Second, the country sub-panels are unbalanced (36 Indonesian versus 94 Singaporean observations), which may affect the precision of country-specific estimates and the country-interaction result's stability. Third, the panel covers only four years, limiting the ability to detect delayed financial consequences of ESG investment, which may involve upfront costs and benefits realized only over longer periods. Fourth, the study relies on a composite ESG score, which improves parsimony and comparability but may conceal heterogeneous effects across individual environmental, social, and governance pillars that could operate through different mechanisms and at different speeds.

Fifth, the study excludes financial firms, which operate under distinct capital, liquidity, and regulatory requirements, so findings should not be generalized automatically to banks or insurers. Sixth, the empirical models include a relatively limited set of controls; although leverage is examined as an additional robustness check, factors such as firm age, ownership structure, industry characteristics, financing costs, governance, and ESG assurance may also influence the ESG–profitability relationship, so results should not be read as definitive causal estimates. Finally, although the firm-size measurement issue identified during review was addressed by recalculating total assets on a common U.S.-dollar basis, total assets remain an accounting-based proxy for organizational scale that does not fully capture revenue-generating capacity, market valuation, employee base, or organizational complexity; the absence of significant moderation may therefore partly depend on this particular operationalization of firm size.

5.3 Suggestions and Directions for Future Research

Future research should extend the observation period beyond four years and use lagged ESG measures to distinguish short-term implementation costs from delayed benefits, which would also improve within-firm variation and the power of moderation and country-interaction tests. Studies should examine individual ESG pillars rather than relying solely on a composite score, to reveal whether particular dimensions are more financially material and whether firm size differentially strengthens their effects. To address sample-selection concerns, future work should seek broader ESG coverage and examine whether firms with and without continuous ESG scores differ systematically, while incorporating firm age, ownership structure, governance, ESG assurance, financing costs, and institutional-quality variables for a more comprehensive account of ESG–financial performance

relationships. Dynamic panel estimators, instrumental-variable approaches, or other quasi-experimental designs could further strengthen causal identification and address potential reverse causality between ESG performance and profitability.

For the Indonesia–Singapore comparison specifically, a longer panel spanning multiple economic cycles and regulatory changes would clarify whether the observed country heterogeneity is stable over time, and extending the comparison to other ASEAN markets could indicate whether the Indonesia–Singapore difference reflects a broader institutional pattern or a country-specific phenomenon. Finally, future studies should employ multiple measures of firm size, including total assets, revenue, market capitalization, and employee count, to determine whether the absence of a significant ESG $\times$ Firm Size interaction reflects a genuine absence of moderation or the particular accounting-based measure used here.

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Author Contributions

BB contributed to study design and manuscript drafting. EJA contributed to conceptualization, study design, and manuscript revision. MS contributed to conceptualization, manuscript revision, and supervision. ND contributed to data collection and analysis. All authors have read and approved the final version of the manuscript.

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