



ESG Disclosure on Firm Risk: An Empirical Study of Indonesian Companies

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Abstract. The nexus between Environmental, Social, and Governance (ESG) disclosure and corporate risk management is increasingly pivotal, yet empirical evidence from emerging markets remains fragmented. This study investigates the influence of ESG transparency on firm risk—specifically total and idiosyncratic risk—among non-financial companies listed on the Indonesia Stock Exchange (IDX). The analysis utilises an unbalanced panel of 376 firm-year observations from the IDX100 index spanning 2017–2023. Underpinned by signalling theory, the study employs a Random Effects Model (REM) to isolate the impact of disclosure practices on risk volatility. The empirical results demonstrate a significant, robust negative association between ESG disclosure and both dimensions of risk. These findings suggest that enhanced sustainability reporting serves as a credible signal of managerial competence and governance quality, thereby mitigating information asymmetry and stabilizing investor expectations. Consequently, this research extends the corporate finance literature by highlighting the risk-mitigating role of ESG within an emerging economy context. It offers strategic implications for corporate executives to utilise transparency as a hedging mechanism and urges regulators to foster standardized reporting frameworks to enhance market resilience.

Keywords: ESG disclosure, firm risk, total risk, idiosyncratic risk, signalling theory, Indonesia

1 Introduction

Over the past decade, the disclosure of Environmental, Social, and Governance (ESG) information has emerged as a critical aspect of corporate transparency and accountability. As investors and regulators increasingly prioritize sustainability information, ESG disclosure has become a vital mechanism for conveying a firm's non-financial performance, risk management strategies, and long-term value orientations. Beyond its ethical and reputational dimensions, ESG disclosure serves as a strategic communication tool that shapes investor perceptions, mitigates information asymmetry, and bolsters market confidence [2].

In financial theory, risk is central to firm valuation and investment decision-making [3, 4]. Firms are exposed to both systematic risk, which arises from market-wide factors, and idiosyncratic risk, which is specific to a firm. Transparent and credible ESG

disclosures can play a significant role in mitigating these risks. By providing consistent and reliable sustainability information, firms reduce the uncertainty surrounding their operations and governance practices, which can lower perceived risks among investors and creditors [5]. In this sense, ESG disclosure operates as a form of risk management and reputation insurance that supports the financial stability.

Empirical research conducted in developed markets has demonstrated that increased ESG disclosure correlates with reduced stock volatility and a diminished downside risk. Companies that effectively communicate their sustainability strategies are perceived as less opaque and more resilient to economic shocks. However, the extent to which this relationship applies to emerging economies remains unclear. Variations in institutional quality, regulatory enforcement, and investor sophistication may affect market interpretations and responses to ESG information.

Indonesia provides a particularly relevant context for exploring this relationship. As the largest economy in Southeast Asia and a member of the G20, Indonesia is gradually shifting toward sustainability-oriented governance. The Financial Services Authority (OJK) and the Indonesia Stock Exchange (IDX) have introduced sustainability reporting guidelines and established ESG indices to encourage corporate transparency in Indonesia. Despite these initiatives, ESG disclosure practices among Indonesian firms remain inconsistent. Many firms still voluntarily disclose sustainability information, and the depth and quality of disclosure vary widely across industries.

This study investigates the impact of Environmental, Social, and Governance (ESG) disclosure on firm risk among non-financial firms in Indonesia. The analysis employs unbalanced panel data consisting of 376 firm-year observations from 61 companies over the period of 2017–2023. Non-financial firms are selected to circumvent the structural and regulatory disparities inherent in the financial sector [6, 7]. This study concentrates on two principal measures of risk: total risk, which represents the overall volatility in firm returns, and idiosyncratic risk, which captures firm-specific fluctuations independent of market conditions. By examining the relationship between ESG disclosure and these two risk dimensions, this study aims to provide a deeper understanding of the role of transparency in influencing firm stability and investor perceptions in an emerging market context.

This study contributes to the growing literature on ESG and corporate finance in three ways. First, it extends the discussion of ESG disclosure beyond financial performance outcomes to its implications for corporate risks. Second, it provides evidence from an emerging market with evolving sustainability regulations and varying disclosure quality, offering insights that are distinct from those of developed economies. Third, it highlights the importance of disclosure transparency as a mechanism through which sustainability practices influence firm valuation and risk management.

2 Literature Review and Hypothesis Development

2.1 Signaling Theory

This study employs signaling theory as the primary framework to elucidate the relationship between ESG disclosures and firm risk. In markets characterized by information asymmetry, firms possess private information regarding their quality, governance, and future prospects that investors cannot directly observe. According to signaling theory [8], firms can mitigate this asymmetry by transmitting credible signals through observable actions, such as voluntary disclosure. ESG disclosure serves as a signal. By communicating comprehensive and consistent sustainability information, firms demonstrate managerial competence, responsible governance and long-term commitment [9]. These signals reduce investor uncertainty and risk perception, thereby fostering greater confidence in the firm's financial stability. Conversely, firms that disclose limited or inconsistent ESG information are often perceived as riskier or less reliable, resulting in higher-risk premiums and volatility. Signaling theory is particularly pertinent in emerging markets such as Indonesia. Due to varying disclosure quality, weaker enforcement mechanisms, and evolving investor sophistication, ESG disclosure has become a critical instrument for firms to distinguish themselves from less transparent peers [10]. Through this signaling channel, ESG disclosure is expected to reduce both total and idiosyncratic risks by enhancing market confidence and mitigating information asymmetry.

2.2 ESG Disclosure and Firm Risk

Risk is a fundamental element influencing firm valuation and investor decision-making. In corporate finance, firm risk denotes the degree of uncertainty associated with a company's prospective cash flows and performance outcomes [11]. It encompasses both systematic risk, which emanates from external macroeconomic and market-wide factors, and idiosyncratic risk, which arises from firm-specific conditions such as governance quality, operational efficiency, and strategic decision-making. Elevated firm risk may lead to volatile earnings, unstable market valuation, and increased cost of capital. For investors, risk determines the expected rate of return, whereas for firms, effective risk management is crucial for attaining long-term financial stability [12]. Mitigating risk exposure enhances investor confidence, reduces financing costs, and contributes to sustainable value creation.

A growing body of research suggests that transparent ESG communication can reduce firm risk by lowering uncertainty and strengthening the trust of investors. Firms that disclose more ESG information provide clearer insights into their governance structures, risk management systems, and long-term orientation [13]. This enhanced transparency enables investors to make better-informed decisions, contributing to greater market stability and lower volatility.

Empirical studies in developed markets have shown that higher levels of ESG disclosure are associated with reduced stock return volatility and improved risk-adjusted performance [10]. In emerging markets, where formal governance systems may be

weaker, disclosure plays an even more important role as a signal of reliability and accountability than in developed markets. In Indonesia, the implementation of sustainability reporting guidelines by the Financial Services Authority (OJK) and the Indonesia Stock Exchange (IDX) has encouraged firms to disclose more non-financial information. However, the quality and comprehensiveness of ESG disclosures remain inconsistent. Given these conditions, disclosure can be a key differentiator of credibility and perceived stability. Thus, it is theoretically expected that higher ESG disclosure is negatively related to firm risks.

2.3 Hypothesis Development

ESG Disclosure and Total Risk. Total risk reflects the overall volatility of a firm's returns, incorporating both systematic and firm-specific factors into the calculation. From a signaling perspective, ESG disclosure reduces total risk by enhancing transparency and reducing uncertainty about firms' operations and long-term prospects. When firms disclose their ESG practices comprehensively, investors interpret such information as a credible signal of good governance and effective risk control [14].

Transparent communication reduces the likelihood of market overreactions to unexpected events and stabilizes price movements. Firms with strong ESG disclosures are also more likely to be included in responsible investment portfolios, which attract longterm investors and reduce speculative trading. Empirical evidence [15, 16] confirms that greater disclosure quality is associated with lower return volatility. Therefore, consistent with signaling theory, firms with higher ESG disclosure are expected to experience lower total risk because transparent reporting reduces information asymmetry and enhances their confidence.

- **H1:** ESG disclosure negatively affects the total firm risk.

ESG Disclosure and Idiosyncratic Risk. Idiosyncratic risk refers to firm-specific volatility that is not influenced by market-wide fluctuations [17]. It is often linked to internal governance, operational efficiency and exposure to non-financial risks. Within the signaling framework, ESG disclosure can mitigate idiosyncratic risk by signaling that management is aware of and actively addressing potential sustainability-related vulnerabilities.

Firms that engage in comprehensive ESG reporting are compelled to assess and manage environmental, social, and governance risks systematically [18]. This process promotes accountability and the early detection of potential issues that could disrupt operations or damage reputation. Moreover, transparency reduces the likelihood of surprises or negative firm-specific events that increase the volatility.

Empirical studies [5, 9] show that firms with more reliable ESG disclosures tend to experience lower idiosyncratic volatility. In Indonesia's emerging market environment, where institutional enforcement remains uneven, ESG disclosure serves as a substitute for external governance mechanisms, signaling credibility and stability to the market. Accordingly, firms that provide higher-quality ESG disclosures are expected to face lower idiosyncratic risks.

- **H2:** ESG disclosure negatively affects idiosyncratic risk.

3 Research Methodology

3.1 Data and Sample

This study examines the effect of ESG disclosure on firm risk among non-financial firms listed on the Indonesia Stock Exchange (IDX). The analysis covers the period from 2017 to 2023, which reflects Indonesia's increasing regulatory attention to sustainability and corporate transparency, particularly following the issuance of sustainability reporting guidelines by the Financial Services Authority (Otoritas Jasa Keuangan, OJK) and the Indonesia Stock Exchange (IDX). This study utilizes unbalanced panel data consisting of 376 firm-year observations from 61 non-financial companies listed in IDX100. Financial institutions are excluded because their risk profiles, capital structures, and disclosure requirements differ fundamentally from those of non-financial firms, which could bias the results [20].

ESG disclosure data, along with financial and market information, were collected from reputable secondary sources, including Bloomberg and Datastream Reuters. To ensure the reliability of the dataset, it is imperative that each firm possesses at least three consecutive years of available ESG disclosure and financial data for each firm. Observations containing missing values or exhibiting extreme outliers were adjusted through winsorization at the 1st and 99th percentiles, thereby enhancing the dataset's robustness.

3.2 Variable Measurement

The dependent variable in this study is firm risk, measured using two complementary dimensions: total risk (TOTR) and idiosyncratic risk (IDIOR). Total risk represents the overall volatility of firm returns and is calculated as the standard deviation of daily stock returns for each firm in a given year. This measure reflects both market-wide and firm-specific sources of uncertainties. Idiosyncratic risk, on the other hand, isolates the portion of risk unique to each firm that cannot be explained by overall market movements and is therefore diversifiable. It is derived from the standard deviation of the residuals of a market-model regression, where individual firm returns are regressed on market returns represented by the IDX Composite Index. These two indicators jointly capture a comprehensive view of the firm's risk exposure. Both total and idiosyncratic risk data were sourced from Datastream Reuters. The key independent variable is ESG disclosure (ESGDISC), which is measured using ESG ratings obtained from Bloomberg. These ratings reflect the extent of a firm's environmental, social, and governance transparency and performance, based on publicly available information compiled using Bloomberg's standardized framework.

Several control variables are included to capture firm-specific characteristics that may influence the risk. Firm size (SIZE) is measured as the natural logarithm of total assets, as larger firms typically exhibit lower risk owing to better diversification and

governance systems. Leverage (LEV), defined as the ratio of total debt to total assets, controls for financial risk. Profitability (ROA) is calculated as net income divided by total assets, which represents a firm's operational performance. The market-to-book ratio (MTB) serves as a proxy for growth opportunities, while liquidity (LIQ), measured using the current ratio, reflects a firm's ability to meet short-term obligations.

3.3 Empirical Models

Two panel regression models were estimated to empirically test the effect of ESG disclosure on firm risk. The first model uses total risk as the dependent variable, whereas the second focuses on idiosyncratic risk. Both models include firm-specific and year-specific effects to control for unobserved heterogeneity and time-varying macroeconomic influences on the dependent variable. The following regression model was used:

$$\text{RISK}_{(it)} = \alpha + \beta_1 \ln \text{ESGDISC}_{(it)} + \beta_2 \text{SIZE}_{(it)} + \beta_3 \text{LEV}_{(it)} + \beta_4 \text{ROA}_{(it)} + \beta_5 \text{MTB}_{(it)} + \beta_6 \text{LIQ}_{(it)} + \varepsilon_{(it)} \quad (1)$$

where $\text{RISK}_{(it)}$ represents either total risk (TOTR) or idiosyncratic risk (IDIOR) for firm i in year t , and ε_{it} is the error term. The coefficient β_1 is the main parameter of interest, capturing the impact of ESG disclosure on firm risk. A negative and significant β_1 supports the hypothesis that higher ESG disclosure reduces firm risk.

3.4 Estimation Methods

This study employs the Random Effects Model (REM) as the primary estimation technique. The REM is chosen because it assumes that the unobserved individual effects are uncorrelated with the explanatory variables, allowing both firm-specific and timeinvariant factors to contribute to the overall variation in the dependent variable [21]. The Hausman test was performed to confirm the suitability of the random effects specification. The test results support the use of the REM, indicating that the assumption of no correlation between the individual effects and regressors holds. To ensure robustness, heteroskedasticity-robust standard errors were applied to correct for potential nonconstant variance in the residuals. Overall, the use of the Random Effects Model provides a suitable and statistically efficient framework for evaluating the relationship between ESG disclosure and firm risk in Indonesia's non-financial sector, capturing both cross-sectional differences across firms and temporal variations over the study period.

4 Result

4.1 Descriptive Analysis and Correlation Matrix

Table 1 presents the descriptive statistics for all the variables used in this study. The analysis is based on 376 firm-year observations of non-financial companies listed on

the Indonesia Stock Exchange (IDX) from 2017 to 2023. The average value of total risk (TOTR) is 5.2070, with a standard deviation of 2.1221, while idiosyncratic risk (IDIOR) shows a slightly lower mean of 4.2686 and a standard deviation of 2.3800. These figures indicate that Indonesian non-financial firms experience moderate return volatility, with variations across firms and time.

The mean value of ESG disclosure (ESG) is 3.8329, with a standard deviation of 0.2759, suggesting a relatively low dispersion in ESG reporting practices among the sampled firms. This indicates that while most firms have adopted ESG reporting, the level of disclosure remains relatively consistent and modest across the samples. The minimum and maximum values (3.0088 and 4.3479, respectively) imply that no firm achieved full disclosure across all indicators, reflecting the voluntary and evolving nature of ESG reporting in Indonesia.

Among the control variables, the average firm size (SIZE) is 23.2828, with a standard deviation of 1.3049, suggesting that the sample includes a mix of medium and large-sized firms. The mean value of profitability (ROA) is 0.1076, indicating that, on average, firms generated a 10.76% return on their assets during the period. The leverage (LEV) ratio averages 0.4573, showing that Indonesian non-financial firms generally finance approximately 46% of their assets through debt. The market-to-book ratio (MTB) exhibits high variability, implying significant differences in market valuation and growth potential across firms. Finally, liquidity (LIQ) has a mean of 2.2436, suggesting that, on average, firms maintain twice as many current assets as current liabilities, although some firms exhibit much higher short-term flexibility.

Table 1. Descriptive Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
TOTR	376	5.2070	2.1221	-3.5066	9.6846
IDIOR	376	4.2686	2.3800	-2.6593	8.6997
ESGDISC	376	3.8329	0.2759	3.0088	4.3480
SIZE	376	23.2828	1.3049	19.6637	25.9962
ROA	376	0.1076	0.0964	-0.0537	0.6092
LEV	376	0.4573	0.2115	0.0810	1.5478
MTB	376	3.5250	7.6597	0.2300	85.1800
LIQ	376	2.2436	1.6673	0.1822	10.0743

Note. Descriptive data for all variables are presented.

Source: Primary Data (2025)

Table 2 reports the correlation matrix of the variables. The correlation between ESG disclosure and total risk (TOTR) is negative (-0.1021), providing preliminary support for the study's first hypothesis that higher ESG disclosure is associated with lower firm risk. Although this correlation is weak, its direction aligns with the theoretical expectation that transparent ESG communication reduces information asymmetry and investor uncertainty. The correlation between ESG and firm size (0.2467) is positive, implying that larger firms tend to disclose more ESG information, consistent with the prior literature that associates firm size with better reporting capacity and stakeholder visibility. Profitability (ROA) is positively correlated with both ESG (0.1203) and total risk (0.1614), indicating that more profitable firms are not necessarily less volatile, possibly due to their greater exposure to market expectations. Leverage (0.0063) and the market-to-book ratio (0.0625) exhibit weak correlations with total risk, while liquidity (0.0118) is almost uncorrelated, suggesting that financial characteristics other than disclosure play a limited role in explaining short-term volatility. Importantly, none of the correlation coefficients exceeded 0.70, indicating the absence of severe multicollinearity issues that could bias the regression estimates.

Overall, the descriptive and correlation analyses provide an initial indication that ESG disclosure may contribute to reducing firm risk, particularly in Indonesia's emerging capital market. The relatively narrow dispersion of ESG scores also reflects a developing but gradually improving sustainability reporting practice. These patterns form the foundation for the subsequent regression analysis, which further investigates the magnitude and significance of the ESG–risk relationship.

Table 2. Correlation Matrix

Variable	TOTR	ESG	SIZE	ROA	LEV	MTB	LIQ
TOTR	1.0000						
ESGDISC	-0.1021	1.0000					
SIZE	0.0161	0.2467	1.0000				
ROA	0.1614	0.1203	-0.1923	1.0000			
LEV	0.0063	0.0306	0.5997	-0.1210	1.0000		
MTB	0.0625	0.1006	-0.0330	0.5445	0.1321	1.0000	
LIQ	0.0118	-0.0965	-0.6076	0.1113	-0.7036	-0.0840	1.0000

Note. The table shows the Pearson pair-wise correlation matrix among the variables in this study.

Source: Primary Data (2025)

4.2 Regression Results

Table 3. Multivariate regression of the effect of corporate governance on risk-taking

Variable	(1) TOTR	(2) IDIOR
ESGDISC	-1.1812 ** (0.5568)	-0.7702** (0.6181)
SIZE	0.2074** (0.1587)	0.0782** (0.1732)
ROA	4.6685 ** (1.7876)	4.6536 ** (1.9212)
LEVERAGE	0.0689 (1.0256)	0.7871 (1.3946)
MTB	-0.0105 (0.0251)	-0.0511 ** (0.0226)
LIQUIDITY	0.0458 (0.1326)	0.0725 (0.1684)
Constant	4.2151*** (3.8109)	4.5216** (4.0043)
Adjusted R ²	0.024	0.012
Year effect	YES	YES
Industry effect	YES	YES
No. of Observation	376	376

Note. The above table highlights the panel data models using Random Effect Model. ***, **, * denote statistical significance at 1%, 5%, and 10% respectively.

Source: Primary Data (2025)

Table 3 reports the results of the multivariate panel regressions examining the effect of ESG disclosure on firm risk, measured by total risk (TOTR) and idiosyncratic risk (IDIOR). The estimations employ the Random Effects Model (REM) using 376 firm-year observations of non-financial companies listed on the IDX100 over the period 2017–2023. All regressions control for firm-specific characteristics and incorporate year and industry effects to account for temporal and sectoral heterogeneity.

The coefficients on ESG disclosure (ESGDISC) are negative and statistically significant across both models, confirming the hypothesized risk-mitigating role of ESG transparency. Specifically, the coefficient for ESGDISC is -1.1812 ($p < 0.05$) in the total risk model and -0.7702 ($p < 0.05$) in the idiosyncratic risk model. These results indicate that firms with higher ESG disclosure levels exhibit lower overall volatility and reduced firm-specific risk. The findings are consistent with signaling theory, which posits that enhanced disclosure reduces information asymmetry between managers and investors. By voluntarily disseminating sustainability information, firms convey credible signals of high managerial quality, governance strength, and long-term strategic orientation. This transparency mitigates uncertainty regarding future cash flows and firm conduct, thereby diminishing the perceived risk to investors.

5 Discussion

The inverse relationship between ESG disclosure and various risk measures corroborates the existing evidence that sustainability communication can act as an informational stabilizer in capital markets. Mechrugui & Theiri, [22] and Al-Hiyari & Kolsi,

[23] similarly report that firms engaging in enhanced ESG transparency experience reduced stock return volatility and improved downside protection. In the Indonesian context, where institutional enforcement and information environments are still evolving, voluntary ESG disclosure serves as a substitute for formal governance mechanisms, thereby enhancing investor confidence and distinguishing credible firms from less transparent counterparts.

Among the control variables, firm size (SIZE) shows positive and significant coefficients in both models (0.2074 for TOTR and 0.0782 for IDIOR). This suggests that larger firms, while often perceived as more stable, may also face higher exposure to market expectations and public scrutiny, leading to increased return variability [24]. Profitability (ROA) also exhibits a positive and statistically significant association with both risk measures (4.6685 for TOTR and 4.6536 for IDIOR). This indicates that more profitable firms may experience greater return volatility, possibly because higher profitability attracts investor attention and amplifies sensitivity to market movements [25]. The coefficients for leverage (LEV) and liquidity (LIQ) are positive but statistically insignificant, indicating that these financial characteristics do not significantly impact firm risk when disclosure and firm fundamentals are considered.

The market-to-book ratio (MTB) is negative in both models and achieves statistical significance in the idiosyncratic-risk specification (0.0511 , $p < 0.05$). This finding suggests that firms with higher growth prospects may experience relatively lower firm-specific volatility, possibly because of enhanced investor confidence and sustained market valuation.

The regression analysis collectively offers substantial support for both hypotheses (H1 and H2). Empirical evidence indicates that increased ESG disclosure is associated with reduced total and idiosyncratic risk, thereby substantiating the theoretical proposition that sustainability transparency is a credible indicator of corporate reliability and governance quality. These findings enhance the understanding of the role of non-financial disclosure in mitigating firm-level risk in emerging markets.

From a policy perspective, the findings highlight the critical need to enhance ESG reporting frameworks in Indonesia. The Financial Services Authority (OJK) may utilize these insights to promote greater standardization and comparability in sustainability reporting, thereby enhancing the overall information environment and mitigating systemic uncertainty within the domestic capital markets.

6 Conclusion

6.1 Conclusion

The empirical findings of this study provide compelling evidence that environmental, social, and governance (ESG) disclosure significantly mitigates firm risk among nonfinancial firms in Indonesia. Firms exhibiting greater ESG transparency demonstrate reduced total and idiosyncratic risks, indicating that sustainability disclosure functions as an effective mechanism for alleviating both market-wide and firm-specific volatility. Enhanced ESG communication augments informational transparency, diminishes investor uncertainty, and contributes to stable firm performance.

These findings are consistent with signaling theory, which suggests that voluntary disclosure provides credible information that mitigates information asymmetry between firms and investors. By disclosing comprehensive ESG information, firms demonstrate managerial integrity, governance quality, and long-term commitment to sustainable operations. In the Indonesian context, where disclosure quality and regulatory enforcement are inconsistent, ESG transparency is a credible signal that enhances investor confidence and improves market valuation.

From a practical perspective, these findings underscore that ESG disclosure is not merely a compliance-related obligation but also a strategic risk management instrument. Firms that enhance their ESG transparency can improve their reputation and reduce their risk costs. For regulators, these findings underscore the importance of fortifying sustainability disclosure standards and promoting the broader adoption of reliable ESG reporting frameworks. Collectively, these measures can enhance information efficiency, bolster market credibility, and support Indonesia's transition to a more sustainable and transparent capital market.

6.2 Limitations

Although this study provides valuable empirical insights, several limitations warrant acknowledgment. First, the ESG disclosure data were sourced from Bloomberg, which offers a standardized and internationally recognized measure of disclosure practices.

However, Bloomberg's scoring methodology may not fully capture the qualitative nuances or contextual specifics of Indonesian firms, as it primarily emphasizes breadth rather than depth or credibility of disclosures. Second, the sample is restricted to nonfinancial firms because of their relatively homogeneous reporting environment and risk characteristics. Consequently, the findings may not be directly applicable to financial institutions or small private firms in the region. Third, although the model accounts for key firm-level financial variables, it does not incorporate certain qualitative factors, such as board composition, ownership structure, or governance mechanisms, which may also impact both ESG transparency and firm risk. Finally, the study is limited to a single-country context; thus, the findings may reflect institutional and regulatory conditions unique to Indonesia's emerging market environment.

6.3 Suggestions for Future Research

Future research could expand the scope of analysis by undertaking cross-country comparative studies to investigate whether institutional quality moderates the relationship between ESG (Environmental, Social, and Governance) factors and risk. Extending the investigation beyond a single-country context would enable researchers to evaluate how variations in regulatory environments, governance frameworks, and market maturity influence the extent to which ESG disclosure affects firm risk. Further research could employ causal inference techniques to establish more robust causal interpretations of the ESG risk relationship. Utilizing such methodologies would aid in distinguishing the directionality of the effect and addressing the potential endogeneity between ESG disclosure and firm performance outcomes. Additionally, broadening both the methodological and contextual scope of future research would offer a more comprehensive understanding of how ESG disclosure contributes to firm stability, investor confidence, and long-term value creation, particularly in emerging market economies, where disclosure practices and institutional frameworks are continually evolving.

References

1. Landi, G.C., Rey, A., Renzi, A., Iandolo, F.: Embedding Sustainability in Risk Management: The Impact of Environmental, Social, Governance Ratings on Corporate Financial Risk. *Corporate Social Responsibility and Environmental Management* 29(4), 1096–1107 (2022). <https://doi.org/10.1002/csr.2256>
2. Yu, E.P., Guo, C.Q., Luu, B.V.: Environmental, Social and Governance Transparency and Firm Value. *Business Strategy and the Environment* 27(7), 987–1004 (2018). <https://doi.org/10.1002/bse.2047>
3. Kong, X., Sun, H., Pan, Y., Taghizadeh-Hesary, F.: Can Environmental Corporate Social Responsibility Reduce Firms' Idiosyncratic Risk? Evidence from China. *Frontiers in Environmental Science* 8 (2020). <https://doi.org/10.3389/fenvs.2020.608115>
4. Zhou, Z., Zhang, T., Liu, J., Han, S., Dai, Y., Chen, X.: Supplier Carbon Management and Firm Idiosyncratic Risk: Empirical Evidence from China. *Journal of Supply Chain Management* 61(1), 34–61 (2024). <https://doi.org/10.1111/jscm.12334>

5. Reber, B., Gold, S., Gold, A.: ESG Disclosure and Idiosyncratic Risk in Initial Public Offerings. *Journal of Business Ethics* 179(3), 867–886 (2021). <https://doi.org/10.1007/s10551021-04847-8>
6. Brahmna, R.K., You, H., Lau, E.: Does Reputation Matter for Firm Risk in a Developing Country? *International Journal of Finance & Economics* 27(2), 2110–2123 (2020). <https://doi.org/10.1002/ijfe.2262>
7. Hatane, S.E., Jie, F., Supangat, S., Tarigan, J.: Does Internal Corporate Governance Mechanism Control Firm Risk? Evidence from Indonesia's Three High-Risk Sectors. *Corporate Governance: The International Journal of Business in Society* 19(6), 1362–1376 (2019). <https://doi.org/10.1108/cg-02-2019-0071>
8. Spence, M.: Job Market Signaling. *The Quarterly Journal of Economics* 87(3), 355 (1973). <https://doi.org/10.2307/1882010>
9. Khalid, F., Razi, U., Razzaq, A., Ming, J.: Firm Characteristics, Governance Mechanisms, ESG Disclosure: How Caring about Sustainable Concerns? *Environmental Science and Pollution Research* 29(54), 82064–82077 (2022). <https://doi.org/10.1007/s11356-022-21489-z>
10. Gangwani, M., Kashiramka, S.: Does ESG Performance Impact Value and Risk-Taking by Commercial Banks? Evidence from Emerging Market Economies. *Business Strategy and the Environment* 33(7), 7562–7589 (2024). <https://doi.org/10.1002/bse.3882>
11. Tian, H., Tian, G.: Corporate Sustainability and Trade Credit Financing: Evidence from Environmental, Social, Governance Ratings. *Corporate Social Responsibility and Environmental Management* 29(5), 1896–1908 (2022). <https://doi.org/10.1002/csr.2335>
12. Abbas, A.A., Hassouni, A.A.K.: Exploring the Nexus between Banking Stability and Market Value: Evidence from the Iraqi Banking Sector. *Economics, Management and Sustainability* 9(1), 21–42 (2024). <https://doi.org/10.14254/jems.2024.9-1.2>
13. Wang, B., Liu, C., Liu, L., Kong, X., Wang, F.: Environmental, Social, Governance Disclosure and Capital Market Mispricing. *Corporate Social Responsibility and Environmental Management* 31(3), 2383–2401 (2023). <https://doi.org/10.1002/csr.2691>
14. Zhao, Y., Khalid, Z., Sun, X., Elahi, E., Sun, F.: Environmental, Social and Governance Performance: Analysis of CEO Power and Corporate Risk. *Sustainability* 15(2), 1471 (2023). <https://doi.org/10.3390/su15021471>
15. Djebali, N., Zaghdoudi, K.: Testing the Governance–Performance Relationship for the Tunisian Banks: A GMM in System Analysis. *Financial Innovation* 6(1) (2020). <https://doi.org/10.1186/s40854-020-00182-5>
16. Meher, B.K., Spulbar, C., Hawaldar, I.T., Birau, R., Mohapatra, L.: The Effects of Environment, Society and Governance Scores on Investment Returns and Stock Market Volatility. *International Journal of Energy Economics and Policy* 10(4), 234–239 (2020). <https://doi.org/10.32479/ijep.9311>
17. Shaikh, I.: Environmental, Social, Governance (ESG) Practice and Firm Performance: An International Evidence. *Journal of Business Economics and Management* 23(1), 218–237 (2022). <https://doi.org/10.3846/jbem.2022.16202>
18. Chen, S.: The Influence of Artificial Intelligence and Digital Technology on ESG Reporting Quality. *International Journal of Global Economics and Management* 3(1), 301–310 (2024). <https://doi.org/10.62051/ijgem.v3n1.36>
19. Lavin, J.F., Montecinos-Pearce, A.A.: ESG Reporting: Empirical Analysis of the Influence of Board Heterogeneity from an Emerging Market. *Sustainability* 13(6), 3090 (2021). <https://doi.org/10.3390/su13063090>
20. Hussain, M.A., Alsayegh, M.F., Boshnak, H.A.: The Impact of Environmental, Social, Governance Disclosure on the Performance of Saudi Arabian Companies: Evidence from the

- Top 100 Non-Financial Companies Listed on Tadawul. Sustainability 16(17), 7660 (2024). <https://doi.org/10.3390/su16177660>
21. Gidage, M., Kolte, A., Bhide, S., Paurkar, R.: ESG Performance and Systemic Risk Nexus: Role of Firm-Specific Factors in Indian Companies. *Journal of Risk and Financial Management* 17(9), 381 (2024). <https://doi.org/10.3390/jrfm17090381>
 22. Mechrui, S., Theiri, S.: The Effect of Environmental, Social, Governance (ESG) Performance on the Volatility of Stock Price Returns: The Moderating Role of Tax Payment. *Journal of Financial Reporting and Accounting* (2024). <https://doi.org/10.1108/jfra-03-20240140>
 23. Al-Hiyari, A., Kolsi, M.C.: How Do Stock Market Participants Value ESG Performance? Evidence from Middle Eastern and North African Countries. *Global Business Review* 25(4), 934–956 (2021). <https://doi.org/10.1177/09721509211001511>
 24. Fonseca, S., Guedes, M.J., Da Conceição Gonçalves, V.: Profitability and Size of Newly Established Firms. *International Entrepreneurship and Management Journal* 18(2), 957–974 (2021). <https://doi.org/10.1007/s11365-020-00730-6>
 25. Li, Z., Hu, B., Zhang, Y., Yang, W.: Financial Market Spillovers and Investor Attention to the Russia–Ukraine War. *International Review of Economics and Finance* 96, 103521 (2024). <https://doi.org/10.1016/j.iref.2024.103521>

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