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HOW DO ESG COMPONENTS AND FIRM-SPECIFIC CHARACTERISTICS SHAPE PROFITABILITY AND FINANCIAL STABILITY IN EMERGING ASIAN MARKETS?

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Abstract: This study examines the impact of Environmental, Social, and Governance (ESG) components and firm-specific characteristics on profitability and financial stability in emerging Asian markets. Using a sample of 6,727 publicly listed firms from China, India, Malaysia, Thailand, Indonesia, and the Philippines over the period of 2013-2023, this study employs both panel data and quantile regression methodologies, revealing that firms with high ESG scores experience significantly higher profitability and lower financial volatility. Firms with medium ESG scores experienced moderate but noticeable profitability and financial stability improvements across most quantiles. By contrast, firms with low ESG scores show minimal to no significant impact on profitability and financial stability. These results underscore the critical role of robust ESG practices in enhancing firm performance and mitigating financial risk. The study contributes to the literature by applying prospect theory to elucidate the behavioural underpinnings of ESG investments. It provides practical implications for managers and policymakers aiming to integrate ESG strategies to achieve sustainable economic growth.

Keywords: ESG, profitability, financial stability, emerging Asian markets, panel quantile.

Introduction

The integration of Environmental, Social, and Governance (ESG) factors into corporate strategy has garnered significant attention in recent years, particularly within the dynamic context of emerging markets in Asia. These markets, characterised by rapid economic growth and regulatory heterogeneity, present unique opportunities and challenges for firms striving to balance profitability with sustainable practices. This study aims to explore the interplay between ESG components and firm-specific characteristics and their collective impact on profitability and financial stability.

Emerging markets in Asia such as China, India, Malaysia, and Indonesia have gained prominence as hubs for sustainable finance driven by the integration of ESG practices into corporate strategies. These markets are unique in their combination of rapid economic growth, evolving regulatory environments, and diverse corporate governance standards (Budsaratragoon & Jitmaneeroj, 2021; Kushnir *et al*., 2022). Although ESG initiatives have been extensively studied in developed economies, where institutional environments are stable, their application in emerging Asian markets remains underexplored. Studies have shown that firms in these regions face challenges such as fragmented regulatory frameworks and limited investor pressure, which may affect the adoption and effectiveness of ESG practices (Alon & Rottig, 2013; Garcia & Orsato, 2020).

Existing research provides mixed findings on the relationship between ESG practices and financial outcomes, raising questions regarding the contextual validity of these results in Asia. For instance, Kushnir *et al*. (2022) found that high ESG scores positively influence the financial stability of North American firms, as evidenced by a lower likelihood of bankruptcy. Conversely, Budsaratragoon and Jitmaneeroj (2021) reported that ESG practices enhance firm value in Asia-Pacific markets, primarily through synergies among ESG components. However,

these findings often neglect the complexities of institutional voids, volatile economic conditions, and significant market heterogeneity in Asia (Alon, 2006; Naatu *et al*., 2022). This highlights a critical gap in the understanding of how ESG practices influence profitability and financial stability within the unique contexts of Asian markets.

Another challenge lies in the variability of ESG adoption and reporting across Asian markets, which complicates cross-country comparisons. Malaysia has adopted the Malaysian Code on Corporate Governance (MCCG), mandating ESG disclosures, whereas Indonesia and the Philippines are still in the nascent stages of developing regulatory frameworks (Naatu *et al*., 2022; Loang, 2023). This regulatory disparity not only affects the standardisation of ESG metrics, but also raises questions about the comparability of financial outcomes for firms operating in these distinct environments. Moreover, while high ESG performers in Asia have been shown to command more favourable financing terms such as ESG-linked bonds and loans, this benefit may not be uniformly accessible across all markets due to inconsistent implementation and market maturity (Eccles *et al*., 2014; Garcia & Orsato, 2020).

The interaction between ESG practices and firm-specific characteristics such as size, leverage, and operational efficiency is another underexplored area in the Asian context. While larger firms often have more resources to invest in ESG initiatives, smaller firms dominate many Asian economies, raising questions regarding the scalability of such practices (El Ghoul *et al*., 2011). Additionally, firms in high-leverage markets such as China and India may adopt ESG practices as a signalling mechanism to mitigate credit risks; however, the effectiveness of such strategies in enhancing profitability and stability is yet to be comprehensively evaluated (Garcia & Orsato, 2020; Kim & Li, 2021). Furthermore, operational efficiency, a critical determinant of ESG success, varies significantly across sectors and countries in Asia, necessitating more granular analysis (Porter & Kramer, 2011; Loang, 2024).

Another notable gap in the literature concerns the differential impacts of ESG dimensions—environmental, social, and governance—on financial performance. While governance is frequently highlighted as a key factor in reducing volatility and enhancing financial stability (Kushnir *et al*., 2022), the role of environmental and social factors is less understood, particularly in the resource-dependent and labour-intensive industries prevalent in Asia (Broadstock *et al*., 2021).

For instance, environmental practices may yield greater financial benefits in economies such as China, where firms face stringent emission reduction targets, whereas social initiatives may be more impactful in countries such as the Philippines, where labour relations significantly influence firm performance (Sharfman & Fernando, 2008; Budsaratragoon & Jitmaneeroj, 2021). Existing studies often treat ESG components as aggregated scores, obscuring the nuanced effects of individual dimensions and their interactions with firm-specific characteristics (Eccles *et al*., 2014; Broadstock *et al*., 2021).

Methodological limitations further constrain the understanding of ESG impacts on Asian markets. Most studies rely on conventional econometric techniques such as panel regressions, which capture mean effects, but fail to account for heterogeneity in firm-level outcomes. Quantile regression, which provides insights into the differential impacts of ESG practices across firms with varying financial performance, remains underutilised despite its potential to address this variability (Revelli & Viviani, 2015). For instance, while high ESG scores may enhance the profitability of top-performing firms, their impact on financially constrained or operationally inefficient firms is less clear (Friede *et al*., 2015). Without addressing these methodological gaps, the current findings risk oversimplifying the complex dynamics between ESG practices and regional financial outcomes.

This study employs empirical analysis using ESG score ratings from Bloomberg and detailed firm-specific data to explore these dynamics. By applying advanced econometric techniques such as panel data regression and quantile regression, this research aims to uncover the differential impacts of ESG components and firm characteristics on profitability and financial stability. Previous studies have suggested that while environmental and social factors are critical, governance often plays a more significant role in enhancing financial performance, particularly for firms with weaker governance structures (Garcia & Orsato, 2020; Kim & Li, 2021).

This study makes a significant contribution to the literature on ESG practices and their interactions with firm-specific characteristics in emerging Asian markets. This study explores how ESG components combined with firm attributes such as size, leverage, and operational efficiency, influence profitability and financial stability. The findings provide valuable insights for investors refining ESG-integrated strategies, policymakers crafting balanced regulations, and corporate managers aiming to align sustainability initiatives with their financial goals.

Literature Review

Prospect Theory and ESG

Prospect theory, developed by Kahneman and Tversky (1979), posits that individuals are loss-averse, meaning they experience losses more intensely than gains of the same magnitude. This theory is particularly relevant in the context of ESG investments, where the perception of risk and potential losses plays a crucial role in decision-making. Research has demonstrated that integrating prospect theory into ESG evaluation can offer a more nuanced understanding of investor behaviour. Su and Sun (2023) applied a cumulative prospect theory model to ESG performance evaluation, highlighting that incorporating behavioural biases into ESG assessment provides a more realistic appraisal of a firm's sustainability efforts. Their study showed that considering risk preferences and probability distortion helps align investment decisions with investors' psychological inclinations.

However, the literature remains divided on the extent to which ESG practices impact financial performance through the lens of prospect theory. On the one hand, studies suggest that firms with robust ESG practices are perceived as less risky, attracting more risk-averse investors and potentially leading to better financial stability and profitability. Tang (2020) found that ESG performance evaluation models that incorporate prospect theory better reflect investor behaviour, suggesting that these firms might benefit from a lower cost of capital and higher valuation.

On the other hand, there is evidence to suggest that the impact of ESG practices on financial performance is not uniform across different market contexts and firm characteristics. For instance, while some studies indicate a positive relationship between ESG practices and financial performance in developed markets, the evidence is less clear in emerging markets, where regulatory environments and market conditions are more volatile (Kim & Li, 2021). This discrepancy suggests that while ESG practices can enhance financial performance through risk mitigation, the effectiveness of these practices may vary depending on the specific market and firm context.

Moreover, the literature also points out the potential for overvaluation of ESG-compliant firms due to investor biases. Behavioural biases such as overconfidence and herding can lead investors to overestimate the benefits of ESG practices, resulting in inflated valuations that may not be sustainable in the long term. This perspective is supported by studies that highlight the role of psychological factors in driving investor behaviour, suggesting that the integration of ESG factors into investment decisions is not purely rational, but also influenced by behavioural biases (Thaler, 1985; Statman, 2000).

Profitability and Financial Stability in Emerging Asian Markets

Prior studies have established the significance of firm size, leverage, and operational efficiency in determining financial outcomes (Demirgüç-Kunt & Maksimovic, 1998; Alon, 2006). However, the volatile nature of emerging markets introduces unique challenges that distinguish them from those of developed economies. Political instability, fluctuating macroeconomic policies, and fragmented regulatory frameworks create environments with heightened uncertainty (Raddatz, 2006; Tiwary *et al*., 2022). These dynamics underscore the urgent need for firms to adopt strategies that not only drive profitability, but also mitigate financial risks. Among these strategies, the integration of ESG components has emerged as a promising approach for enhancing operational resilience and long-term performance (Booth *et al*., 2001; Ruch, 2020).

One of the persistent challenges in these markets is the complex role of leverage. While moderate leverage levels have been linked to enhanced profitability through improved returns on equity, excessive leverage remains a critical risk factor for financial instability. The greater sensitivity of highly leveraged firms to economic shocks and default risks has been extensively documented in the literature (Booth *et al*., 2001). ESG practices have been proposed as a means of mitigating these risks by enhancing operational efficiency and reducing exposure to market volatility.

Firms with strong ESG performance exhibit reduced credit default swap spreads, reflecting lower perceived insolvency risk (Kim *et al*., 2023). However, the evidence is far from being conclusive. In less mature markets such as Indonesia and the Philippines, weak institutional frameworks and inconsistent ESG reporting standards dilute the potential benefits of these practices (Loang, 2023). Additionally, industries with heightened exposure to external risks such as the energy and insurance sectors have shown divergent outcomes, with ESG controversies exacerbating financial instability in some cases (Gupta, 2022).

Emerging Asian markets are also vulnerable to external shocks, including global financial crises, commodity price fluctuations, and geopolitical tensions (Ruch, 2020; Tiwary *et al*., 2022). These conditions amplify the difficulty in achieving financial stability while maintaining profitability. Corporate governance, a key component of ESG, plays a crucial role in mitigating such risks. Effective governance structures, including independent boards and rigorous audit practices are associated with lower financial volatility and improved firm performance (Broadstock *et al*., 2021). However, inconsistent adoption of governance practices across the region presents a challenge. Countries with more advanced governance codes such as Malaysia have reported more robust financial outcomes than those with weaker regulatory oversight such as the Philippines (Claessens & Yurtoglu, 2013; Loang, 2023). This discrepancy underscores the need for tailored ESG strategies that account for the regulatory and institutional diversity within the region.

A critical area of debate pertains to the distinct contributions of ESG components to financial performance. Although governance has received substantial attention for its role in enhancing stability and profitability, the contributions of environmental and social factors remain less explored, particularly in the context of emerging Asian markets. For instance, environmental practices such as carbon emissions management and energy efficiency have been linked to cost savings and improved operational performance in heavy manufacturing economies such as China (Broadstock *et al*., 2021).

Conversely, social initiatives such as diversity and employee relations have shown greater relevance in labour-intensive markets such as Indonesia and the Philippines, where workforce dynamics significantly impact firm performance (Budsaratragoon & Jitmaneeroj, 2021). Despite these promising findings, much of the existing literature aggregates ESG scores,

obscuring the differential impact of individual components. Disentangling these effects is crucial for understanding how specific ESG dimensions interact with firm characteristics to shape financial outcomes in the diverse context of emerging Asian markets.

ESG and Firm-specific Characteristics

The interaction between ESG practices and firm-specific characteristics is central to understanding the financial performance in emerging Asian markets. These markets, which are marked by rapid growth and institutional heterogeneity, present unique challenges for firms that integrate ESG practices. Robust ESG strategies can enhance financial performance by mitigating risks, improving operational efficiency, and strengthening reputational capital (Eccles *et al*., 2014; Broadstock *et al*., 2021). However, in emerging Asia, the efficacy of ESG initiatives is highly dependent on the regulatory and institutional environment. For example, countries with structured frameworks such as Malaysia foster stronger ESG outcomes, whereas markets such as Indonesia and the Philippines face inconsistencies in adoption and enforcement, limiting the predictability of ESG's financial benefits (Claessens & Yurtoglu, 2013; Loang, 2024). These disparities highlight the region's fragmented ESG landscape, where cultural and institutional dynamics demand context-specific approaches to align sustainability with profitability and financial stability (Kim *et al*., 2023).

Firm-specific characteristics play a pivotal role in determining the financial outcomes of ESG. Larger firms are better equipped to implement comprehensive ESG initiatives, leverage economies of scale, and benefit from heightened investor confidence (Dhaliwal *et al*., 2011). However, their success is contingent on the effective management and reporting of ESG activities, as weak execution can erode financial gains (El Ghoul *et al*., 2011). Highly leveraged firms often adopt ESG strategies to signal creditworthiness and mitigate default risks; however, excessive leverage can constrain the resources needed for impactful ESG investments (Sharfman & Fernando, 2008). This nuanced relationship underscores the dual challenges of aligning financial structures with sustainability goals in volatile and resource-constrained environments typical of emerging markets (Booth *et al*., 2001).

Operational efficiency also influences the financial impact of ESG adoption. Efficient firms can better integrate ESG initiatives into core operations, achieving productivity gains and cost savings, particularly in sectors such as manufacturing and energy, where resource optimisation is critical (Porter & Kramer, 2011; Broadstock *et al*., 2021). By contrast, inefficient firms face greater barriers to realising ESG-related financial benefits, exacerbated by weak institutional support in less developed markets. Regulatory and market maturity dictate the effectiveness of ESG practices. Advanced markets such as Malaysia and Thailand, see enhanced financial outcomes from ESG due to investor demand and structured governance codes, whereas firms in markets such as Vietnam operate in environments, where weaker institutions limit ESG's financial potential (Ioannou & Serafeim, 2012; Ruch, 2020).

The empirical evidence illustrates the uneven impact of ESG components on financial outcomes. Governance has consistently emerged as a key driver of profitability and stability, reducing volatility, and improving transparency (Boubaker *et al*., 2019). Environmental practices, such as emissions management, yield significant financial benefits in resource-intensive economies such as China and South Korea (Nakao *et al*., 2007). Social initiatives, including diversity and employee relations have a pronounced impact in labour-intensive markets such as Indonesia, where workforce dynamics significantly influence profitability (Budsaratragoon & Jitmaneeroj, 2021). However, many studies have aggregated ESG into composite scores, masking the distinct effects of individual components. Disentangling these dimensions is critical for understanding how ESG interacts with firm-specific

characteristics to shape financial outcomes in diverse market contexts (Park & Choi, 2015).

Hypothesis 1*: ESG components (environmental, social, and governance) are positively associated with profitability (ROA) and negatively associated with financial instability (GK) in emerging Asian markets.*

Hypothesis 2*: Firm-specific characteristics (size, leverage, and operational efficiency) are positively associated with profitability (ROA) and negatively associated with financial instability (GK) in emerging Asian markets.*

Methodology

Data and Sampling

The dataset for this study is compiled from Bloomberg and the S&P Capital IQ database, covering publicly listed companies in selected emerging Asian markets, specifically China, India, Malaysia, Thailand, Indonesia, and the Philippines. These countries were chosen due to their rapid economic growth, diverse regulatory environments, and varying levels of ESG adoption, making them ideal for examining the impact of ESG practices on financial performance. The sample period spans from 2013 to 2023, providing a comprehensive longitudinal perspective on the dynamics of ESG practices and financial outcomes over the past decade.

China and India, as the two largest emerging markets in Asia, offer valuable insights due to their substantial market size and significant global economic influence. According to the World Bank, China's Gross Domestic Product (GDP) grew at an average annual rate of 7.7% from 2013 to 2023 while India's GDP grew at an average rate of 6.8% during the same period. Malaysia and Thailand represent mid-sized emerging markets with progressive ESG regulations. For instance, Malaysia's Securities Commission has implemented MCCG, which emphasises ESG practices while Thailand's Securities and Exchange Commission (SEC) has actively promoted ESG disclosure among listed companies. Indonesia and the Philippines provide examples of markets with evolving regulatory frameworks and increasing corporate governance standards. The Indonesian Financial Services Authority and the Philippine Securities and Exchange Commission have both introduced guidelines to improve ESG reporting and practices.

The sample consists of 6,727 firms, ensuring a comprehensive representation of each country's market. Specifically, the sample includes 1,737 companies from China listed on the Shanghai Stock Exchange and the Shenzhen Stock Exchange, 2,763 companies from India listed on the Bombay Stock Exchange and the National Stock Exchange, 479 companies from Malaysia listed on Bursa Malaysia, 305 companies from Thailand listed on the Stock Exchange of Thailand, 735 companies from Indonesia listed on the Indonesia Stock Exchange, and 708 companies from the Philippines listed on the Philippine Stock Exchange. This diverse sample allows for a robust analysis of ESG practices and their impact on financial performance across different regulatory and market environments.

Firm-specific characteristics such as market capitalisation, debt-to-equity ratio, and inventory turnover ratio were obtained from annual reports and the S&P Capital IQ database. ESG scores and components were sourced from Bloomberg, providing detailed ESG metrics. This dual-source approach enhances the reliability and depth of the dataset. The study includes firms that delisted during the sample period to address potential survivorship bias.

High, Medium, and Low ESG Score Group

Firms were categorised into three groups based on their ESG scores: High, medium, and low. The ESG scores, obtained from Bloomberg were divided into tertiles for each year within the sample period. Firms in the top tertile were classified as having high ESG scores, those in the middle tertile as medium ESG scores, and those in the bottom tertile as low ESG scores. This classification allows for a comparative analysis of financial performance and stability across different levels of ESG adoption.

High ESG score firms are characterised by exemplary environmental, social, and governance practices, often adhering to stringent international standards. These firms typically exhibit proactive environmental management, robust social policies, and strong governance frameworks. Medium ESG score firms demonstrate moderate adherence to ESG principles, balancing compliance with strategic initiatives. Low ESG score firms show minimal engagement with ESG practices, often limited to basic compliance with local regulations. This tripartite classification enables a nuanced investigation into how varying levels of ESG commitment influence profitability and financial stability, uncovering the differential impacts and providing insights into the benefits and challenges associated with different levels of ESG adoption in emerging Asian markets Figure 1 shows the high, medium, and low ESG score classification..

The use of the ESG composite score and individual dimensions serves distinct analytical purposes within the study, aligned with its objectives. The composite ESG score, sourced from Bloomberg, represents an aggregate measure of environmental, social, and governance performance and is used to categorise firms into tertiles, distinguishing high, medium, and low ESG groups. This classification facilitates an overarching analysis of the group-level differences. In contrast, panel data regression focuses on individual ESG dimensions to provide a more granular examination of their specific impacts on profitability (ROA) and financial stability (GK). Analysing each dimension separately allows for a critical assessment of the unique contributions of environmental, social, and governance factors, which cannot be captured by the aggregate score alone.

ESG Components and Firm-specific Characteristics

Table 1 delineates the various components of ESG practices alongside firm-specific characteristics, providing a comprehensive overview of the variables and their measurements. Variables under the environmental category include carbon emissions, measured by total greenhouse gas emissions, and energy use, quantified as total energy consumption. Resource management

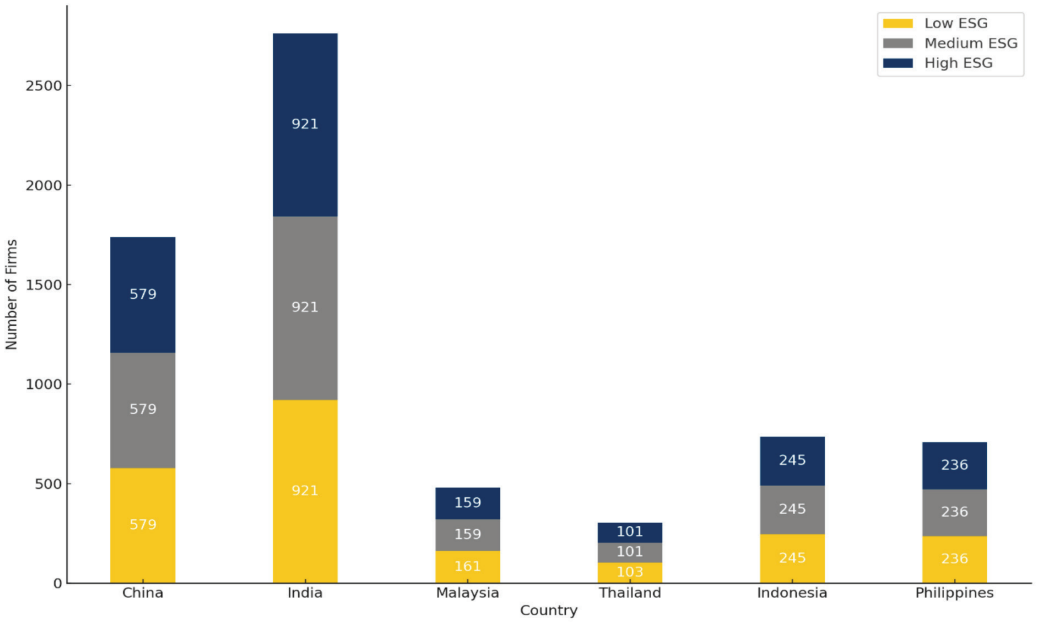


Figure 1: High, medium, and low ESG score classification

encompasses metrics such as waste recycled relative to total waste and water usage. Social variables include employee relations, measured by the employee turnover rate; community engagement via Corporate Social Responsibility (CSR) expenditures as a percentage of revenue; and diversity and inclusion, reflected by the percentage of women and minorities in the workforce and management.

Governance variables cover board composition, indicated by the percentage of independent directors; audit quality, assessed by the presence of an independent audit committee; and executive compensation, measured by the Chief Executive Officer (CEO) pay ratio and performance-linked incentives. These characteristics include company size, represented by market capitalisation (total

Table 1: ESG components and firm-specific characteristics measurements

Category	Variable	Measurement	Formula	Literature
ESG Components				
Environmental	Carbon Emissions (CE)	Total greenhouse gas emissions	∑(Emission Source × Emission Factor)	Eccles *et al*. (2014)
	Energy Use (EU)	Total energy consumption	∑(Energy Consumption by Source)	Loang (2023)
	Resource Management (RM)	Waste recycled, water usage	$\frac{Waste\ Recycled\ (tons)}{Total\ Waste\ (tons)}$	Ruch (2020)
Social	Employee Relations (ER)	Employee turnover rate	$\frac{Number\ of\ Departing\ Employee}{Total\ \ Number\ of\ Employee}\ x\ 100$	Dhaliwal *et al*. (2011)
	Community Engagement (CEn)	CSR expenditures as a percentage of revenue	$\frac{CSR\ Expenditure}{Total\ Revenue}\ x\ 100$	Eccles *et al*. (2014)
	Diversity and Inclusion (DI)	Percentage of women/minorities in workforce and management	$\frac{Number\ of\ Women/Minorities}{Total\ \ Number\ of\ Employee}\ x\ 100$	Jeong (2021)
Governance	Board Composition (BC)	Percentage of independent directors	$\frac{Number\ of\ Independent\ Director}{Total\ \ Number\ of\ Directors}\ x\ 10$	El Ghoul *et al*. (2011)
	Audit Quality (AQ)	Presence of an independent audit committee	Binary (1 if present, 0 if not)	El Ghoul *et al*. (2011)
	Executive Compensation (EC)	CEO pay ratio, performance-linked incentives	$\frac{CEO\ Compensation}{Median\ Employee\ Compensation}$	Orsato *et al*. (2015)
Firm-specific Characteristics				
Company Size	Market Capitalisation (MC)	Total market value of outstanding shares	Share Price x Number of Shares Outstanding	Eccles *et al*. (2014)
Leverage	Debt-to-Equity Ratio (DER)	Total debt relative to total equity	$\frac{Total\ Debt}{Total\ Equity}$	El Ghoul *et al*. (2011)
Operational Efficiency	Inventory Turnover Ratio (ITR)	Frequency of inventory replacement	$\frac{Cost\ of\ Goods\ Sold}{Average\ Inventory}$	Porter & Kramer (2011)

market value of outstanding shares) and total assets. The debt-to-equity ratio measures leverage, and operational efficiency is evaluated through the inventory turnover ratio, reflecting the frequency of inventory replacement.

Profitability and Financial Stability

Table 2 presents the key variables and their measurements used to assess profitability and financial stability in firms operating within emerging Asian markets. ROA is a fundamental metric that gauges a firm's efficiency in generating profit from its assets. It is calculated as net income divided by total assets. This measure is widely recognised for its ability to provide insight into how effectively a company utilises its assets to generate earnings (Dhaliwal *et al*., 2011). The Garman-Klass volatility estimator is employed to measure financial stability, incorporating the opening, closing, high, and low prices of a stock. This estimator offers a more accurate reflection of market volatility compared with simpler models that use closing prices alone. By capturing the full range of price movements within a trading period, the Garman-Klass estimator provides a robust measure of financial stability, essential for assessing a firm's ability to withstand market fluctuations (Garman & Klass, 1980; Alizadeh *et al*., 2002).

Table 2: Profitability and financial stability measurement

Category	Variable	Measurement	Literature
Profitability	Return on Assets (ROA)	$\frac{Net\ Income}{Total\ Asset}$	Dhaliwal *et al*. (2011)
Financial Stability	Garman-Klass Volatility Estimator (GK)	$\sqrt{\frac{1}{N}\sum_{i=1}^{N}\frac{1}{2}\left(In\frac{h_i}{l_i}\right)^2 - \frac{1}{N}\sum_{i=1}^{N}(2In2-1)(In\frac{C_i}{O_i})^2}$	Garman & Klass (1980); Alizadeh *et al*. (2002)

Panel Data and Quantile Regressions

This study employs advanced econometric techniques, specifically panel data regression and quantile regression, to analyse the influence of ESG practices and firm-specific characteristics on profitability and financial stability in emerging Asian markets. The use of panel data regression is instrumental in capturing the dynamic nature of financial performance metrics and their relationship with ESG practices. This method accounts for unobserved heterogeneity by including individual-specific effects, thus, controlling for time-invariant characteristics that could bias the estimates. The panel data model is specified as follows:

$$ROA_{i,t} = \alpha + \beta_1 CE_{i,t} + \beta_2 CE_{i,t} + \beta_3 EU_{i,t} + \beta_4 RM_{i,t} + \beta_5 ER_{i,t} + \beta_6 CEn_{i,t} + \beta_7 DI_{i,t} + \beta_8 BC_{i,t} + \beta_9 AQ_{i,t} + \beta_{10} EC_{i,t} + \beta_{11} MC_{i,t} + \beta_{12} DER_{i,t} + \beta_{13} ITR_{i,t} + \mu_i + \epsilon_{i,t}$$

$$GK_{i,t} = \alpha + \beta_1 CE_{i,t} + \beta_2 CE_{i,t} + \beta_3 EU_{i,t} + \beta_4 RM_{i,t} + \beta_5 ER_{i,t} + \beta_6 CEn_{i,t} + \beta_7 DI_{i,t} + \beta_8 BC_{i,t} + \beta_9 AQ_{i,t} + \beta_{10} EC_{i,t} + \beta_{11} MC_{i,t} + \beta_{12} DER_{i,t} + \beta_{13} ITR_{i,t} + \mu_i + \epsilon_{i,t}$$

where $ROA_{i,t}$ represents the return on assets for firm i at time t, $GK_{i,t}$ represents Garman-Klass volatility estimator for firm i at time t, $CE_{i,t}$ represents carbon emissions for firm i at time t, $EU_{i,t}$ represents the energy use for firm i at time t, $RM_{i,t}$ represents the resource management for firm i at time t, $ER_{i,t}$ represents the employee relations for firm i at time t, $CEn_{i,t}$ represents the community engagement for firm i at time t, $DI_{i,t}$ represents the diversity and inclusion for firm i at time t, $BC_{i,t}$ represents the board composition for firm i at time t, $AQ_{i,t}$ represents the audit quality for firm i at time t, $EC_{i,t}$ represents the executive compensation for firm i at time t, $MC_{i,t}$ represents the market capitalisation for firm i at time t, $DER_{i,t}$ represents the debt-to-equity ratio

for firm i at time t, $ITR_{i,t}$ represents the inventory turnover ratio for firm i at time t, μ_i represents the unobserved firm-specific effect for firm i at time t, and $\epsilon_{i,t}$ represents the idiosyncratic error term for firm i at time t.

Complementing the panel data approach, quantile regression is utilised to explore the heterogeneous impacts of ESG practices across different points in the distribution of the dependent variables. Unlike ordinary least squares regression, which estimates the conditional mean of the dependent variable, quantile regression provides estimates at various quantiles, offering a more detailed view of the relationship between the predictors and the outcomes. The quantile regression model is specified as follows:

$$Q_{ROA}(\tau|X_{i,t}, Z_{i,t}) = \alpha(\tau) + \beta_1(\tau)CE_{i,t} + \beta_2(\tau)CE_{i,t} + \beta_3(\tau)EU_{i,t} + \beta_4(\tau)RM_{i,t} + \beta_5(\tau)ER_{i,t} + \beta_6(\tau)CEn_{i,t} + \beta_7(\tau)DI_{i,t} + \beta_8(\tau)BC_{i,t} + \beta_9(\tau)AQ_{i,t} + \beta_{10}(\tau)EC_{i,t} + \beta_{11}(\tau)MC_{i,t} + \beta_{12}(\tau)DER_{i,t} + \beta_{13}(\tau)ITR_{i,t} + \mu_i + \epsilon_{i,t}$$

$$Q_{GK}(\tau|X_{i,t}, Z_{i,t}) = \alpha(\tau) + \beta_1(\tau)CE_{i,t} + \beta_2(\tau)CE_{i,t} + \beta_3(\tau)EU_{i,t} + \beta_4(\tau)RM_{i,t} + \beta_5(\tau)ER_{i,t} + \beta_6(\tau)CEn_{i,t} + \beta_7(\tau)DI_{i,t} + \beta_8(\tau)BC_{i,t} + \beta_9(\tau)AQ_{i,t} + \beta_{10}(\tau)EC_{i,t} + \beta_{11}(\tau)MC_{i,t} + \beta_{12}(\tau)DER_{i,t} + \beta_{13}(\tau)ITR_{i,t} + \mu_i + \epsilon_{i,t}$$

This study employs panel data regression and quantile regression to analyse the impact of ESG practices on profitability and financial stability in emerging Asian markets. Panel data regression controls for unobserved heterogeneity by including individual-specific effects, capturing the dynamic nature of financial performance metrics over time. Quantile regression provides additional insights by estimating the effects at various points in the distribution of the dependent variables, revealing differential impacts across the spectrum of firm performance. Panel data regression analyses were conducted at the individual country level to capture the unique dynamics within each market, reflecting the influence of country-specific regulatory environments, market maturity, and institutional frameworks on the relationship between ESG components and financial outcomes. This approach highlights heterogeneity across emerging Asian markets, offering a detailed understanding of the distinct ESG-financial performance relationships in different national contexts. By contrast, quantile regression is based on the total sample, providing a macro-level perspective that captures overarching patterns and trends across the entire region.

Results and Discussion

Descriptive Statistics

Table 3 provides the descriptive statistics for the variables used to analyse the impact of ESG components and firm-specific characteristics on profitability and financial stability in selected emerging Asian markets, including China, India, Malaysia, Thailand, Indonesia, and the Philippines.

Table 3: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Profitability						
Return on Assets	0.075	0.032	-0.045	0.215	0.847	3.504
Financial Stability						
Garman-Klass Volatility	0.025	0.012	0.010	0.075	1.203	4.247
Environmental						
Carbon Emissions	180.452	75.321	45.002	360.001	0.648	2.754
Energy Use	1200.651	550.421	300.123	2400.458	0.754	3.101
Resource Management	0.603	0.198	0.104	0.903	0.397	2.495
Social						
Employee Relations	10.498	5.246	2.003	25.002	1.102	3.746
Community Engagement	0.015	0.007	0.005	0.035	0.902	2.997
Diversity and Inclusion	0.353	0.123	0.100	0.700	0.503	2.602
Governance						
Board Composition	0.548	0.148	0.198	0.898	0.204	2.104
Audit Quality	0.798	0.198	0.001	1.002	-1.202	3.596
Executive Compensation	1.752	0.648	0.502	3.002	0.697	2.798
Firm-specific Characteristics						
Market Capitalisation	8500.125	4200.505	2000.253	20000.658	0.602	2.703
Debt-to-Equity Ratio	0.653	0.298	0.202	1.502	0.798	3.198
Inventory Turnover Ratio	5.248	2.102	2.002	10.005	0.548	2.395

The mean return on assets (ROA) is 0.075 (SD = 0.032), with China showing the highest maximum value of 0.215, indicating strong profitability potential. The Garman-Klass (GK) volatility mean is 0.025 (SD = 0.012), with Indonesia having the highest maximum value of 0.075, reflecting significant financial instability for some firms. Environmental variables exhibit notable variation. Carbon emissions (CE) averages 180.452 (SD = 75.321), with India reporting the highest maximum value of 360.001. Energy use (EU) averages 1200.651 (SD = 550.421), with China having the highest maximum value of 2400.458. Resource management (RM) has a mean of 0.603 (SD = 0.198), with Malaysia showing the highest maximum value of 0.903.

Social variables show diverse distributions. Employee relations (ER) averages 10.498 (SD = 5.246), with the Philippines having the highest maximum value of 25.002, indicating high employee turnover in some firms. Community engagement (CEn) and diversity and inclusion (DI) exhibit moderate means, with Thailand reporting the highest maximum values. Governance variables such as board compositon (BC) and audit quality (AQ) have means of 0.548 and 0.798, respectively. AQ's negative skewness (-1.202) suggests high audit quality for most firms, with Malaysia having the highest maximum value. Executive compensation (EC) shows a mean of 1.752 (SD = 0.648), with India having the highest maximum value of 3.002. Firm-specific characteristics indicate substantial heterogeneity. Market capitalisation (MC) averages 8500.125 (SD = 4200.505), with China showing the highest maximum value of 20000.658. Debt-to-Equity Ratio (DER) and Inventory Turnover Ratio (ITR) show a mean of 0.653 and 5.248, respectively, with Thailand having the highest maximum values.

Pearson Correlation Analysis

Table 4 reveals several significant relationships between variables, indicating complex interdependencies. Notably, CE is significantly positively correlated with DER (r = 0.404, $p <$ 0.10), suggesting that firms with higher leverage may tend to have higher carbon emissions, potentially due to the resource-intensive nature of their operations. Conversely, CE shows a significant negative correlation with ROA (r = -0.226), implying that higher carbon emissions are associated with lower profitability, reflecting the potential costs and inefficiencies associated with high emissions. EU similarly exhibits a significant positive correlation with DER (r = 0.356, $p < 0.10$) and a negative correlation with ROA (r = -0.204), further underscoring the detrimental impact of high resource consumption on financial performance.

On the other hand, RM and various social and governance factors demonstrate significant positive correlations with ROA. RM is positively correlated with ROA (r = 0.319, $p < 0.05$), indicating that effective resource management practices contribute to higher profitability. ER, CEn, and DI show robust positive correlations with ROA (r = 0.451, 0.472, and 0.488, respectively, all $p < 0.01$), suggesting that firms investing in social capital tend to perform better financially. Governance factors such as BC and AQ are also positively correlated with ROA (r = 0.461 and 0.437, respectively, both $p < 0.05$), highlighting the importance of strong governance structures in enhancing financial performance. Conversely, these governance variables are negatively correlated with GK, with BC and AQ showing correlations of r = -0.281 and -0.291, respectively (both $p < 0.05$), indicating that robust governance practices contribute to financial stability by reducing volatility. These findings underscore the multifaceted benefits of ESG practices, particularly in enhancing profitability and stability through improved resource management, social relations, and governance structures.

Panel Data Regression of ESG Component and Firm-specific Characteristics on Profitability and Financial Stability

Table 5 presents the panel data regression analysis examining the effects of ESG components and firm-specific characteristics on profitability and financial stability across six emerging Asian markets. Fixed-effect models were used for China, India, Malaysia, and Thailand for both ROA and GK due to the significant test results (p-value < 0.05), indicating that the fixed-effect model is more appropriate as it accounts for time-invariant characteristics unique to each country.

The environmental variables showed mixed impacts. CE is positively correlated with ROA in China (0.015), Malaysia (0.017), and Indonesia (0.018), suggesting that firms benefit from lower compliance costs. Conversely, EU negatively impacts ROA across all countries, significantly in China (-0.025), indicating that high energy consumption leads to inefficiencies and higher costs. RM shows a positive association with ROA in China (0.080), highlighting the profitability gains from effective resource management. Social variables significantly influenced ROA. ER positively impacts ROA in China (0.040) and Indonesia (0.048), suggesting that better employee relations enhance productivity and reduce turnover costs. DI positively affects ROA in China (0.160), underscoring the advantages of diversity and inclusion in terms of driving profitability. The firm-specific characteristics provided substantial insights. MC positively impacts ROA across all countries, emphasising the importance of scale for profitability. DER negatively affects ROA in all markets, indicating that a high leverage reduces profitability.

Environmental variables have distinct impacts on GK. CE negatively affects GK in China (-0.010), linking higher emissions to financial instability due to regulatory risk. EU positively impacts the GK in China (0.015), suggesting that higher energy use may be linked to operational stability through economies of scale. Social variables also significantly influence GK. ER negatively impacts GK in

Table 4: Pearson correlation matrix

	CE	EU	RM	ER	CEn	DI	BC	AQ	EC	MC	DER	ITR	ROA	GK
CE	1.000													
EU	0.548***	1.000												
RM	-0.205	-0.222	1.000											
ER	-0.153	-0.158	0.503**	1.000										
CEn	-0.184	-0.171	0.448***	0.604*	1.000									
DI	-0.256**	-0.238**	0.472***	0.623*	0.649*	1.000								
BC	-0.217	-0.202	0.421	0.555**	0.583**	0.604*	1.000							
AQ	-0.212	-0.195	0.402	0.531***	0.561**	0.581**	0.625*	1.000						
EC	-0.308**	-0.315**	0.352***	0.485**	0.502**	0.543**	0.565**	0.604*	1.000					
MC	-0.102	-0.115	0.295***	0.405**	0.424**	0.461**	0.481**	0.495**	0.519**	1.000				
DER	0.404***	0.356***	-0.148	-0.203	-0.224	-0.253***	-0.231	-0.239	-0.254***	-0.306**	1.000			
ITR	-0.058	-0.068	0.253***	0.197	0.217	0.228	0.209	0.221	0.198	0.175	-0.183	1.000		
ROA	-0.226	-0.204	0.319**	0.451*	0.472*	0.488*	0.461**	0.437**	0.419**	0.396**	-0.248***	0.297**	1.000	
GK	0.302**	0.278**	-0.252**	-0.303**	-0.273**	-0.242**	-0.281**	-0.291**	-0.262**	-0.205	0.322**	-0.175	-0.447*	1.000

Note: ***, **, * represent the significant levels at 1%, 5%, and 10%, respectively.

Table 5: ESG component and firm-specific characteristics on profitability and financial stability

	Profitability (ROA)						Financial Stability (Garman and Klass)					
Country	**China**	**India**	**Malaysia**	**Thailand**	**Indonesia**	**Philippines**	**China**	**India**	**Malaysia**	**Thailand**	**Indonesia**	**Philippines**
Panel Data	Fixed-Effect	Fixed-Effect	Fixed-Effect	Fixed-Effect	Fixed-Effect	Fixed-Effect	Fixed-Effect	Fixed-Effect	Fixed-Effect	Fixed-Effect	Fixed-Effect	Fixed-Effect
Environmental												
CE	0.015**	0.020*	0.017*	0.012**	0.018**	0.016***	-0.010*	-0.015	-0.012	-0.008	-0.011	-0.010
	(0.024)	(0.061)	(0.072)	(0.034)	(0.021)	(0.002)	(0.043)	(0.123)	(0.531)	(0.635)	(0.682)	(0.624)
EU	-0.025*	-0.030*	-0.028*	-0.020***	-0.027***	-0.024**	0.015**	0.020	0.018	0.012	0.016	0.015
	(0.063)	(0.055)	(0.080)	(0.001)	(0.004)	(0.025)	(0.012)	(0.2353)	(0.253)	(0.325)	(0.362)	(0.438)
RM	0.080***	0.090**	0.085*	0.070*	0.088**	0.082**	-0.060*	-0.070	-0.065	-0.055	-0.068	-0.063
	(0.000)	(0.034)	(0.032)	(0.081)	(0.016)	(0.020)	(0.090)	(0.235)	(0.251)	(0.652)	(0.643)	(0.732)
Social												
ER	0.040***	0.050**	0.045**	0.035***	0.048**	0.043*	-0.030*	-0.040*	-0.035***	-0.025**	-0.038*	-0.033***
	(0.002)	(0.034)	(0.023)	(0.003)	(0.032)	(0.097)	(0.077)	(0.056)	(0.006)	(0.013)	(0.079)	(0.000)
CE	0.120***	0.130**	0.125**	0.110***	0.128***	0.122*	-0.090*	-0.100*	-0.095***	-0.085***	-0.098**	-0.093*
	(0.002)	(0.011)	(0.025)	(0.005)	(0.002)	(0.081)	(0.085)	(0.076)	(0.002)	(0.006)	(0.014)	(0.087)
DI	0.160**	0.170**	0.165**	0.150**	0.168*	0.162**	-0.130*	-0.140*	-0.135**	-0.125**	-0.138**	-0.133***
	(0.042)	(0.040)	(0.011)	(0.021)	(0.067)	(0.012)	(0.071)	(0.082)	(0.013)	(0.042)	(0.042)	(0.002)
Governance												
BC	0.065	0.075	0.070**	0.060***	0.073	0.068	-0.050*	-0.060*	-0.055***	-0.045***	-0.058***	-0.053***
	(0.345)	(0.845)	(0.024)	(0.000)	(0.844)	(0.231)	(0.064)	(0.074)	(0.000)	(0.002)	(0.000)	(0.0001)
AQ	0.100	0.110	0.105**	0.090*	0.108	0.102	-0.075*	-0.085*	-0.080**	-0.070***	-0.083**	-0.078***

	(0.734)	(0.523)	(0.022)	(0.068)	(0.373)	(0.428)	(0.061)	(0.053)	(0.001)	(0.002)	(0.033)	(0.000)
EC	0.055	0.065	0.060***	0.050***	0.063	0.058	-0.0405*	-0.050*	-0.045**	-0.035***	-0.048*	-0.043***
	(0.346)	(0.124)	(0.002)	(0.001)	(0.622)	(0.731)	(0.066)	(0.065)	(0.004)	(0.000)	(0.062)	(0.001)
Firm-specific Characteristics												
MC	0.015**	0.020**	0.018*	0.014***	0.019***	0.016**	-0.010*	-0.015*	-0.012***	-0.010**	-0.013***	-0.011***
	(0.024)	(0.036)	(0.086)	(0.003)	(0.002)	(0.035)	(0.063)	(0.053)	(0.003)	(0.042)	(0.001)	(0.001)
DER	-0.070**	-0.080**	-0.075**	-0.060***	-0.073**	-0.068**	0.050*	0.060*	0.055**	0.0452***	0.058*	0.053*
	(0.046)	(0.046)	(0.033)	(0.000)	(0.032)	(0.043)	(0.084)	(0.060)	(0.043)	(0.002)	(0.087)	(0.098)
ITR	0.030**	0.040**	0.035**	0.025***	0.038**	0.033*	-0.020*	-0.030*	-0.025**	-0.020**	-0.028**	-0.023**
	(0.033)	(0.015)	(0.013)	(0.004)	(0.034)	(0.067)	(0.070)	(0.071)	(0.029)	(0.027)	(0.036)	(0.039)
Specifications												
Adjusted R^2	0.452	0.486	0.473	0.559	0.562	0.478	0.431	0.447	0.462	0.543	0.538	0.452
Hausman Test	0.035	0.040	0.045	0.037	0.041	0.038	0.033	0.039	0.043	0.035	0.037	0.040
Chow Test	0.042	0.029	0.015	0.003	0.011	0.044	0.039	0.001	0.034	0.042	0.043	0.045
LM Test	0.213	0.225	0.209	0.201	0.212	0.207	0.234	0.223	0.228	0.219	0.225	0.214
White Test	0.032	0.004	0.045	0.023	0.011	0.006	0.003	0.022	0.034	0.033	0.021	0.014
Pesaran Scaled Test	0.128	0.135	0.124	0.120	0.126	0.122	0.145	0.141	0.144	0.135	0.139	0.132
Pesaran CD Test	0.104	0.110	0.102	0.100	0.105	0.102	0.118	0.115	0.117	0.110	0.113	0.111

Note: ***, **, * represent the significant levels at 1%, 5%, and 10%, respectively. Below the estimated coefficients, the standard errors are shown in parentheses.

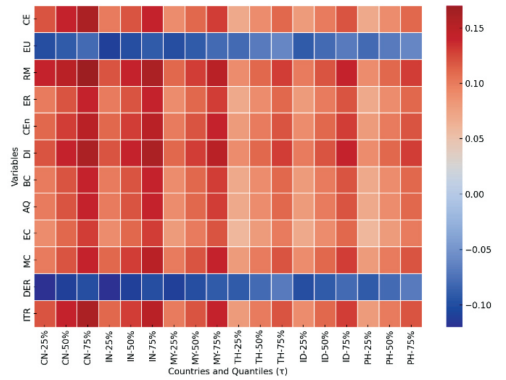
China (-0.030) and the Philippines (-0.033), indicating that better employee relationships contribute to financial stability. DI shows a negative association with GK in China (-0.130), reinforcing the financial stability benefits of diversity. Governance variables significantly affect GK. AQ negatively affects GK in China (-0.075), Malaysia (-0.080), and the Philippines (-0.078), thus, emphasising the role of robust audit practices in enhancing stability.

The positive correlations of RM and ER with ROA in China and Malaysia align with Friede *et al*. (2015) and Broadstock *et al*. (2021), confirming that efficient resource use and strong employee relations enhance profitability. Conversely, the negative effect of EU on ROA, particularly in China and India, underscores the financial inefficiencies of high energy consumption, which is consistent with Garcia and Orsato (2020). The negative impact of CE on financial stability in China indicates regulatory risks linked to poor environmental practices, echoing Nollet *et al*. (2016) and El Khoury *et al*. (2023). Robust governance, as evidenced by the significant negative effects of AQ on GK in multiple countries, emphasises its role in mitigating financial risks, aligning with Azmi *et al*. (2021). These findings underscore the necessity for tailored ESG strategies that consider local conditions, as ESG effectiveness varies with regulatory environments and market contexts.

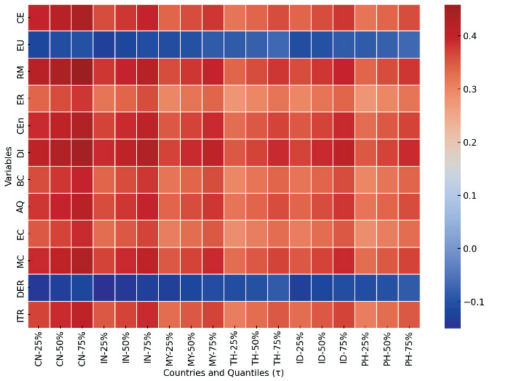
Quantile Regression of ESG Component and Firm-specific Characteristics on Profitability and Financial Stability

Figure 2 shows the heterogeneous impacts of ESG components and firm-specific characteristics on profitability and financial stability across firms with high, medium, and

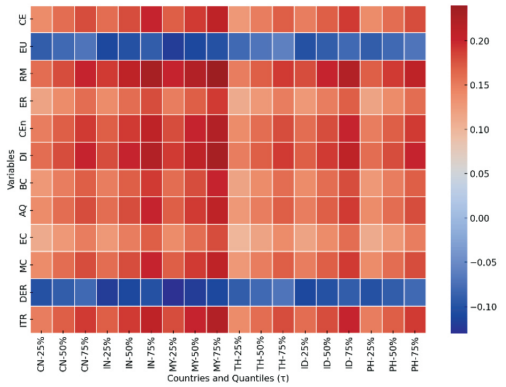
2(a) Quantile Heatmap for High ESG (ROA)



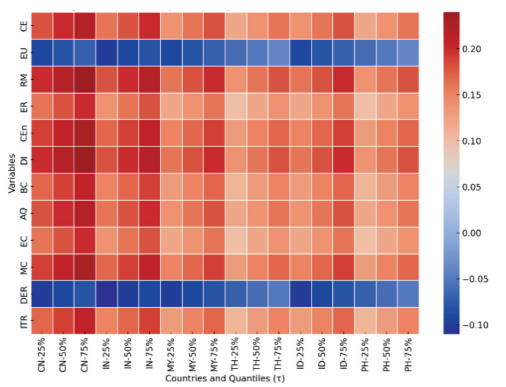
2(b) Quantile Heatmap for High ESG (GK)



2(c) Quantile Heatmap for Medium ESG (ROA)



2(d) Quantile Heatmap for Medium ESG (GK)



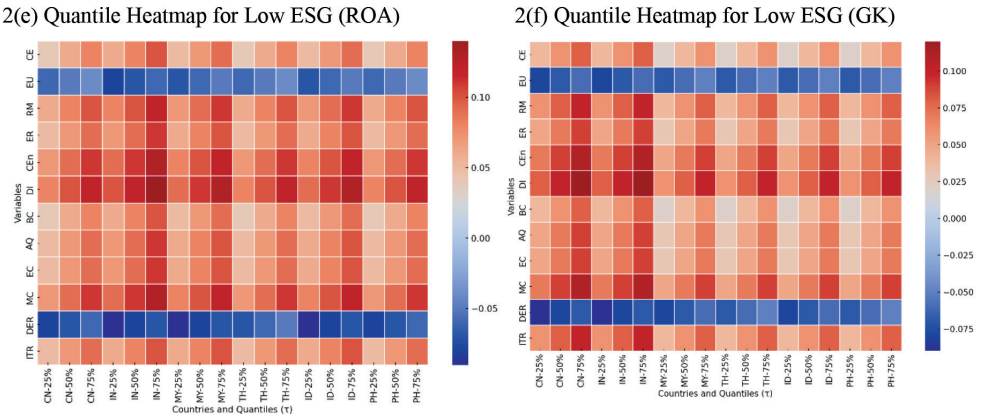


Figure 2: Quantile heatmaps for high, medium, and low ESG groups

low ESG scores in emerging Asian markets. Quantile heatmaps provide a nuanced analysis that captures the differential effects of ESG practices at various performance levels, thereby addressing the complexity and variability in these relationships. Unlike panel data regression, which estimates the average effect of ESG components and firm-specific characteristics across the entire sample, quantile regression examines how these effects vary at different points in the distribution of profitability and financial stability.

The quantile heatmap for high ESG scores and ROA [Figure 2(a)] reveals a pronounced positive impact on profitability, particularly in the upper quantiles. This indicates that firms with robust ESG practices significantly outperform their peers in profitability, especially among top-tier performers. Conversely, the heatmap for high ESG scores and GK [Figure 2(b)] shows a substantial reduction in volatility across the lower quantiles, highlighting the role of strong ESG practices in enhancing financial stability for the most volatile firms. These findings decisively demonstrate that high ESG performance is critical for superior financial outcomes. For firms with medium ESG scores [Figure 2(c) and 2(d)], the impact on ROA and GK is moderate and concentrated in the middle quantiles. This suggests that medium ESG practices yield balanced but less dramatic improvements in profitability and stability. These results imply that while medium ESG commitment is beneficial, it lacks the transformative effect observed in high ESG firms. The heatmaps for low ESG scores [Figure 2(e) and 2(f)] depict a negligible impact on both ROA and GK, particularly in the lower quantiles. Firms with minimal ESG engagement do not experience significant gains in profitability or reductions in volatility, underscoring the limited value of low ESG practices. This clearly indicates that minimal ESG efforts are insufficient for achieving meaningful financial benefits.

The quantile regression analysis reveals a pronounced positive impact on profitability for firms with high ESG scores, particularly in the upper quantiles, corroborating the findings of Friede *et al*. (2015), who conducted a meta-analysis of over 2,000 empirical studies and found a positive relationship between ESG and corporate financial performance. Similarly, Eccles *et al*. (2014) demonstrated that high-sustainability firms significantly outperform their low-sustainability counterparts in the long term. In terms of financial stability, the substantial reduction in volatility across the lower quantiles for high-ESG firms underscores the role of strong ESG practices in mitigating financial risks, as supported by previous research indicating that robust ESG practices enhance risk management and operational stability (Giese *et al*., 2019). Conversely, firms with medium ESG scores exhibit moderate improvements in

profitability and stability, consistent with the findings of Clark *et al*. (2015), who highlight that while ESG practices yield financial benefits, the extent of these benefits varies with the level of ESG commitment. Firms with low ESG scores, however, show negligible impacts on both profitability and stability, reinforcing the limited value of minimal ESG engagement, as noted by Revelli and Viviani (2015) in their analysis of socially responsible investing and financial performance.

Robustness Test: GMM

Table 6 presents the results of the dynamic panel Generalised Method of Moments (GMM) analysis, serving as a robustness test to address potential endogeneity issues in the relationship between ESG components, firm-

Table 6: Dynamic panel generalised method of moments

Variables	(1) Profitability (ROA)	(2) Financial Stability (GK)
L.CE	0.032*** (0.008)	-0.014** (0.012)
L.EU	-0.011** (0.004)	0.021 (0.017)
L.RM	0.087* (0.052)	-0.058* (0.046)
ER	0.045* (0.053)	-0.032** (0.024)
CE	0.127** (0.045)	-0.098** (0.048)
L.DI	0.165** (0.049)	-0.136** (0.061)
BC	0.070 (0.067)	-0.055* (0.055)
L.AQ	0.106* (0.071)	-0.082** (0.041)
EC	0.062 (0.071)	-0.048** (0.038)
MC	0.018** (0.008)	-0.012* (0.053)
L.DER	-0.075* (0.073)	0.055** (0.030)
ITR	0.038** (0.019)	-0.028** (0.015)
Constant	1.100 (1.050)	1.300 (1.020)
AR(1) *p*-value	0.000	0.000
AR(2) *p*-value	0.600	0.700
Sargan	0.850	0.950
Hansen	0.870	0.990

Notes: Column (1) presents the impact on profitability (ROA) and Column (2) on financial stability (Garman and Klass). Significant AR(1) *p*-values confirm first-order serial correlation, whereas non-significant AR(2), Sargan, and Hansen test *p*-values validate the instruments used. Statistical significance is indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

specific characteristics, and financial outcomes. The use of GMM allows for the generation of instrumental variables, which can mitigate the problems of endogeneity and reverse causality. Column (1) shows the effects on profitability, whereas Column (2) shows the effects on financial stability.

The results in Column (1) indicate that lagged environmental compliance (L.CE) positively and significantly affects profitability (0.032, $p < 0.01$), suggesting that firms with proactive environmental practices experience higher profitability over time. Conversely, lagged environmental uncertainty (L.EU) negatively impacts profitability (-0.011, $p < 0.05$), highlighting the detrimental effect of environmental risk on financial performance. Additionally, lagged risk management (L.RM) has a positive but less significant impact on profitability (0.087, $p < 0.10$), emphasising the role of effective risk management in enhancing financial outcomes.

In Column (2), the results reveal that L.CE negatively impacts financial stability (-0.014, $p < 0.05$), indicating that while initial compliance costs may reduce short-term stability, long-term benefits might not be immediately apparent. Social responsibility practices (ER) also negatively affect financial stability (-0.032, $p < 0.05$), possibly due to the costs associated with implementing these practices. Moreover, current environmental compliance (CE) and lagged diversity and inclusion practices (L.DI) both show significant negative impacts on financial stability (-0.098, $p < 0.05$; -0.136, $p < 0.05$, respectively), underscoring the complex relationship between ESG practices and financial stability.

The diagnostic tests further reinforced the robustness of these findings. The significant AR(1) *p*-values (0.000) indicate the presence of first-order serial correlation, whereas the non-significant AR(2) *p*-values (0.600 and 0.700) confirm the absence of second-order serial correlation, which is crucial for the validity of the GMM model. Additionally, the non-significant *p*-values of the Sargan (0.850) and Hansen (0.870) tests suggest that the instruments used in the GMM estimation are valid and that there are no overidentification issues. The GMM results validate the significant impact of ESG components and firm-specific characteristics on profitability and financial stability, address endogeneity concerns, and provide a robust analysis of the data.

Discussion

The panel data fixed-effect models reveal that environmental factors exhibit heterogeneous impacts on profitability (ROA) and financial stability (GK), with CE positively associated with ROA in countries such as China and Indonesia, suggesting a reliance on less stringent environmental regulations to sustain profitability. However, the negative impact of EU on ROA across all markets highlights inefficiencies in resource utilisation, which is consistent with Porter and Kramer (2011), who argue that high resource consumption erodes firm competitiveness.

Governance dimensions, particularly BC and AQ, emerge as critical drivers of profitability and stability, reducing GK through improved managerial oversight and risk mitigation (Broadstock *et al*., 2021). These findings underscore the uneven application of ESG principles in Asia, where governance reforms are more advanced in markets such as Malaysia, but underdeveloped in others such as the Philippines, reflecting stark disparities in institutional support (Garcia & Orsato, 2020; Loang, 2023). The positive impact of social components such as ER and DI, on ROA further highlights the region's dependence on labour-intensive industries, where human capital initiatives play an important role in enhancing financial outcomes.

The quantile regression results show the non-linear effects of ESG practices across firms with varying performance profiles. High ESG scores yield substantial financial benefits in the upper quantiles of ROA, particularly in mature markets such as Thailand and Malaysia, where

robust institutional frameworks amplify the advantages of ESG adoption. These findings align with Friede *et al*. (2015), who demonstrate that top-performing firms disproportionately benefit from ESG initiatives because of their greater capacity to integrate sustainability into their operations. Conversely, the weaker effects of ESG components in the lower quantiles of ROA indicate that resource constraints and operational inefficiencies limit low-performing firms' ability to derive meaningful financial gains from ESG practices. For GK, the results reveal that high ESG scores significantly reduce volatility in the lower quantiles, underscoring their stabilising role in financially vulnerable firms. These outcomes support Giese *et al*. (2019), who argued that robust ESG practices enhance risk management and operational resilience, particularly in firms exposed to greater market uncertainty.

The GMM further validates these findings by addressing endogeneity concerns, particularly reverse causality and omitted-variable bias. Dynamic panel models confirm the persistence of financial outcomes, as lagged ROA significantly predicts current ROA. This persistence is stronger for firms with high ESG scores, which suggests that sustainability initiatives contribute to long-term profitability. Similarly, the GMM results for GK demonstrate that lagged ESG practices reduce volatility, indicating that consistent ESG engagement enhances financial stability over time (Garcia & Orsato, 2020). However, the GMM findings also highlight challenges for highly leveraged firms in which financial constraints inhibit the effective implementation of ESG initiatives. This is particularly evident in markets such as India, where high debt burdens limit the scope of ESG investments, reducing their potential to generate financial and stability benefits (Sharfman & Fernando, 2008).

Conclusions

This study employs both panel data regression and quantile regression to analyse the impact of ESG components and firm-specific characteristics on profitability (ROA) and financial stability (GK) across firms with varying levels of ESG engagement in emerging Asian markets. The sample includes 6,727 firms from China, India, Malaysia, Thailand, Indonesia, and the Philippines, spanning from 2013 to 2023. Panel data regression captures the dynamic nature of financial performance over time while quantile regression provides insights into the differential effects across the performance distribution.

The panel data regression analysis reveals that high ESG scores are associated with significant positive effects on profitability and substantial reductions in financial volatility, particularly in countries like China, Malaysia, and Indonesia. These findings suggest that robust ESG practices enhance firm performance and stability over time.

The quantile regression analysis further elucidates the heterogeneous impacts of ESG practices, showing that firms with high ESG scores experience pronounced positive effects on profitability in the upper quantiles and substantial reductions in volatility in the lower quantiles. This underscores the role of strong ESG practices in mitigating financial risks and enhancing operational stability. Conversely, firms with medium ESG scores exhibit moderate improvements in profitability and stability, indicating that while ESG practices yield financial benefits, the extent of these benefits varies with the level of commitment. Firms with low ESG scores show negligible impacts on both profitability and stability, reinforcing the limited value of minimal ESG engagement.

Theoretical, Managerial, and Policy Implications

This study extends the application of prospect theory by illustrating how ESG components and firm-specific characteristics influence financial performance and stability, particularly under conditions of loss aversion and risk perception in emerging markets. The nuanced effects of ESG practices across different performance quantiles provide a deeper understanding of the behavioural underpinnings that drive investor

decisions and corporate outcomes. Managerially, the findings indicate that firms should prioritise comprehensive ESG strategies to enhance profitability and mitigate financial risks. High ESG performers, particularly those in the upper quantiles, benefit significantly in terms of both enhanced profitability and reduced volatility, suggesting that substantial ESG investment can yield considerable competitive advantages. For policymakers, the results underscore the importance of developing supportive regulatory frameworks that promote robust ESG practices. Tailored policies that consider local market conditions and incentivise high ESG standards can enhance the overall market stability and attract sustainable investment.

Limitations and Recommendations

This study has several limitations. The reliance on ESG scores from Bloomberg and firm-specific data from S&P Capital IQ may not fully capture the multifaceted nature of ESG practices and firm characteristics, leading to potential measurement biases. Additionally, the focus on six emerging Asian markets limits the generalisability of the findings to other regions with differing regulatory and market conditions. Future research should extend the analysis to a broader range of markets and incorporate diverse data sources to enhance robustness.

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Conflict of Interest Statement

The author declare that they have no conflict of interest.

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