ESG and Financial Resilience: Evidence from BRICS Stock Markets

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Abstract

We examine the relationship between Environmental, Social, and Governance (ESG) scores and financial resilience in BRICS stock markets, using the United States as a benchmark. Firm-level data from 2016 to 2024 are employed, and financial resilience is assessed ex ante using three risk-based measures: stock return volatility, Value-at-Risk (VaR), and Expected Shortfall (ES), the latter introduced as a novel proxy in this context. The results indicate that in BRICS economies, higher environmental and social scores, as well as stronger overall ESG performance, are associated with lower tail risk and volatility, reflecting greater financial resilience in weaker institutional settings. In contrast, environmental scores in the U.S. market are positively related to risk measures. Overall, the findings suggest that ESG practices mitigate financial vulnerability in emerging markets, while their risk implications in developed markets are more nuanced. This study extends the ESG–resilience literature and highlights Expected Shortfall as a valuable indicator of financial resilience.

Keywords: ESG, financial resilience, BRICS, emerging markets
JEL codes: G32, Q56

1. Introduction

The expression "to rise like a phoenix from the ashes", inspired by a mythological bird, is often used as a metaphor to describe how contemporary organizations confront increasingly adverse and uncertain environments. Nowadays, companies face a wide range of pressures, including climate change, regulatory challenges, stakeholder pressures, and growing technological, economic, social, and environmental uncertainties. In response to this context, over the past decade, Environmental, Social, and Governance (ESG) practices have evolved from peripheral concerns to strategic imperatives for corporations, policymakers, and investors (Rahi et al., 2021; Biju et al., 2025). Firms are increasingly embedding ESG into their core operations not only to comply with regulations or meet societal expectations, but also to gain competitive advantages. The literature has documented a variety of benefits associated with the adoption of ESG practices, including a

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better brand reputation, increased customer loyalty, greater access to capital, innovation capacity, improved operational efficiency (Arrive et al., 2019; Rahi et al., 2021; Alshehhi et al., 2018), and financial performance gains (Velte, 2017; Bodhanwala and Bodhanwala, 2018; Albuquerque et al., 2019; Dalal and Thaker, 2019; Yu et al., 2018; Xie et al., 2019; Bhaskaran et al., 2020; Ahmad et al., 2021; Yoo and Managi, 2022; Sinha Ray and Goel, 2023).

High levels of ESG can enhance a company's operational capabilities, reduce exposure to financial distress, and strengthen its capacity to withstand adverse conditions, thereby contributing to corporate resilience. According to Wang et al. (2024), ESG performance supports resilience through several mechanisms: i) Enhanced operational capabilities: Good ESG performance strengthens management, encourages technological innovation, and optimizes the allocation of human capital, enhancing operational capabilities; ii) Resources and stakeholder support: Companies with stronger ESG performance tend to attract greater stakeholder support, increasing the resources available to cope with adverse conditions; iii) Reputational resilience: ESG responsibility brings moral and reputational capital, softening the impact of negative news, increasing investor confidence, and reducing the risk of bankruptcy. Given this, ESG performance emerges as a relevant variable to promote corporate resilience (Walker et al., 2024; Liu et al., 2024; Wang et al., 2024).

The concept of resilience has interdisciplinary origins. In ecology, Holling et al. (1973) defined it as the ability of a system to maintain its core functions when exposed to shocks. In corporate contexts, resilience is increasingly viewed through a financial lens. For Ortiz-de Mandojana and Bansal (2016), resilience refers to the ability to anticipate, withstand, and recover from disruptive events. While influential, such definitions are typically grounded in event-based perspectives. Although there is a set of resilience drivers, some studies indicate that the driving force of financial resilience lies in effective risk management (Dahms, 2010; Armeanu et al., 2017). According to Ortiz-de Mandojana and Bansal (2016), risk and resilience are closely linked, as resilient organizations not only adapt to unexpected challenges but also excel at managing risks effectively. Based on this and studies such as Ortiz-de Mandojana and Bansal (2016), Soufi et al. (2023), and Xie et al. (2025), our study operationalizes resilience through financial risk proxies (volatility and losses (Righi, 2019)).

Despite growing academic interest, existing literature on ESG and resilience exhibits some limitations. Most studies focus on one or two ESG dimensions, neglecting the interplay among ESG factors. For instance, Ortiz-de Mandojana and Bansal (2016) and DesJardine et al. (2019) analyze the role of social and environmental practices (SEPs) in corporate resilience, while Huang et al. (2020) evaluates corporate social responsibility. Furthermore, the majority of the research is concentrated in developed economies—particularly the United States, where ESG integration is relatively mature and supported by well-established institutional frameworks (Ortiz-de Mandojana and Bansal, 2016; DesJardine et al., 2019; Walker et al., 2024; Ameur and Boussetta, 2025). Some studies have examined China as a unique case, but comprehensive multi-country analyses in emerging markets remain rare (Huang et al., 2020; Liu et al., 2024; Xu et al., 2023).

Among emerging markets, the BRICS countries [1] (Brazil, Russia, India, China, and South Africa), represent an important setting for studying ESG and financial resilience. These economies combine pronounced environmental and social challenges with structurally higher financial risk, less efficient capital markets, and institutional heterogeneity. In such contexts, adopting ESG practices becomes more difficult but offers greater potential for impact (Alshehhi et al., 2018; Liu et al., 2023b). Yet, few studies explore the BRICS bloc as a unified analytical framework, and almost none examine financial resilience as a direct function of ESG in this group of economies.

To our knowledge, no studies have yet investigated the relationship between ESG performance and resilience, with an explicit focus on resilience indicators associated with corporate risk characteristics (see Section 2.1 for additional details). For example, Xu et al. (2023) examine the impact of ESG scores on the resilience of stock returns, particularly using buy-and-hold returns (BAHR). Meanwhile, Wang et al. (2024) assess corporate resilience in terms of production and orientation, utilizing the economic value added ratio (rEVA) and bankruptcy risk coefficient as a measure. In contrast, Liu et al. (2024) associate resilience with cumulative abnormal returns calculated using Fama-French three- and five-factor models.

Against this backdrop, this research investigates the relationship between ESG performance and corporate financial resilience across BRICS firms between 2016 and 2024. We focus on three risk-based measures of resilience – volatility (Standard Deviation (σ)), Value-at-Risk (VaR), and, notably, Expected Shortfall (ES) – as they capture firms' ex ante vulnerability to adverse market conditions and extreme downside realizations. Volatility expresses stability and the ability to withstand daily market fluctuations, while tail measures reflect firms' exposure to severe downside risk and their structural capacity to absorb adverse price movements. Thus, in this study, we consider financially resilient firms to be those with less volatile and less exposed to critical losses. To the best of our knowledge, we are the first to propose ES as a resilience indicator, bridging risk management theory with corporate sustainability debates. Additionally, we benchmark our results by comparing them with a sample of USA firms.

This study makes three main contributions to the literature. First, we contribute to the growing debate on ESG and financial resilience (Wang et al., 2024) by conceptualizing financial resilience from an *ex ante*, risk-based perspective. While most existing studies assess resilience using event-driven or recovery-based indicators, we operationalize resilience through firms' exposure to volatility and tail risk. Our approach complements the dominant post-shock literature (Xia et al., 2022; Gittell et al., 2006) by adopting an ex ante,

[1] This study focuses on the five original BRICS members rather than the current eleven, as only these countries constituted the BRICS group throughout the 2016 - 2024 period, ensuring consistency in the longitudinal analysis. The expansion of the group, incorporating six new members, became effective only in 2024.

risk-based perspective on financial resilience, consistent with the foundations of financial risk management. Second, this study advances the measurement of financial resilience by introducing Expected Shortfall as a novel proxy within the ESG–resilience literature. Although ES is widely employed in risk management to quantify tail risk, it has not previously been used as an indicator of financial resilience. Third, we extend the empirical analysis of ESG and financial resilience to emerging markets by focusing on the BRICS economies. Prior evidence is largely concentrated in developed markets (Walker et al., 2024; Ameur and Boussetta, 2025), the BRICS countries combine higher structural financial risk, institutional heterogeneity, and pronounced environmental and social challenges, and have undergone decades of rapid, environmentally costly economic growth (Lai and Zhang, 2026). In such contexts, ESG adoption is more demanding but potentially more impactful (Alshehhi et al., 2018; Liu et al., 2023b). Our findings indicate that environmental and social ESG dimensions are associated with lower ex ante risk exposure in BRICS firms. In contrast, a markedly different pattern emerges for U.S. firms, highlighting that ESG–resilience relationships are strongly context-dependent.

In addition to this introduction, the article is organized into the following sections: Section 2 describes the resilience measures and introduces the new indicator proposed in this study. It also presents the research hypotheses. Section 3 outlines the dataset and details the empirical procedures used to test the proposed hypotheses. In Section 4, we present the results, followed by the conclusion.

2. Resilience measures and research hypotheses

This section is divided into two parts. The first presents the risk-based measures that are the subject of this study. The second part describes the research hypothesis.

2.1. Resilience measures

Consider $X \in \mathcal{X} := \mathcal{X}(\Omega, \mathcal{F}, \mathbb{P})$ a random financial position defined on a probability space, where $X \geq 0$ represents a gain and $X < 0$ a loss. We determine the expected value, the cumulative distribution function, and the left quantile of $X \in \mathcal{X}$ as $E[X]$, $F_X(x)$, and $F_X^{-1}(\alpha)$, respectively.

In this study, financial resilience is conceptualized as an *ex ante* and latent firm-level attribute that reflects the structural capacity of firms to absorb severe adverse shocks. This perspective departs from event-driven approaches to resilience, which typically assess firms' responses to defined crises, and instead focuses on firms' exposure to downside risk (also referred to here as tail risk) and volatility. Accordingly, lower volatility and reduced tail risk indicate a greater capacity to withstand adverse market conditions, even in the absence of an adverse event.

As described in the introduction, the concept of resilience has interdisciplinary origins, particularly in ecology and organizational studies (Folke, 2006). Despite differences in the conceptualization of resilience across disciplines, a common element is the ability to withstand adverse disturbances (Folke, 2006). In organizational research, resilience is broadly understood as the ability of systems or organizations to adapt to and recover from disruptions (DesJardine et al., 2019). Over the past years, studies on organizational resilience have emerged as a response to the ongoing and increasingly severe economic crises over the past few years (Ortiz-de Mandojana and Bansal, 2016; Armeanu et al., 2017; Xia et al., 2022; Uddin et al., 2022; Yu et al., 2023). This literature provides important conceptual insights into how organizations adapt to disruptions; however, the present study focuses specifically on the financial dimension of resilience.

From a financial perspective, resilience refers to firms' capacity to absorb unfavorable shocks that affect their financial position (Barbera et al., 2017). In event-based studies, financial resilience is often treated as observable recovery-related metrics, such as severity of loss and time to recovery following a shock (DesJardine et al., 2019; Xia et al., 2022; Gittell et al., 2006). By contrast, this study adopts an ex ante perspective and operationalizes financial resilience through firms' exposure to downside risk and volatility using risk-based measures that capture firms' exposure to adverse market conditions.

Effective risk management is a potential driver of financial resilience, as it enhances firms' ability to withstand adverse financial conditions and limit downside exposure (Armeanu et al., 2017). From this perspective, Dahms (2010) argues that resilience emerges from effective risk management practices. In this sense, resilience has also been interpreted as lower risk-taking behavior (Chan et al., 2016; Ferreira et al., 2021). According to Righi (2019), financial risk can be decomposed into two core components: variability around expected outcomes and the possibility of extreme losses.

Focusing on the variability component, Ortiz-de Mandojana and Bansal (2016) assessed resilience as stock return volatility, among others, a variable often used to quantify risk (see, for example, Foguesatto et al. (2024)). The stock return volatility is defined in the following way:

$$\sigma_R(X) = \sqrt{\frac{1}{n-1}\sum_{t=1}^{n}\left(x_t - \bar{X}\right)^2}, \tag{1}$$

where x_t is the return in period t, $\bar{X}$ is the average return, and n is the total number of periods. Lower stock return volatility reflects greater financial resilience. Firms with lower volatility are better positioned to withstand adverse market conditions, as it indicates stability during market fluctuations. As such, risk and resilience are closely linked, as resilient organizations not only adapt to unexpected challenges but also excel in managing risks effectively (Ortiz-de Mandojana and Bansal, 2016). Following Ortiz-de Mandojana and Bansal (2016), Xie et al. (2025) also use stock return volatility to proxy for financial volatility as a resilience variable to examine the impact of government customers on resilience. According to De Moura and Tomei (2021)'s literature review, risk management is an example of financial resilience, hence no wonder why resilience might manifest through risk.

From the perspective of extreme losses, Soufi et al. (2023) propose measuring resilience through Value-at-Risk (VaR). VaR corresponds to the quantile of the distribution for a significance level α, is defined by:

$$\mathrm{VaR}_R^{\alpha}(X) = -Q_{\alpha}(X) := -\inf\{x : F_X(x) \geq \alpha\} = -F_X^{-1}(\alpha), \tag{2}$$

where $\alpha \in (0, 1)$. VaR represents the maximum loss for a given period and α. Since this value represents a loss threshold, exceeding it can be understood as a critical period in terms of financial value. Thus, companies exposed to lower losses can be considered more financially resilient.

Although VaR is a widely used measure of risk, it has notable limitations, such as ignoring losses beyond the α-quantile. For a comprehensive review of VaR, we recommend Duffie and Pan (1997) and Jorion (2007). From a theoretical standpoint, VaR does not satisfy the subadditivity axiom; in other words, contrary to the principle of diversification, the VaR of a portfolio is not necessarily less than the sum of the VaR of the individual assets composing the portfolio (see Artzner et al. (1999)).

To address this limitation of VaR, Acerbi and Tasche (2002) proposed the ES (Expected Shortfall). This measure quantifies the expected value of losses beyond the α-quantile of X, i.e., VaR^{α}. Furthermore, ES respects the principle of diversification. It can be defined as:

$$\mathrm{ES}_R^{\alpha}(X) = -\frac{1}{\alpha}\int_0^{\alpha} F_X^{-1}(s)ds. \tag{3}$$

For the same significance level, ES is higher than VaR. By explicitly capturing tail risk, ES provides a more comprehensive representation of firms' exposure to extreme downside realizations.

In this study, the Expected Shortfall is also employed as a risk-based proxy for financial resilience. Although it has been proven that ESG enhances resilience, which in turn reduces tail-risk exposure (in this case, crash risk) (Thompson, 2026), resilience has not yet been accessed by a tail-risk measure. From an ex ante perspective, ES captures firms' exposure to extreme downside risk by measuring the expected magnitude of losses in the tail of the return distribution. Consequently, higher ES values indicate greater vulnerability to adverse market conditions and a lower structural capacity to absorb severe negative realizations.

2.2. Research hypothesis

ESG practices have gained increasing prominence as global climate change becomes an ever more urgent concern (Mu et al., 2023). For stakeholders—including investors, customers, suppliers, and other interested parties—analyzing ESG scores provides insight into a company's investments and its approach to business operations (Atan et al., 2018; Tahmid et al., 2022). The environmental score encompasses efforts in environmental conservation, climate change mitigation, and the environmental impact of the company's activities. The social score focuses on human rights, equality, board diversity, and social contributions. The governance score evaluates ownership structure, board independence, equitable treatment of shareholders, minority shareholder rights, transparency, and corporate information disclosure (Atan et al., 2018; Tahmid et al., 2022).

The growing relevance of ESG practices has sparked debate about their potential financial benefits (Jahmane and Gaies, 2020). Companies with stronger ESG performance have demonstrated higher profitability and more accurate share pricing (Aydoğmuş et al., 2022; Bofinger et al., 2022). Studies indicate that the disclosure of ESG scores is positively and significantly associated with return on assets (ROA), return on equity (ROE), earnings per share, company value (measured by Tobin's Q), average share price, and other variables representing corporate financial performance (Bodhanwala and Bodhanwala, 2018; Albuquerque et al., 2019; Yu et al., 2018; Xie et al., 2019; Ahmad et al., 2021; Yoo and Managi, 2022; Sinha Ray and Goel, 2023). Further evidence of a positive relationship between ESG performance and financial outcomes is found in Velte (2017), Dalal and Thaker (2019), Bhaskaran et al. (2020), and Ahmad et al. (2021). Supporting this, Chen and Xie (2022) note that the act of disclosing ESG scores generates a positive and significant impact on corporate performance. Albuquerque et al. (2019) propose a model where firms invest in ESG policies as a product differentiation strategy (for example, Apple is transitioning to 100% renewable energy). The advantage of this approach is a more loyal customer base and a lower price elasticity of demand for their products, enabling them to charge higher prices and achieve higher profit margins.

Initially, scholars focused on the financial benefits of these business practices (Atan et al., 2018; Tahmid et al., 2022), but attention is increasingly shifting toward the resilience-related advantages of ESG performance (DesJardine et al., 2019). Wu et al. (2024) demonstrate that the higher a company's ESG score, the more resilient it is in terms of both the magnitude and duration of stock price declines. Moreover, Saona and Martín (2026) found that ESG initiatives and default risk have a negative relationship, thus concluding that ESG enhances access to capital and fosters financial stability. ESG performance also appears to reduce stock idiosyncratic volatility (Liu et al., 2023a), which, in this study, is considered a measure of resilience.

Related to the fact that risk-based resilience measures with lower values indicate that the institution is more resilient, we formulated the following research hypothesis:

$\mathcal{H}_1$. *Companies with stronger ESG performance exhibit greater financial resilience, reflected in lower ex ante exposure to tail risk and volatility, as measured by stock return volatility, Value-at-Risk, and Expected*

Shortfall.

3. Data and methodological procedures

This section presents a description of the data used and empirical procedures.

3.1. Data

In this study, we used data from Refinitiv Eikon on companies, for the period 2017 to 2023, listed on the stock exchanges of the main countries comprising the BRICS bloc: Brazil, Russia, India, China, and South Africa. The sample period from 2017 to 2023 was selected based on the availability of data and contextual relevance. ESG indicators have become increasingly standardized and consistently reported by firms only in recent years. Furthermore, this period encompasses important regulatory, market, and societal shifts related to sustainability and corporate responsibility, including global initiatives such as the Paris Agreement, the growing influence of ESG-oriented investors, and the acceleration of ESG disclosures following the COVID-19 pandemic (Narula et al., 2024).

We clean the data following previous research in finance: (i) We include only common stocks, excluding depository receipts, real estate investment trusts (REITs), preferred shares, investment funds, and other securities with special characteristics (Fracasso et al., 2023); (ii) We exclude stocks for which the ratio of nonzero return days to the total number of trading days is less than 90% (Guedes et al., 2023); (iii) We exclude stocks that do not have ESG scores for the period under analysis (Walker et al., 2024); and (iv) We exclude firms from the finance and insurance industry (Yuan et al., 2022). Moreover, we excluded observations with missing ESG data and winsorized our dependent and control variables at the 5th and 95th percentiles. For Brazil, Russia, India, China and South Africa, our final sample consists of 461 companies (1,287 observations), distributed as follows: Brazil: 59 companies (192 observations); China: 12 companies (33 observations); India: 313 companies (775 observations); Russia: 22 companies (98 observations); South Africa: 55 companies (189 observations).

To quantify risk-based measures of financial resilience, we worked with the daily log-returns of the closing prices of the stocks included in our sample. For each stock, the resilience estimates were obtained via σ_R, VaR_R^α, and ES_R^α, which are defined in Equations 1 to 3. For VaR, a significance level of 1% was used, and for ES, 2.5%. These levels are commonly adopted in risk management practice and are consistent with Basel Committee recommendations. We estimated the resilience measures using a non-parametric method known as Historical Simulation (HS). This method does not rely on distributional assumptions and is the most commonly employed technique by financial institutions and in the academic literature. For resilience quantification, we adopted a rolling-window scheme of 250 daily observations. Thus, approximately one year of past data – 250 observations – is required to obtain the first resilience estimate. Accordingly, our final dataset comprises daily resilience estimates spanning from 2017 to 2024. After estimating the resilience, we aggregated the information to obtain annual values. Following Atilgan et al. (2020) and Foguesatto et al. (2024), we consider the last risk estimate in each year to be representative of annual resilience. Daily risk forecasts were transformed into annual ones because the ESG indicators are reported on an annual basis. As robustness checks, alternative aggregation approaches were also considered, such as computing the mean and median values of each risk measure for each market index in each year. The results are qualitatively the same.

To represent environmental, social, and governance dimensions, we construct an ESG matrix for each stock. Specifically, for each firm $i = 1, \ldots, N$, we define $\mathbf{ESG}^{(i)} \in \mathbb{R}^{T \times 4}$ as the matrix of ESG indicators, where each row corresponds to a time-series observation $t = 1, \ldots, T$, and the four columns represent: The Environmental Score — a measure of the firm's environmental impact and sustainability practices; The Social Score — capturing social responsibility, labor practices, and stakeholder relations; The Governance Score — evaluating corporate governance, board structure, and transparency; The Pillar ESG Score — an overall composite indicator summarizing the three previous dimensions.

To examine whether a set of firm-specific attributes affects the relationship between financial resilience and ESG indicators, we include these attributes as control variables. The control variables used are displayed in Table 1. Including these control variables enables us to determine whether the observed results stem from the relationship between the variables of interest or are influenced by the firms' underlying financial health. Total assets (Wang et al., 2024; Walker et al., 2024; Liu et al., 2024), for example, account for a firm's size, which can imply greater (or less) stability considering its substantial (or limited) resources. Gearing (Wang et al., 2024; Wu et al., 2024), on the other hand, captures the extent to which a firm relies on debt financing, which may reflect greater or smaller risk exposure. Market capitalization (Wu et al., 2024; Ameur and Boussetta, 2025) and total equity (Ameur and Boussetta, 2025) account for the market value and investors' stake in a firm, both of which affect the access to capital and firm valuation. Moreover, we account for Return on Assets (Wu et al., 2024; Ameur and Boussetta, 2025; Liu et al., 2024) and profitability (DesJardine et al., 2019) as they measure how efficiently a company uses its assets to generate profits and earnings, respectively.

3.2. Analysis

To test the research hypothesis formulated in this study, we organized the data using panel data regression models. Initially, we conducted diagnostic tests to assess the appropriate model specification. The Chow test

(Chow, 1960) was applied to compare the pooled OLS model with the fixed effects model ($p-value < 0.001$). To choose between random effects and pooled OLS, we performed the Breusch-Pagan test ($p-value < 0.001$), and finally, to choose between the fixed and random effects, the Hausman test ($p-value < 0.001$) (Hausman, 1978) was employed. Moreover, we conducted a series of diagnostic tests to confirm the robustness of our analysis. First, the Shapiro-Wilk normality test was applied to the residuals ($p - value < 0.001$), indicating that the residuals significantly deviate from a normal distribution. However, as our sample is large, the Central Limit Theorem suggests that the sampling distribution of the estimated coefficients tends to be approximately normal; hence, lack of normality in residuals is not a big concern. Next, the Breusch-Pagan test revealed evidence of heteroskedasticity ($p - value < 0.001$), suggesting that the variance of the errors is not constant. Regarding autocorrelation, Wooldridge's test for serial correlation in panel data (Wooldridge, 2002) (p = 0.5065) indicated no first-order autocorrelation in the model. Finally, we assessed multicollinearity through the Variance Inflation Factor (VIF), and all variables had VIF values below the conventional threshold of 10, suggesting that multicollinearity is not a concern in our model.

Based on the diagnostic tests, the panel data models were estimated using the fixed effects estimator with robust standard errors to account for heteroskedasticity. The fixed effects structure controls for unobserved heterogeneity across firms, ensuring that time-invariant characteristics specific to each company (ticker) do not bias the estimation results. We estimated the models using heteroskedasticity-consistent robust standard errors clustered at the firm level, which account for arbitrary heteroskedasticity and within-firm correlation in panel data settings.

Our dependent variables are risk-based proxies for financial resilience. Let $\mathbf{Z}_R := (\sigma_R, \mathrm{VaR}_R^\alpha, \mathrm{ES}_R^\alpha) \in \mathbb{R}^{N \times T \times 3}$ be the panel tensor of resilience measures, where N denotes the number of stocks, T the number of time-series observations per stock, and the third dimension corresponds to the three resilience indicators: volatility (σ_R), Value at Risk (VaR_R^α), and Expected Shortfall (ES_R^α). Each resilience indicator is analyzed separately through panel regressions. Let $\mathbf{Z}_R^{(k)} \in \mathbb{R}^{N \times T}$ denote the slice of $\mathbf{Z}_R$ corresponding to the k-th resilience measure, with $k \in \{1, 2, 3\}$. For each k, we estimate the following model:

$$\left[\mathbf{Z}_R^{(k)}\right]_{it} = \alpha + \beta_1 ESG_{it}^{(j)} + \boldsymbol{\beta}_2^\top \mathbf{X}_{it} + \mu_i + \varepsilon_{it}, \tag{4}$$

where $\left[\mathbf{Z}_R^{(k)}\right]_{it}$ is the k-th resilience indicator for stock i at time t; $ESG_{it}^{(j)}$ is the j-th ESG dimension for firm i in period t, with $j \in \{1 : \text{Environmental}, 2 : \text{Social}, 3 : \text{Governance}, 4 : \text{Pillar ESG}\}$; $\mathbf{X}_{it} \in \mathbb{R}^p$ is a vector of p control variables for stock i at time t; $\boldsymbol{\beta}_2 \in \mathbb{R}^p$ is the associated coefficient vector; μ_i captures stock-specific unobserved heterogeneity; ε_{it} is the idiosyncratic error term.

Equation 4 assumes that the j-th ESG dimension is contemporaneous with the k-th resilience indicator (data from 2017 to 2023). We re-estimate the equation by lagging the j-th ESG dimension by one period. ESG-related actions tend not to generate immediate effects. Thus, the use of a lagged j-th ESG dimension allows us to capture these effects with greater economic realism. Moreover, this specification is consistent with previous literature (Yuan et al., 2022). Accordingly, for each k, we estimate the following model:

$$\left[\mathbf{Z}_R^{(k)}\right]_{it} = \alpha + \beta_1 ESG_{it-1}^{(j)} + \boldsymbol{\beta}_2^{\top}\mathbf{X}_{it} + \mu_i + \varepsilon_{it}. \tag{5}$$

The empirical analysis consists of twelve panel regression models. For each of our three dependent variables we have models with the ESG pillar as the main independent variable and the individual ESG dimensions -Environmental, Social, and Governance- scores. We estimate these variations (three dependent variables x two groups of independent variables) using contemporaneous data and lagged data both with robust standard errors.

As a robustness check, the entire set of models was re-estimated using only the subsample of firms headquartered in the United States[2]. This additional analysis aimed to verify whether the relationships identified in the full sample remained consistent when focusing on a single, large, and relatively homogeneous capital market. The results for the U.S. subsample confirmed the overall findings, supporting the stability and generalizability of the main conclusions.

4. Results and Discussion

Table 2 reports the descriptive statistics for the resilience measures. The descriptive statistics of the resilience measures (VaR, ES, and σ) reveal significant differences among the BRICS countries. China and Brazil stand out as the least resilient. China shows the highest mean values across all three resilience measures (VaR: 128.69; ES: 124.43; σ: 33.93), indicating strong vulnerability to financial shocks. India and Russia present lower means, close to those of the BRICS aggregate. Both countries exhibit skewness greater than 2.5 and kurtosis above 7, indicating a frequent occurrence of resilience fluctuations. Compared with the BRICS group, the USA displays lower mean values for all metrics (VaR: 45.59; ES: 49.91; σ: 15.84), which demonstrates greater stability and financial resilience. Although the USA also shows heavy-tailed distributions, American firms are, on average, better prepared to absorb adverse shocks and maintain stability during periods of crisis. In this regard, according to Muguto and Muzindutsi (2022), the volatility of the stock return is structurally higher in the BRICS markets compared to developed markets such as the United States, due to factors including lower market liquidity, increased exposure to macroeconomic shocks

[2]For the United States, the final sample comprises 1,053 companies, totaling 3,703 observations.

and asymmetric responses to negative events. The analyzes of the study show that the BRICS markets exhibit stronger persistence of volatility and greater sensitivity to adverse shocks. In contrast, developed markets tend to benefit from deeper liquidity and stronger institutional settings, contributing to more stable return dynamics. This evidence is consistent with our descriptive results showing that, on average, USA-listed firms exhibit lower volatility—hence lower values of our risk-based resilience proxy—than those listed in BRICS exchanges.

Table 3 reports the panel regression estimates based on the ESG pillar and its individual components for BRICS. The results provide relevant insights into the relationship between ESG performance and financial resilience in this context. The evidence indicates that higher environmental and social scores are negatively associated with our risk-based measures of resilience, namely VaR, ES, and volatility (σ). This negative association implies that firms with stronger environmental and social engagement tend to be more resilient, displaying lower exposure to extreme losses and reduced return volatility. These findings are consistent with prior evidence that stronger environmental and social engagement is associated with lower downside exposure and greater financial robustness, including evidence documented for Brazilian firms during the COVID-19 period (Garcia, 2022). Alshehhi et al. (2018) and Liu et al. (2023b) point out that social and environmental challenges are greater in emerging countries, suggesting that ESG practices can lead to more substantial results in these territories. By supporting social and environmental causes, a company can build trust with the community and enhance its reputation. In times of crisis, engaging in corporate social responsibility activities allows corporations to mitigate the risk they are exposed to and improve their post-crisis value (Chintrakarn et al., 2021). As companies meet and exceed the expectations of different stakeholders, the market is likely to reward them. An indication of this can be seen in the empirical evidence that has identified a positive relationship between ESG performance and corporate financial performance (Aydoğmuş et al., 2022).

In contrast, the governance ESG score, although not statistically significant, is positively related to our risk-based proxy for financial resilience, which contrasts with the common expectation that stronger governance is associated with lower risk exposure (and thus greater resilience). Mohammad et al. (2023) show that governance scores are positively associated with firms' cost of capital, both in emerging market data and in developing countries. These findings indicate that companies with stronger governance face higher financing costs, which suggests greater higher risk exposure (lower resilience in our risk-based framework). According to Mohammad et al. (2023), in many countries, governance disclosures are made only in compliance with regulatory requirements. Emerging countries, in many situations, tend to have their decisions driven by personal/family ties rather than institutional criteria. Furthermore, following the findings of (Miranda et al., 2021), for Brazil, companies listed on the Novo Mercado, a higher-level corporate governance segment of the stock market, do not present lower risk. On the contrary, the evidence suggests that these companies may carry greater systematic risk and lower risk compensation, indicating lower resilience. This phenomenon can be explained by the logic of legitimacy, in which riskier companies seek the governance seal as a way to gain credibility with the market. In these cases, governance functions less as a driver of resilience and more as a corrective or legitimizing mechanism for preexisting vulnerabilities.

For the ESG pillar, the results are not significant. However, the coefficient remains negative, suggesting that overall ESG performance may still be associated with lower risk exposure (i.e., greater resilience in our framework) (Xu et al., 2023). It is important to emphasize that, since resilience in this study is defined in terms of risk, a negative relationship implies that higher ESG performance is associated with lower financial risk and, consequently, greater resilience. Taken together, these findings provide support for our initially formulated hypothesis for BRICS countries.

Table 3 also presents the results for the control variables. The findings indicate that the total market value of the company (log Market Cap.) is statistically significant across all resilience measures. Specifically, lower market values are associated with higher risk and, therefore, with lower resilience. This result can be summarized by the adapted expression: *"small stocks, small resilience,"* inspired by the phrase from the recent report by Financial Times (2024), *"Small stocks, big problems"*. Smaller companies tend to exhibit higher volatility and a greater likelihood of extreme losses due to lower liquidity, less diversified operations, and higher sensitivity to adverse market conditions. Consequently, the market value is negatively associated with VaR, ES, and σ, reflecting the well-documented size effect in financial markets (Peterburgsky, 2024).

Considering that ESG might not have immediate effects on firm resilience, we perform further analyses with lagged data. Table 4 reports the results of the panel regression using the lagged values of the ESG pillar and its individual components for BRICS. Our results indicate no statistically significant effects for the ESG pillar or its individual components. Nevertheless, the ESG pillar consistently exhibited a negative coefficient across all dependent variables (VaR, ES, and σ), suggesting that higher ESG scores are associated with greater resilience. Interestingly, the direction of the relationships changed for social and governance factors. Although the immediate impact of the social factor is negative, in the aftermath, it is positive, jeopardizing a firm's financial resilience. The opposite can be said for governance: while its immediate effect is positive, eventually its effect becomes negative, thus fostering resilience. However, these results are not statistically significant in any model. The ratio of net income to revenue was the only variable to exhibit consistent statistical significance across all specifications. The positive and significant coefficients indicate that firms with higher profitability tend to display higher values of VaR, ES, and σ. This finding suggests that, within our sample, more profitable firms were also those assuming greater levels of market risk, possibly reflecting the risk–return trade-off inherent in financial markets.

For comparison purposes, we estimate our model for the USA - consolidated and developed market. Table 5 reports the panel regression estimates based on the ESG pillar and its individual components. The environmental factor is positively related to VaR ($p-value < 0.01$), σ ($p-value < 0.01$), and ES ($p-value < 0.05$), and so is the social factor (not statistically significant) and the ESG pillar (statistically significant at the 10% level only for VaR). The governance factor, on the other hand, is negatively related to our dependent variables (not statistically significant). The results are contrary to those found for BRICS, where the environmental and social factors, along with the ESG pillar, were negatively related to VaR, σ, and ES. In contrast, the governance factor was positively associated with them.

Table 6 reports the results of the panel regression using the lagged values of the ESG pillar and its individual components for the United States. This time, all ESG components, as well as the pillar itself, are positively related to our dependent variables. This result suggests that, for firms listed in the United States, higher ESG scores are associated with greater exposure to downside risk and return volatility, as captured by the risk-based resilience measures adopted in this study. The results were statistically significant, with two exceptions: the governance factor is not significant for σ and ES. This finding reinforces the results found for non-lagged data and the differences between developed and developing markets.

At least three factors can explain this contrast between the BRICS and the USA. First, because of macroeconomic volatility, regulatory instability, and governance risks, BRICS countries generally have weaker institutions that are more sensitive to underlying risks (Muguto and Muzindutsi, 2022). In this context, companies that adopt ESG practices signal stronger management, greater transparency, enhanced accountability, and improved reputational standing. By contrast, in more efficient markets such as the USA, ESG is commonly already regarded as a baseline requirement rather than a source of competitive advantage or financial protection (Zhang et al., 2024; Santos Jhunior et al., 2025). Second, emerging markets benefit from ESG adoption through reduced capital costs, as international investors tend to view firms with robust ESG practices more favorably (Fandella et al., 2023). In contrast, investors in financially stable markets such as the USA may be more focused on margins, weighing the trade-offs between the costs and benefits of risk-adjusted returns associated with ESG adoption, including expenses related to disclosure, auditing, and compliance (Christensen et al., 2021). Third, emerging markets are particularly vulnerable to risks associated with deforestation, pollution, and loss of biodiversity (Ren et al., 2024). Accordingly, companies that engage in environmental practices are better positioned to mitigate environmental and regulatory risks, thereby enhancing financial resilience. In contrast, in the USA, where anti-ESG movements have gained traction in some states (for example, see Rajgopal (2025)), investments in ESG practices may have increased volatility rather than reduced it, ultimately undermining firms' financial resilience. This aligns with the idea that during crises and adverse periods (such as the anti-ESG movement), ESG may be perceived as a resource drain and viewed less positively by the market (Mita et al., 2024). Furthermore, firms under financial distress tend to avoid ESG investments that require financial resources, particularly in the presence of uncertainties that may affect future cash flows (Lohmann et al., 2025). Finally, it is important to note that corporate social responsibility and environmental management practices are shaped by local issues and national cultural traditions (Welford, 2005). In this regard, the BRICS countries exhibit several institutional, social, and cultural characteristics that differ substantially from those of the USA.

5. Conclusion

This study aimed to examine the relationship between ESG performance and financial resilience—conceptualized as an ex ante, risk-based firm attribute—among BRICS firms from 2016 to 2024. Using panel data regressions, we found that ESG performance, along with its individual components, is associated with lower downside risk and volatility, indicating greater financial resilience from an ex ante perspective, with effects that are not only immediate but also persistent over time. Although not statistically significant across all models, the economic implications of such results remain meaningful, particularly when compared to our findings from a developed economy such as the United States of America. In contrast to the developing markets (BRICS), the U.S. capital market exhibits a different pattern, in which higher ESG scores are associated with greater exposure to risk-based resilience measures.

Our contributions are threefold. First, we add to existing literature by examining the relevance of ESG in enhancing financial resilience, as measured by risk-related proxies. As far as we are concerned, we are the first to investigate such a relationship, focusing on risk characteristics. Second, given the importance of financial resilience, we contribute to the literature by demonstrating that ESG performance and its individual components foster a healthier corporate environment in emerging markets. Notably, while ESG practices are associated with lower risk exposure and greater financial resilience in emerging economies, a different relationship emerges in developed markets, where ESG engagement is linked to higher risk exposure from an ex ante perspective. Therefore, applying findings from developed economies to inform decisions in developing markets may be inappropriate and potentially misleading. Finally, the practical implications of our findings extend beyond the theoretical contributions discussed above. Managers, investors, and policymakers should recognize that ESG plays a critical role in strengthening financial resilience. In the context of heightened uncertainty and recurrent shocks, this reinforces ESG as a strategy that may strengthen firms' capacity to withstand adverse financial conditions.

Nonetheless, this study is not free of limitations. First, our time span encompasses a significant global crisis—namely, the COVID-19 pandemic. While this can be valuable in our estimations, we did not explicitly assess the role of ESG performance during the crisis itself, when financial resilience was *de facto* tested. Although such analysis was beyond the scope of our primary research objective, future studies could investigate whether our findings hold before, during, and after a crisis, using alternative estimation techniques, such as event study methodologies. Moreover, the disaggregation of BRICS could also bring interesting insights, allowing for a country-level analysis. This can be achieved in several ways, including estimating the panel regression with country fixed effects instead of firm fixed effects, as we did in this investigation.

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Table 1: Control variable definitions and measurement

Variable	Description	How is Measured	Source
Total Assets	Total assets of a company	Natural logarithm of a company's total assets	Wang et al. (2024); Walker et al. (2024); Liu et al. (2024)
Gearing	Ratio of the company's total liabilities to total assets	Total Liabilities / Total Assets	Wang et al. (2024); Wu et al. (2024)
Market Capitalization	Total market value of the company	Natural logarithm of a company's market capitalization	Wu et al. (2024); Ameur and Boussetta (2025)
Return on Assets (ROA)	Net income to total assets ratio	Net Income / Total Assets	Wu et al. (2024); Ameur and Boussetta (2025); Liu et al. (2024)
Total Equity	Equity value of preferred shareholders, general and limited partners, and common shareholders	Total Assets – Total Liabilities	Ameur and Boussetta (2025)
Profitability	Firm's ability to generate operating earnings from its asset base	Ratio of EBITDA to total book assets	DesJardine et al. (2019)

Table 2: Descriptive Statistics of Resilience Indicators: Aggregated BRICS, Individual Countries, and the United States (USA)

Region	Resilience	Mean	Median	SD	Min	Max	Kurtosis	Skewness
BRICS	VaR	58.88	25.55	81.34	2.25	612.53	11.36	3.02
BRICS	ES	61.01	27.61	76.68	2.26	547.58	8.40	2.55
BRICS	σ	18.69	9.70	21.32	1.03	138.13	5.49	2.21
Brazil	VaR	96.81	78.69	73.67	8.79	504.55	5.21	1.85
Brazil	ES	94.41	75.00	69.48	10.53	485.75	4.75	1.73
Brazil	σ	26.12	20.58	18.89	3.18	118.35	3.15	1.54
Russia	VaR	44.25	20.68	77.76	4.53	505.80	20.48	4.35
Russia	ES	50.11	21.87	75.72	5.06	452.75	13.04	3.39
Russia	σ	16.51	7.63	21.20	2.11	113.08	7.05	2.57
India	VaR	42.60	17.14	74.70	2.25	612.53	20.02	4.10
India	ES	46.49	18.78	71.66	2.26	547.58	13.49	3.30
India	σ	15.09	6.96	20.41	1.03	128.94	8.21	2.73
China	VaR	128.69	97.81	117.11	17.62	577.10	3.84	1.98
China	ES	124.43	100.27	107.76	19.04	543.59	3.95	1.94
China	σ	33.93	26.87	29.05	4.95	138.13	2.82	1.76
South Africa	VaR	58.62	26.00	81.96	2.85	481.53	7.52	2.69
South Africa	ES	60.22	27.15	75.38	2.96	441.51	4.63	2.13
South Africa	σ	19.62	10.31	21.81	1.23	116.14	2.91	1.84
USA	VaR	45.59	18.26	83.75	1.21	638.92	16.46	3.91
USA	ES	49.91	19.88	80.36	1.32	601.59	11.74	3.24
USA	σ	15.84	6.93	22.54	0.48	157.66	7.48	2.72

Note: SD, Min, and Max denote the standard deviation, minimum, and maximum values of the resilience measures (VaR, ES, and σ), respectively.

Table 3: Regression Estimates with Robust Std. Errors (ESG Components vs. ESG Pillar)

	VaR				σ				**ES**			
Environmental	-0.315·				-0.099*				-0.318·			
	(0.164)				(0.050)				(0.174)			
Social		-0.223				-0.071				-0.251		
		(0.159)				(0.046)				(0.161)		
Governance			0.093				0.023				0.091	
			(0.146)				(0.044)				(0.149)	
ESG				-0.268				-0.088				-0.286
				(0.216)				(0.064)				(0.221)
log Total Assets	0.252	-0.924	-4.892	-0.921	0.272	-0.086	-1.300	-0.051	0.260	-0.542	-4.902	-0.732
	(11.128)	(11.178)	(10.664)	(11.141)	(3.134)	(3.154)	(2.986)	(3.151)	(11.021)	(11.097)	(10.567)	(11.045)
ratio Liabilities	-27.764	-20.652	-15.417	-23.081	-4.844	-2.620	-1.065	-3.457	-22.782	-16.042	-10.388	-18.418
	(27.839)	(26.998)	(26.700)	(27.554)	(8.187)	(7.915)	(7.892)	(8.118)	(28.038)	(27.090)	(26.947)	(27.682)
log Market Cap.	-11.874**	-12.670**	-13.126***	-12.750**	-3.929**	-4.177***	-4.332***	-4.197***	-12.551**	-13.283**	-13.815***	-13.403**
	(4.009)	(3.980)	(3.947)	(3.986)	(1.197)	(1.197)	(1.181)	(1.197)	(4.118)	(4.103)	(4.042)	(4.105)
ratio Net Income	-17.631	-8.819	-6.078	-10.129	-4.497	-1.736	-0.844	-2.198	-17.980	-9.456	-6.333	-10.675
	(35.119)	(34.100)	(34.172)	(34.214)	(10.575)	(10.174)	(10.152)	(10.266)	(36.320)	(35.050)	(35.058)	(35.263)
R2	0.029	0.024	0.022	0.024	0.032	0.027	0.024	0.027	0.029	0.025	0.022	0.024
Num. obs.	1248	1248	1248	1248	1248	1248	1248	1248	1248	1248	1248	1248

***p <0.001; **p <0.01; *p <0.05; ·p <0.1

All models were estimated using fixed effects with robust standard errors. R^2 are 0.002, 0.003 and 0.003 for Standard Deviation, Expected Shortfall, and Value at Risk, respectively.

Table 4: Regression Estimates with Lagged Data and Robust Std. Errors (ESG Components vs. ESG Pillar)

	VaR				σ				ES			
Environmental	-0.111				-0.030				-0.100			
	(0.298)				(0.079)				(0.296)			
Social		0.231				0.075				0.222		
		(0.294)				(0.081)				(0.300)		
Governance			-0.149				-0.041				-0.153	
			(0.187)				(0.061)				(0.207)	
ESG				-0.036				-0.003				-0.036
				(0.379)				(0.102)				(0.383)
log Total Assets	-22.115	-26.293·	-23.454	-23.614	-5.850	-7.103	-6.201	-6.313	-19.579	-23.482	-20.719	-20.897
	(15.624)	(15.857)	(15.606)	(15.634)	(4.605)	(4.603)	(4.500)	(4.577)	(16.216)	(16.298)	(16.078)	(16.159)
ratio Liabilities	-55.439	-48.191	-54.488·	-52.132	-16.228	-14.113	-16.005	-15.193	-62.897·	-56.184·	-62.450·	-59.994·
	(34.033)	(30.643)	(31.201)	(32.992)	(10.296)	(9.414)	(9.724)	(10.068)	(36.167)	(32.966)	(33.978)	(35.330)
log Market Cap.	-7.595	-8.527	-8.234	-7.882	-3.071·	-3.356·	-3.243·	-3.155·	-10.062	-10.938·	-10.677·	-10.317·
	(5.931)	(5.870)	(5.664)	(5.802)	(1.760)	(1.754)	(1.717)	(1.736)	(6.210)	(6.164)	(5.992)	(6.091)
ratio Net Income	159.769**	164.206**	161.896**	162.609**	50.761**	52.007**	51.315**	51.608**	177.803**	181.865**	179.563**	180.316**
	(57.492)	(55.666)	(55.910)	(56.356)	(16.447)	(16.085)	(16.058)	(16.204)	(58.779)	(57.358)	(57.382)	(57.814)
R2	0.063	0.065	0.063	0.062	0.065	0.068	0.065	0.064	0.066	0.068	0.067	0.065
Num. obs.	659	659	659	659	659	659	659	659	659	659	659	659

***p <0.001; **p <0.01; *p <0.05; ·p <0.1
All models were estimated using fixed effects with robust standard errors. R^2 are 0.002, 0.003 and 0.003 for Standard Deviation, Expected Shortfall, and Value at Risk, respectively.

Table 5: Regression Estimates with Robust Std. Errors (ESG Components vs. ESG Pillar) for the USA

	VaR				σ				**ES**			
Environmental	0.209**				0.063**				0.198*			
	(0.077)				(0.024)				(0.080)			
Social		0.128				0.045				0.127		
		(0.103)				(0.032)				(0.108)		
Governance			-0.032				-0.016				-0.062	
			(0.079)				(0.026)				(0.085)	
ESG				0.195·				0.058				0.168
				(0.118)				(0.037)				(0.124)
log Total Assets	-14.229**	-11.386*	-9.269*	-12.424**	-4.664**	-3.898**	-3.119*	-4.105**	-17.278***	-14.667**	-12.335**	-15.311***
	(4.630)	(4.652)	(4.409)	(4.702)	(1.421)	(1.397)	(1.336)	(1.412)	(4.651)	(4.625)	(4.411)	(4.647)
ratio Liabilities	49.187**	47.893**	46.224**	48.273**	15.463**	15.149**	14.543**	15.178**	53.814**	52.656**	50.879**	52.779**
	(17.248)	(17.200)	(17.314)	(17.195)	(5.402)	(5.364)	(5.402)	(5.378)	(17.819)	(17.719)	(17.853)	(17.737)
log Market Cap.	6.751*	6.808*	7.142**	6.765*	1.370·	1.372·	1.495·	1.375·	5.600*	5.641*	6.009*	5.643*
	(2.667)	(2.657)	(2.647)	(2.670)	(0.830)	(0.824)	(0.823)	(0.830)	(2.750)	(2.733)	(2.728)	(2.751)
ratio Net Income	68.033·	66.714·	68.951·	67.314·	20.686·	20.181·	20.983·	20.476·	71.212·	69.867·	72.180*	70.666·
	(36.862)	(37.011)	(36.901)	(36.945)	(10.911)	(10.957)	(10.917)	(10.926)	(36.786)	(36.935)	(36.805)	(36.845)
R2	0.012	0.009	0.009	0.010	0.011	0.009	0.008	0.009	0.012	0.010	0.010	0.010
Num. obs.	3703	3703	3703	3703	3703	3703	3703	3703	3703	3703	3703	3703

***p <0.001; **p <0.01; *p <0.05; ·p <0.1
All models were estimated using fixed effects with robust standard errors. R^2 are 0.002, 0.003 and 0.003 for Standard Deviation, Expected Shortfall, and Value at Risk, respectively.

Table 6: Regression Estimates with Lagged Data and Robust Std. Errors (ESG Components vs. ESG Pillar) for the USA

	VaR				σ				**ES**			
Environmental	0.371***				0.115***				0.380***			
	(0.104)				(0.032)				(0.109)			
Social		0.418***				0.105**				0.379**		
		(0.120)				(0.040)				(0.132)		
Governance			0.220·				0.046				0.181	
			(0.124)				(0.036)				(0.126)	
ESG				0.640***				0.171***				0.600***
				(0.166)				(0.052)				(0.175)
log Total Assets	-19.470**	-17.053*	-12.133·	-20.817**	-7.112**	-5.968**	-4.649*	-7.083**	-23.330**	-20.080**	-15.463*	-23.822**
	(7.144)	(7.063)	(6.654)	(7.087)	(2.240)	(2.206)	(2.095)	(2.249)	(7.675)	(7.568)	(7.180)	(7.666)
ratio Liabilities	53.714*	52.929·	44.610	54.747*	8.991	8.227	6.103	8.855	40.698	38.868	31.269	40.851
	(27.145)	(27.353)	(27.289)	(27.225)	(8.871)	(8.997)	(8.866)	(9.016)	(29.226)	(29.547)	(29.323)	(29.569)
log Market Cap.	-1.184	-1.183	-0.703	-1.046	-0.802	-0.783	-0.670	-0.752	-2.762	-2.725	-2.304	-2.606
	(4.074)	(4.023)	(4.017)	(4.087)	(1.262)	(1.242)	(1.240)	(1.260)	(4.284)	(4.214)	(4.205)	(4.282)
ratio Net Income	248.254***	241.776***	250.754***	244.215***	68.351***	66.892***	69.177***	67.396***	254.334***	248.802***	256.987***	250.795***
	(56.357)	(56.368)	(56.298)	(56.262)	(16.996)	(16.916)	(16.958)	(16.930)	(58.212)	(58.012)	(58.051)	(58.001)
R2	0.035	0.033	0.028	0.038	0.034	0.030	0.026	0.034	0.036	0.033	0.029	0.037
Num. obs.	2128	2128	2128	2128	2128	2128	2128	2128	2128	2128	2128	2128

***p <0.001; **p <0.01; *p <0.05; ·p <0.1

All models were estimated using fixed effects with robust standard errors. R^2 are 0.002, 0.003 and 0.003 for Standard Deviation, Expected Shortfall, and Value at Risk, respectively.