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Do environmental, social, and governance practices affect financial distress and performance? Evidence from Latin American firms

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ABSTRACT

This study examines the impact of environmental, social, and governance (ESG) performance and its three pillars on financial distress (FD) in Latin American firms from 2011 to 2022. It also investigates whether the interaction between ESG performance and FD affects firm performance (return on assets [ROA]). The existing literature shows important limitations in understanding the relationship between ESG practices and FD. Although some studies have examined these constructs separately, empirical evidence integrating both remains scarce, particularly in emerging economies. Moreover, no studies were identified that simultaneously analyze these effects within the Latin American context, revealing a substantial gap that this research aims to address. We employ a multilevel regression model estimated by maximum likelihood (ML), using a sample of 963 firms, comprising 11,724 firm-year observations. This approach allows us to control for firm-specific, country-specific, and temporal effects, providing robust evidence on the ESG, FD, and performance nexus. Findings indicate that ESG is positively associated with FD in models excluding lagged FD, but this relationship becomes negative when lagged FD is included, a pattern consistent across all ESG pillars. While ESG positively affects ROA, this relationship reverses when interacting with FD, reflecting the short-term costs and long-term benefits of ESG adoption. This study contributes to the literature by demonstrating how ESG practices influence FD and firm performance in emerging markets. It provides valuable guidance for managers, investors, creditors, regulators, and other stakeholders, showing that ESG investments can reduce financial vulnerability, improve access to cheaper financing, and enhance corporate reputation. The findings underscore the strategic role of ESG as a tool for risk mitigation and long-term value creation in Latin American firms.

Keywords: environmental, social, and governance, financial distress, firm performance, Latin America.

1. INTRODUCTION

In recent years, the business world has experienced a significant transformation in how companies approach environmental, social, and governance (ESG) issues. This evolution is not only a response to the increasing global awareness of the importance of sustainability but also an essential strategy to manage financial risks, including financial distress (FD) (Boubaker et al., 2020).

Sustainability has increasingly become a central topic of discussion across multiple sectors of society. Issues such as global warming, water scarcity, climate change, pollution, floods, and hurricanes are no longer restricted to the academic sphere but have also garnered significant attention from the broader public. Data from the Social Investment Forum's Trends Report (2020) indicate that investments in sustainable companies have expanded by 258% since 2005, an increase that surpasses the overall growth of assets under management in the United States of America.

There is a growing need for sustainability reports issued by companies around the world, with demands for improvements in their environmental and social image (Beijer & Pålsson, 2021). Researchers state that companies with a higher level of ESG performance are less likely to go bankrupt, becoming more solid and more likely to recover in FD situations (Broadstock et al., 2021; Hoepner et al., 2023).

Adequate communication between the company and its stakeholders is a relevant issue of governance (Duarte et al., 2025). Furthermore, corporate governance

mechanisms help control the decisions of the firm's managers, aligning them with the interests of owners and investors (Berger et al., 1997; Canassa et al., 2025; Shleifer & Vishny, 1997). A company with better governance and ESG scores may have less firm risk, a lower cost of capital, and lower overall risk (Wang & Sarkis, 2015). Evidence shows that companies in the United States of America with higher ESG scores had better financial performance during the 2008 financial crisis (Lins et al., 2017).

In summary, companies with good sustainability practices are more likely to survive in FD situations (Mecaj & Bravo, 2014). Companies that face sustainability challenges due to their environmental impact, including higher carbon emissions, have higher risks. To be ready for the future, long-term corporate strategies must include sustainable initiatives (Karaman & Akman, 2018; Kou et al., 2022). Although the literature has investigated the relationship between corporate sustainability and FD with some depth, there has been no consensus, which leads to the need to explore this relationship further.

This study examines the relationship between ESG practices and FD in Latin American firms. The 2008 global financial crisis and the COVID-19 pandemic intensified financial challenges, increasing competition and the risk of distress. The study investigates whether adopting ESG practices influences the likelihood of corporate FD. Evidence indicates that ESG adoption can lower fundraising costs (Wang & Sarkis, 2015) and enhance corporate reputation (Beijer & Pålsson, 2021), providing competitive advantages and improving economic resilience. Consequently, investments in ESG practices are likely to reduce the probability of FD for Latin American companies.

There are still few studies (Al-Hadi et al., 2017; Harymawan et al., 2021) focusing on the relationship between sustainability and FD. Some authors indicate that the lack of a positive orientation towards sustainability could have severe consequences, such as loss of reputation, political and media pressure, potential fines, penalties, or even customer boycott (Al-Hadi et al., 2017). The likelihood of facing FD may be reduced by increasing positive ESG activities (Al-Hadi et al., 2017; Cooper & Uzun, 2019). For instance, companies with higher ESG involvement tend to anticipate and reduce potential sources of business risk, such as risk related to governmental regulations, labor issues, and/or environmental damage (Orlitzky & Benjamin, 2001). Studies indicate that firms with high ratings in sustainable practices mitigate their bankruptcy risk and their risk of facing FD, enjoying high credit ratings due to their strong corporate image (Attig et al., 2013).

According to Harymawan et al. (2021), ESG practices require corporate management to shift from a neoclassical to a more stakeholder-oriented paradigm, demanding substantial investments in both costs and expertise for full implementation. While mature and financially stable firms may be able to cover these costs and capture the associated benefits, companies facing FD often lack the resources to do so. Consequently, FD may moderate the relationship between ESG practices and firm performance, such that the positive effects of ESG on performance are attenuated or even reversed for financially constrained firms. This highlights the importance of examining not only the direct impact of ESG but also how FD conditions shape its effectiveness.

This study analyzes the effect of ESG practices on FD in 963 Latin American firms listed from 2011 to 2022 and examines whether FD, combined with ESG practices, can enhance firm financial performance. Its contributions are twofold: (1) assessing whether ESG practices influence FD levels; and (2) evaluating whether ESG performance, alongside FD, affects financial performance. Unlike previous research, which typically addresses only one perspective, this study integrates both. While many studies examine ESG and firm performance or FD and performance separately, none have analyzed their joint impact, highlighting the innovative nature of this research.

The main findings of this research reveal that ESG investments can exacerbate FD due to their high implementation costs. However, when time lags are considered, this trend reverses, reflecting the potential for raising funds at lower costs. In general, ESG investments may alleviate the difficulties of implementing firms, offering increased shareholder value. However, there must be a balance between ESG investments and maintaining the firm's profitability, highlighting the need to align these investments with the organization's financial capacity.

Investigating the moderating role of FD in the ESG performance relationship is crucial for both theory and practice. Previous studies have generally focused on the direct effects of ESG on firm outcomes, without explicitly considering how financial constraints may influence these effects, particularly in emerging markets. By incorporating FD as a moderator, this study provides a more nuanced understanding of the conditions under which ESG practices enhance or hinder firm performance. This approach contributes original insights to the literature, demonstrating that the benefits of ESG are not uniform across all firms but depend on financial resilience, a perspective unexplored in prior research.

Understanding the factors leading to FD could significantly reduce corporate bankruptcy risk, increasing efficiency, performance, and value for stakeholders, investors, and society. This study also benefits creditors by preventing losses and enables shareholders and managers to improve cash management. Furthermore, investors and regulators could use this information to supervise the governance and financial management structures of companies listed on the stock exchange. Companies with robust governance mechanisms, social accountability practices, and controlled FD are considered more trustworthy for financial investment, potentially promoting economic development in their respective countries.

2. THEORETICAL FRAMEWORK

2.1 Understanding the ESG and CSR Constructs and the Stakeholder Theory

This study is grounded in stakeholder theory, originally proposed by Freeman (1984), which argues that firms must consider the interests of multiple stakeholders in their decision-making processes, including governments, non-governmental organizations, unions, customers, potential clients, employees, and society at large. ESG practices align with this theoretical perspective, as they reflect the firm's ability to manage ESG responsibilities while addressing the often-divergent expectations of different stakeholders. In this context, balancing such interests may influence financial outcomes and firms' exposure to FD, also intersecting with agency theory.

Recent research has examined the evolution from corporate social responsibility (CSR)-related practices to ESG-oriented approaches. According to Galindo et al. (2023), CSR focuses on socially responsible activities, whereas ESG expands this view by integrating ESG dimensions into core business operations and investment decisions (Galindo et al., 2023; Gillan et al., 2021). Thus, ESG represents a broader and more structured framework compared to CSR and is widely recognized as an evolution of CSR practices.

Importantly, this study focuses on ESG performance rather than ESG disclosure. The ESG measure provided by Refinitiv captures the firm's effectiveness in managing risks and opportunities associated with ESG dimensions. Although the data are self-reported by firms, prior literature (Galindo et al., 2023; Gillan et al., 2021) treats

Refinitiv's composite ESG score as a performance metric because it evaluates the quality and outcomes of ESG-related practices rather than merely the extent of disclosure.

Distinguishing ESG performance from ESG disclosure, the former reflects how effectively a company manages and implements ESG practices, producing measurable outcomes related to sustainability and corporate responsibility. ESG disclosure, in contrast, refers only to the volume and quality of information publicly reported by firms regarding these practices. While disclosure indicates transparency, performance captures the substantive actions and results. Although Refinitiv's ESG data are based on publicly available information, the score weights and evaluates the firm's actions across ESG dimensions and therefore is considered a measure of performance rather than disclosure.

2.2 Studies on ESG/CSR and FD

The literature indicates reasons why ESG practices may affect the likelihood of FD (Boubaker et al., 2020; Dumitrescu et al., 2020). Firstly, ESG practices may reduce firm risk, providing a reduction in corporate FD (Dumitrescu et al., 2020). In this regard, Boubaker et al. (2020) investigated how CSR practices affect the level of FD in a sample of 1,210 companies listed in the United States of America from 1991 to 2012. The authors found that firms with a prominent level of CSR performance have less FD, suggesting that companies that are more engaged in CSR practices are more trustworthy.

Farooq and Noor (2021) investigated the impact of CSR practices on the likelihood of FD in a sample of 139 Pakistani companies from 2008 to 2019. They found a positive effect of CSR practices on FD. In a related study, Farooq et al. (2022) explored the CSR-FD relationship through the moderation of corporate governance for 117 Pakistani companies from 2008 to 2021. Similarly, Guotai et al. (2023) investigated the connection between CSR and FD in China, analyzing 4,202 observations from 2011 to 2017. They found a stronger association for companies with low corporate governance and low participation of institutional investors, especially among non-state companies with mandatory ESG disclosure.

Furthermore, Habib (2023) analyzed the relationship between business strategies, ESG, and FD for a sample of 1,970 North American companies from 2016 to 2020. The findings demonstrate that firms with better cost leadership strategies have better ESG performance. In turn, the cost strategy and ESG performance have a negative impact on the likelihood of facing FD.

Some authors have argued that investing in corporate sustainability has a high cost, and that companies usually need to sacrifice financial resources in order to reach ESG goals (Harymawan et al., 2021). In addition, some findings have demonstrated that the benefits of ESG reporting may not be reached in every case (Rubab et al., 2022) and that some companies may not obtain any return on ESG investments (Harymawan et al., 2021).

Harymawan et al. (2021) explored the relationship between FD and ESG performance. The authors assumed that companies with FD are inclined to increase ESG to improve financial and market performance. However, ESG practices require substantial resources, which companies facing FD may lack. In the Indonesian context, the authors found that companies with FD have a lower quality of ESG practices compared to companies that do not experience such a situation.

Some authors investigated whether a company's financial situation affects their ESG reporting. Campbell et al. (2008) found that companies facing FD are less likely to invest in CSR, not intentionally but due to insufficient capital (Harymawan et al., 2021). Companies in FD will likely resort to a low-cost strategy for ESG investments.

Conversely, other authors have argued that companies with high ESG scores are less likely to face FD and are more resilient during crises (Broadstock et al., 2021; Hoepner et al., 2023).

Shi et al. (2023) investigated whether corporate sustainability practices may reduce the risk of FD for aviation companies in the Asia-Pacific region. They found that the implementation of environmental practices may increase the risk of FD and that increasing social and governance practices may reduce the risk of FD for these companies.

Al Barrak et al. (2023) analyzed the relationship between ESG practices and cost of debt, as well as the moderating role played by FD in this association. The sample involved Saudi Arabian firms in the period from 2013 to 2021, adopting the generalized method of moments (GMM) method to control for potential endogeneity. The authors found that ESG practices have a strong negative impact on the cost of loans. Therefore, organizations with higher ESG performance had better access to external resources. In addition, they found that the effect of ESG on the cost of debt is negatively moderated by corporate FD.

Chan et al. (2017) investigated whether different states of cash flow liquidity affect the extent of CSR activities in companies. They used the Morgan Stanley Capital International ESG score as the dependent variable and the Kaplan–Zingales index and Altman's Z-score as independent test variables. In addition, they adopted an entrenchment index, executive compensation variables, return on assets (ROA), losses, firm size (SIZE), market-to-book, and leverage as control variables to analyze the impact of FD on ESG practices.

In the context of Latin American companies, a positive relationship between ESG practices and the likelihood of FD seems more plausible. Although studies on ESG and FD have been conducted in several contexts, little is known about this relationship in Latin American companies. Dandaro and Lima (2022) suggested that improving ESG performance does not necessarily lead to a reduction in the credit risk of Latin American companies, which differs from the findings of previous studies on developed economies. Therefore, the first hypothesis is:

H_1: ESG performance is positively associated with corporate FD.

The positive impact of ESG practices on firm performance has been widely recognized, particularly through mechanisms such as reputational enhancement, stakeholder trust, risk mitigation, and long-term value creation (Flammer, 2015; Friede et al., 2015). However, this relationship is not uniform across financial conditions. Firms experiencing FD face liquidity constraints, downgraded credit quality, higher capital costs, and increased market pressure for short-term results (Campbell et al., 2008). Under these circumstances, managerial priority shifts toward immediate survival, which structurally limits the capacity to sustain investments with long-term payoffs, including ESG initiatives (Benlemlih & Bitar, 2018).

In emerging markets, where institutional enforcement is weaker, minority shareholder protection is limited, and stakeholder orientation is comparatively lower (Chong & Silanes, 2007; La Porta et al., 1999), ESG expenditure tends to be perceived as a discretionary cost rather than a strategic necessity. This cost-benefit asymmetry becomes more pronounced when firms encounter financial fragility, as distress pushes managers to cut expenditures that are not directly associated with short-term operational continuity. Thus, while ESG may act as a risk hedge in developed economies with stronger regulatory and information environments, in Latin America, financial pressure

frequently erodes the strategic value conversion of ESG investments (Godinez-Reyes et al., 2025; Kemp & Owen, 2013).

Moreover, recent empirical evidence reinforces that the financial benefits of ESG are conditional on the firm's solvency and risk posture. Wu et al. (2020) demonstrate that ESG improves firm performance primarily among financially stable organizations, whereas distressed firms do not fully internalize the reputational and operational payoffs of ESG engagement. This reinforces the theoretical logic that FD moderates the ESG performance relationship by constraining budgetary flexibility, increasing short-termism, and reducing the depth and continuity of ESG programs. As Cooper and Uzun (2019) note, firms under financial strain are more likely to prioritize liquidity preservation and debt obligations over voluntary sustainability investments, even when such investments yield long-term benefits.

Based on this theoretical framework, FD is expected to attenuate the positive effects of ESG practices on performance, particularly in environments such as Latin America, where institutional fragility and economic volatility amplify short-term corporate pressures. Therefore, the second hypothesis is formally stated as follows:

> H_2: FD exerts a negative moderating effect on the relationship between ESG practices and firm performance in Latin America.

3. METHODOLOGY

3.1 Sample and Data Source

The initial study sample comprised 1,255 Latin American companies. Following previous studies, this analysis excluded companies in the financial sector due to their financial particularities (Martínez-Ferrero et al., 2015). Following this exclusion, the final sample comprised 963 listed firms and 11,724 firm-year observations from 2011 to 2022 across 10 Latin American countries that provided ESG data. The following countries were excluded from the analysis due to the absence of ESG data during the study period: Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Paraguay, Uruguay, and Venezuela. Table 1 shows the number of companies per Latin American country in the study sample.

Table 1
Latin American countries

Country	Frequency	Percentage
Argentina	84	8.72%
Brazil	364	37.79%
Cayman Islands	59	6.13%
Chile	159	16.51%
Colombia	48	4.99%
Mexico	131	13.61%
Peru	118	12.25%
Total	963	100.00%

Source: *Elaborated by the authors.*

The data were collected from the Thomson Reuters database. Although the Refinitiv database provides comprehensive ESG information, it is important to acknowledge that data availability is more limited in the years prior to 2015, which may

affect longitudinal comparability. Nevertheless, in our sample covering the period from 2011 to 2022, approximately 78% of the firms remained listed throughout the entire timeframe, which helps to mitigate potential biases related to data scarcity in the earlier years. Despite this consistency, we recognize this issue as a methodological limitation that should be considered when interpreting the findings.

3.2 Study Variables

3.2.1 Dependent variables

In this study, we employ both Altman's Z-score and ROA as dependent variables, as they capture complementary dimensions of corporate performance. The Z-score measures insolvency risk, reflecting firms' financial health and probability of bankruptcy (Altman, 1968), whereas ROA evaluates operational efficiency by relating net income to total assets (Fama & French, 1998). While ROA is more directly associated with short-term economic performance, the Z-score provides insights into long-term resilience and firms' ability to withstand financial vulnerability. The combined use of these metrics allows for a more comprehensive assessment of the interaction between ESG practices and performance, encompassing both operational efficiency and insolvency risk.

FD: Altman's Z-score (1968) has been used as a dependent variable in many recent studies, particularly Boubaker et al. (2020), Farooq et al. (2022), and Harymawan et al. (2021). It is calculated through the following Eq. 1:

$$\text{Z-score}_{it} = 3.3*X1 + 0.99*X2 + 0.6*X3 + 1.2*X4 + 1.4*X5 \quad (1)$$

where *X1* is earnings before interest and tax payments divided by total assets, *X2* is net revenues divided by total assets, *X3* is equity market value divided by total liabilities, *X4* is working capital divided by total assets, and *X5* is retained earnings divided by total assets.

To calculate FD in this study, in line with Altman et al. (2017), Boubaker et al. (2020), and Farooq et al. (2022), a FD dummy variable was created. Companies with a Z-score lower than 1.81 were considered to be in distress and took the value of "1," and companies with a Z-score higher than 1.81 were considered not to be in distress and took the value of "0."

ROA: Studies such as Wu et al. (2020) and Fischer and Sawczyn (2013) also used ROA as a dependent variable. In this context, ROA is particularly suitable for investigating the effects of FD and ESG practices on firm performance, as it captures how efficiently companies generate returns from their assets while facing potential financial constraints. By linking operational efficiency to both financial vulnerability and sustainability strategies, ROA provides a valuable measure to assess whether ESG initiatives mitigate or exacerbate the adverse impacts of FD on corporate outcomes.

3.2.2 Independent variables

ESG: The ESG score was obtained from the Thomson Reuters database, and its three dimensions (environmental, social, and governance) were analyzed separately, as seen in several studies (Galindo et al., 2023; Habib, 2023; Harymawan et al., 2021).

To estimate the ESG score of companies, Thomson Reuters uses 178 indicators grouped and distributed into three pillars: environmental, social, and governance. Based on the literature, this study chose to adopt the ESG scores developed by Thomson Reuters' Refinitiv, which range from 0.1 to 100, with high scores indicating that companies have better environmental, social, and governance initiatives.

3.2.3 Control variables

Following previous studies, this analysis chose several control variables (Farooq et al., 2022; Wu et al., 2020), since there is evidence from the literature indicating that these variables can control the relationship between ESG and FD. The following control variables were selected:

Cash equivalence (SLACK): A measure defined as cash and cash equivalents divided by total assets, representing the firm's immediately available redundant resources. According to the slack resources perspective (Bourgeois, 1981; Daniel et al., 2004), financial slack can play an ambivalent role in corporate performance. On one hand, excess liquidity provides firms with a buffer against FD and allows strategic flexibility; on the other hand, it may foster inefficiencies and agency costs (Farooq et al., 2022; Wu et al., 2020).

SIZE: Measured by the natural logarithm of total assets, is expected to be positively associated with FD, as larger firms may face more complex operational and financial challenges (Habib, 2023).

Depreciation (DEP): The ratio between depreciation expenses and total assets. Included because higher depreciation tends to reduce FD by reflecting the gradual allocation of asset costs over time (Farooq et al., 2022).

Tangibility of assets (TANG): The ratio between tangible assets and total assets. It is expected to reduce FD, as tangible assets can serve as collateral to facilitate borrowing (Wu et al., 2020).

Leverage (LEV): The ratio between total debt and total assets, as suggested by Bravo-Urquiza and Moreno-Ureba (2021) and by Habib (2023), who indicated that greater leverage tends to increase the level of FD.

Growth opportunity (GROWTH): Proxied by operating revenue growth, is anticipated to positively influence ROA and may mitigate FD by signaling promising development prospects (Liu et al., 2019; Wu et al., 2020).

Current liquidity (CR): The ratio of current assets to current liabilities, is expected to reduce FD by reflecting the firm's ability to meet short-term obligations (Ashraf et al., 2020).

COVID-19 crisis (COVID19): Dummy variable that receives the value 1 for the years of the COVID pandemic (2020 to 2022) and the value 0 otherwise (Habib, 2023). Greater FD is expected during the crisis period. All the dependent, independent, and control variables are shown in Table 2.

Table 2
Study variables

Variable	Symbol	Metric	Expected sign	Reference
Dependent variables				
Financial distress	FD	Dummy variable that takes the value of 1 for firms facing FD and 0 otherwise.		Altman (1968); Bravo-Urquiza and Moreno-Ureba (2021)
Return on assets	ROA	$\frac{Net\ Profit}{Total\ Assets}$		Velte (2017); Wang and Sarkis (2015); Wu et al. (2020)
Independent variable				
ESG	ESG	ESG score and its components (environmental, social, and governance)	Positive	Galindo et al. (2023); Harymawan et al. (2021)
Control variables				
Cash and equivalence	SLACK	$\frac{Cash}{Total\ Assets}$	Negative	Farooq et al. (2022); Wu et al. (2020)
Company size	SIZE	$Log.Total\ Assets$	Positive	Habib (2023)
Depreciation	DEP	$\frac{Depreciation}{Total\ Assets}$	Negative	Boubaker et. al. (2020); Farooq et al. (2022)
Tangibility	TANG	$\frac{Tangible\ Assets}{Total\ Assets}$	Negative	Wu et al. (2020)
Leverage	LEV	$\frac{Total\ Debt}{Total\ Assets}$	Positive	Bravo-Urquiza and Moreno-Ureba (2021); Habib (2023)
Revenue growth	GROWTH	Operating profit in year t minus operating profit in year t-1, divided by operating profit in year t-1	Negative	Wu et al. (2020)
Current liquidity	CR	$\frac{Current\ Assets}{Current\ Liabilities}$	Negative	Ashraf et al. (2020); Wu et al. (2020);

Crisis	COVID19	Dummy that takes a value of 1 for the years of the COVID-19 pandemic and 0 otherwise	Positive	Habib (2023)

Source: *Elaborated by the author.*

3.4 Econometric Models

Based on Bernardo et al. (2018), this study employed a three-level hierarchical regression model with repeated measures, as the data are organized by country and the ESG measurements vary over time for each company. According to Elango and Wieland (2015), the multilevel regression model is more adequate for this type of analysis because it allows for the inclusion of fixed and random intercepts, providing more accurate and valid findings.

All models were estimated at three distinct levels using full maximum likelihood (ML) and with no predictors, to observe the variation of the dependent variables between companies and countries, as well as over time. The regression shown in Eq. 2 represents the three estimated levels, where j is the overall average of FD and performance (ROA), εj captures the random effect for each country j, is the random effect for each firm i, and is the random error term over time.

$$Yijt = \beta 000 + \varepsilon_{ij} + \mu_i + e_{ijt} \quad (2)$$

where j is the overall average of FD and performance (ROA), ε_{ij} is the random effect of the third hierarchical level for the j-th country, μ_i is the random effect of the second hierarchical level in the modeling of the i-th firm, and e_{ijt} represents the random error term of the null model.

It must be considered that ε_{ij} works as a random variable and reflects on the coefficients of the variables at levels 1 and 2. That is also true for μ_i, which behaves as a random variable and reflects on the variables of the first hierarchical level in the models. The econometric models of the study are based on the following hypothesis: H_1: ESG performance is positively associated with corporate FD. This hypothesis was tested through the multilevel logistic regression shown in Eqs. 3-6.

$$FD_{ijt} = \beta 000 + \beta_1 ESG_{ijt} + \beta_2 COVID19_t + \beta_3 CONTROL_{ijt} + \varepsilon_{ij} + \mu_{ij} + e_{ijt} \quad (3)$$

$$FD_{ijt} = \beta 000 + \beta_1 ENV_{ijt} + \beta_2 COVID19_t + \beta_3 CONTROL_{ijt} + \varepsilon_{ij} + \mu_{ij} + e_{ijt} \quad (4)$$

$$FD_{ijt} = \beta 000 + \beta_1 SOCIAL_{ijt} + \beta_2 COVID19_t + \beta_3 CONTROL_{ijt} + \varepsilon_{ij} + \mu_{ij} + e_{ijt} \quad (5)$$

$$FD_{ijt} = \beta 000 + \beta_1 GOV_{ijt} + \beta_2 COVID19_t + \beta_3 CONTR0L_{ijt} + \varepsilon_{ij} + \mu_{ij} + e_{ijt} \quad (6)$$

where FD_{ijt} is the likelihood of firm i facing FD in country j at time t, ESG_{ijt} is the ESG score of firm i in country j at time t, ENV_{ijt} is the environmental score of firms i in country j at time t, $SOCIAL_{ijt}$ is the social score of firm i in country j at time t, GOV_{ijt} is the governance score of firm i in country j at time t, $COVID19$ is the dummy variable for the pandemic period (2020 to 2022), $CONTROL_{ijt}$ represents the set of control variables for firm i in country j at time t, as shown in Table 2, β is the random coefficient of the higher-level variable and its impact on firm i in country j at time t, ε_j is the random effect for each country j, μ_{ij} is the random effect for each firm i in country j, and e_{ijt} is the random error term for firm i in country j over time t.

Afterwards, the study analyzed whether FD and the ESG score affect company performance using the multilevel linear regression model shown in Eqs. 7 and 8. The test used ROA as the dependent variable and was based on H_2 (FD exerts a negative

moderating effect on the relationship between ESG practices and firm performance in Latin America). In addition, the study checked the moderating effect of FD on the relationship between ESG performance (and its individual components) and firm performance, as shown in Eq. 9.

$$ROA_{ijt} = \beta 000 + \beta_1 FD_{ijt-1} + \beta_2 COVID19_t + \beta_3 CONTROL_{ijt} + \varepsilon_{ij} + \mu_{ij} + e_{ijt} \quad (7)$$

$$ROA_{ijt} = \beta 000 + \beta_1 ESG_{ijt} + \beta_2 COVID19_t + \beta_3 CONTROL_{ijt} + \varepsilon_{ij} + \mu_{ij} + e_{ijt} \quad (8)$$

$$ROA_{ijt} = \beta 000 + \beta_1 FD * ESG_{ijt} + \beta_2 COVID19_t + \beta_3 CONTROL_{ijt} + \varepsilon_{ij} + \mu_{ij} + e_{ijt} \quad (9)$$

where ROA_{ijt} is the ROA of firm i in country j at time t, FD_{ijt} is the likelihood of firm i facing FD in country j at time t, ESG_{ijt} is the ESG score and its three components for firm i in country j at time t, $FD * ESG_{ijt}$ is the interaction between FG and the ESG score and its three components for firm i in country j at time t, $COVID19$ is the dummy variable for the pandemic period (2020 to 2022), $CONTROL_{ijt}$ represents the set of control variables for firm i in country j at time t, as shown in Table 2, β is the random coefficient of the higher-level variable and its impact on firm i in country j at time t, ε_j is the random effect for each country j, μ_{ij} is the random effect for each firm i, and e_{ijt} is the random error term for firm i in country j over time t.

The variance inflation factor (VIF) test was performed, and all models presented average VIF values below 3, with a maximum of 1.82. These results confirm that multicollinearity is not a concern among the independent variables. The Wald and Wooldridge tests were performed to check for autocorrelation and heteroscedasticity issues. An autocorrelation issue was found and corrected in the execution of the models.

4. RESULTS ANALYSIS AND DISCUSSION

4.1 Descriptive Statistics

The descriptive statistics results are shown in Table 3. On average, 39.3% of Latin American firms in the sample have faced FD. Chile (41.7%), Colombia (45.8%), and Peru (49.2%) had several companies in FD above the general average, while Argentina (37.1%), Uruguay (5.6%), and Mexico (35.6%) had several companies in FD below the general average. Based on the Z-score criterion, 383 companies were classified as facing FD, while 580 companies were classified as not facing FD.

Table 3

Descriptive statistics

	Overall sample			Argentina		Brazil		Chile		Colombia		Mexico		Peru		Uruguay	
Variable	**Obs.**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
FD	11.724	0.39	0.49	0.37	0.48	0.40	0.50	0.42	0.49	0.46	0.50	0.36	0.48	0.49	0.50	0.06	0.23
ESG	7.109	14.73	22.07	16.33	21.53	16.65	26.28	11.05	22.33	20.60	28.61	19.76	27.35	8.38	18.54	48.95	17.62
ENV	7.081	12.62	23.95	12.37	19.18	14.83	26.07	9.78	21.90	16.29	26.61	17.59	27.95	6.53	16.22	47.62	23.59
SOCIAL	7.080	15.34	26.65	15.27	22.73	17.61	28.46	11.19	23.54	23.34	31.89	20.47	29.81	8.55	20.42	57.23	19.69
GOV	7.026	16.54	26.86	23.34	28.79	17.44	27.24	12.74	24.48	22.05	31.05	20.67	28.24	11.25	23.42	39.00	16.74
SLACK	8.695	0.06	0.08	0.06	0.07	0.08	0.08	0.05	0.07	0.03	0.04	0.06	0.07	0.05	0.08	0.19	0.10
SIZE	10.165	381.64	43.58	149.08	16.03	580.85	77.83	266.26	19.98	393.27	44.90	1,016.87	183.92	197.25	30.40	1,472.17	494.97
DEP	6.777	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.05	0.03	0.02	0.03	0.03	0.04	0.03	0.03	0.02
TANG	9.791	0.92	0.45	0.85	0.46	0.73	0.39	1.07	0.45	1.18	0.36	0.98	0.38	1.16	0.45	0.73	0.54
ROA	9.914	0.02	0.10	0.03	0.12	0.02	0.11	0.03	0.08	0.03	0.07	0.03	0.08	0.04	0.09	0.07	0.09
LEV	10.154	0.58	0.31	0.61	0.27	0.69	0.36	0.48	0.23	0.49	0.27	0.56	0.24	0.46	0.23	0.70	0.15
GROWTH	9.931	0.01	2.95	-0.13	3.29	-0.01	3.01	-0.05	3.03	0.22	2.57	-0.06	2.67	-0.05	3.03	-0.25	2.55
CR	10.138	2.22	2.45	1.63	1.57	2.11	2.37	2.14	2.56	1.74	1.84	2.31	2.47	2.26	2.67	1.27	0.40

Note: *All variables are shown in Table 2.*

SD = standard deviation.

Source: *Elaborated by the author.*

Regarding the ESG variables, there was an average ESG score of 14.73 for the whole sample of Latin American companies, with Uruguay (48.95), Colombia (20.60), and Mexico (19.76) showing the highest scores, while Peru (8.38) and Chile (11.05) showed the lowest average ESG scores. When looking at the ESG components, the average environmental score (ENV) was 12.62 for the whole sample, with Uruguay (47.62) showing a score three times higher than the general average, while Peru (6.53) and Chile (9.78) had below-average scores. In terms of the social component (SOCIAL), the average for the Latin American countries was 15.34, with Uruguay (57.23) still showing the best performance, while Peru (8.53) and Chile (11.19) remained the lowest scores. Lastly, the same was true for the sample regarding the governance score (GOV), with an overall average of 16.54.

In line with previous literature, it is important to note that the average ESG score in our sample is lower than the values reported by Duque-Grisales and Aguilera-Caracuel (2019). While their study examined 104 firms from Brazil, Chile, Colombia, Mexico, and Peru over the period 2011-2015, our analysis covers a broader scope, including Argentina and Uruguay, and extends to a longer timeframe (2011-2022) with 963 firms. These differences in sample size, country coverage, and period of analysis may partly explain the discrepancy in ESG averages. In particular, the inclusion of firms from countries with less mature ESG practices, as well as the larger number of firms with heterogeneous characteristics, tends to reduce the overall average ESG scores.

In general, the results of the descriptive statistics of the variables indicated a concerning scenario when it comes to ESG practices in Latin American countries: except for Uruguay, whose companies had the best ESG scores, most countries fell short on their average scores. Although concerning, these findings align with the observations of studies conducted in emerging countries (Boubaker et al., 2020; Harymawan et al., 2021; Velte, 2017). One explanation can be found in the work of Wu et al. (2020), who stated that the high costs involved in becoming socially and environmentally responsible, together with the perception of long-term returns, could lead to a slow process in applying social and environmental practices.

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Regarding the economic and financial variables, the results show a scenario in which Latin American companies share the same economic conditions despite operating in different countries. Despite having high current liquidity, these companies still show a low level of growth and profitability opportunities and are not very leveraged. These findings reflect some of the results reported by Bernardo et al. (2018) and by Jesuka and Peixoto (2022), who also studied Latin American companies in similar contexts and periods.

4.2 Correlation Analysis

The Pearson correlation between the variables is shown in Table 4. The findings show low correlation coefficients between the independent and control variables, which

indicates the absence of multicollinearity issues in the models, corroborating the previously reported VIF test results.

Table 4
Pearson correlation

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**
FD (1)	1.00													
ESG (2)	0.16*	1.00												
ENV (3)	0.15*	0.95*	1.00											
SOCIAL (4)	0.15*	0.98*	0.92*	1.00										
GOV (5)	0.15*	0.92*	0.78*	0.85*	1.00									
COVID-19 (6)	0.08*	0.21*	0.20*	0.21*	0.19*	1.00								
SLACK (7)	-0.21*	0.03	-0.02	-0.02	-0.01	0.06*	1.00							
SIZE (8)	0.01*	0.46*	0.57*	0.58*	0.56*	0.01	-0.1*	1.00						
DEP (9)	-0.01*	0.17*	0.14*	0.13*	0.14*	0.07*	-0.02	0.09*	1.00					
TANG (10)	-0.18*	0.11*	0.05*	0.04*	0.02	-0.1*	-0.3*	-0.02	0.36*	1.00				
ROA (11)	-0.36*	0.04	0.08*	0.07*	0.05*	-0.3*	0.08*	0.20*	-0.1*	-0.1*	1.00			
LEV (12)	0.28*	0.15*	0.09*	0.09*	0.09*	0.07*	-0.1*	0.06*	0.10*	-0.1*	-0.39*	1.00		
GROWTH (13)	-0.07*	0.02	0.03*	0.04*	0.03*	0.02	0.04*	0.05*	0.02	-0.01	0.08*	-0.03*	1.00	
CR (14)	-0.21*	-0.11*	-0.1*	-0.1*	-0.1*	-0.02	0.31*	-0.2*	-0.2*	-0.3*	0.06*	-0.40*	0.01	1.00

Note: *All variables are shown in Table 2.*
** Significant correlation at the 5% level.*
Source: *Elaborated by the authors.*

4.3 Results of the Null Models

Table 5 shows the results of the regressions of the null models, which are based on the random intercepts and take into account the average of the variables measuring FD, ESG, and ROA for the Latin American companies in the sample. These models that do not include the explanatory variables show the degree of influence of each level on the variation of the dependent variables through variance decomposition, which is represented by the intraclass correlation coefficient.

Table 5
Null model – FD, ESG, and performance

	FD	**ESG**	**ROA**
Observations	11,72	7,68	9,91
Fixed effects	Coefficient	Coefficient	Coefficient
Intercept	-184.26***	-1991.50***	2.34***
Estimators (variance) – Random effects parameters			
Country	15.44	4.62	0.00
Company	17.24	21.97	0.06
Time	0.09	0.99	0.00
Total	32.77	27.59	0.07
Intraclass correlation coefficient			
Level 3 (country)	42.92%	3.71%	0.17%
Level 2 (company)	90.85%	87.74%	48.49%
Level 1 (time)	9.12%	8.72%	50.38%
LR test (chi^2)	360.26***	895.59***	32.67***
Wald	215.98***	957.79***	32.76***

Note: *All variables are shown in Table 2.*
LR = likelihood ratio.
**** Significance at the 5% level.*
Source: Research results

The results suggest that the country level influenced the variation of FD by 42.92%, the variation of the ESG score by 3.71%, and the variation of financial performance by 0.17%. These findings indicate that the variation in the likelihood of companies facing FD is due to their location in their respective countries. Legal and political factors, combined with distinct institutional and economic environments, can influence the level of compliance with ESG practices. Furthermore, higher interest rates than those observed in developed countries are common in the countries studied, which can affect ESG investments, especially in firms facing FD. Discrepancies regarding the development of financial markets in Latin American countries, associated with differences regarding the maturity of regulatory frameworks in the countries comprising the sample, may also explain the observed situation.

Jesuka and Peixoto (2022) observed the same behavior in their studies involving Latin American companies, highlighting the fact that, in recent years, countries in the region have experienced moments of uncertainty due to the many political and economic crises that have limited access to third-party capital by companies. In this context, the evidence found in this study indicates that the internal characteristics of countries can cause a scarcity of resources, limiting access to loans and leading companies to face FD.

The variation in the ROA of companies at the country level also reflects the results found by Jesuka and Peixoto (2022) in their studies.

The results of the null models show that the company level accounted for most of the variation in FD (90.85%) and in the ESG score (87.74%), while the time level accounted for the variation in ROA (50.38%). At the firm level, the results reflect organizational behaviors regarding microeconomic factors. Costs, efficiency, productivity, and available technology, among other factors, impact company performance, ESG score, and FD. These findings are in line with previous observations in the literature (Bernardo et al., 2018; Jesuka & Peixoto, 2022), emphasizing that, even though external factors influence corporate actions, their internal characteristics account for most of the variation in debt and performance, which varies over time.

It is important to note that, as shown in Table 5 with a $p < 0.005$, the results of the ML tests (likelihood ratio [LR] test) for the models were significant at the 5% level, indicating that the multilevel model is the most suitable for this type of analysis.

4.4 The Effect of ESG on the FD of Latin American Companies

The results in Table 6 show the effects of ESG measured by the ESG score and its three components on the likelihood of Latin American companies facing FD in the period from 2011 to 2022 (H_1: ESG performance is positively associated with corporate FD). Following Farooq et al. (2022), this study performed two regressions for each model. The first regression determined how ESG and its three components influence FD, disregarding FD in the previous year. The second regression included a one-period lag of the dependent variable as an independent variable to observe if the relationship is maintained and to mitigate endogeneity and reverse causality issues, providing for more robust findings (Farooq et al., 2022).

Table 6

The effect of ESG on the FD of Latin American companies

	ESG score		**Environment score**		**Social score**		**Governance score**	
	FD (t)	**FD (t-1)**	**FD (t)**	**FD (t-1)**	**FD (t)**	**FD (t-1)**	**FD (t)**	**FD (t-1)**
ESG	**0.0057*** (0.0024)**	**-0.0036* (0.0047)**						
ENV			**0.0056** (0.0023)**	-0.0045 (0.0046)				
SOCIAL					**0.0034* (0.0021)**	**-0.0056* (0.0042)**		
GOV							0.0027 (0.0022)	**-0.0015 (0.0044)**
FD (t-1)		**3.005*** (0.1619)**		**3.0391*** (0.1627)**		**3.0299*** (0.1628)**		**3.0086*** (0.1628)**
COVID19	0.0925 (0.1388)	0.2384 (0.2083)	0.1305 (0.1395)	0.3003 (0.2092)	0.1191 (0.1380)	0.3080 (0.2103)	**0.1042 (0.1457)**	0.2253 (0.2087)
SIZE	**0.1349*** (0.0400)**	**0.273*** (0.0812)**	**0.1369*** (0.0393)**	**0.2722*** (0.0796)**	**0.1500*** (0.0392)**	**0.2879*** (0.0805)**	**0.156*** (0.0382)**	**0.2464*** (0.0811)**
LEV	**3.6011*** (0.2902)**	**5.032*** (0.5919)**	**3.5494*** (0.2900)**	**4.09716*** (0.5854)**	**3.5331*** (0.2884)**	**5.0556*** (0.5919)**	**3.506*** (0.2878)**	**5.0151*** (0.5908)**
TANG	**1.2202*** (0.1578)**	**1.743*** (0.3157)**	**1.2148*** (0.1574)**	**1.7152*** (0.3154)**	**1.1539*** (0.1573)**	**1.7182*** (0.3188)**	**1.187*** (0.1575)**	**1.6720*** (0.3168)**
GROWTH	**-0.0825*** (0.0195)**	**-0.078*** (0.0257)**	**-0.0813*** (0.0193)**	**-0.0751*** (0.0260)**	**-0.078*** (0.0191)**	**-0.071*** (0.0259)**	**-0.077*** (0. 0191)**	**-0.074*** (0.0258)**
SLACK	**-4.4445*** (0.6745)**	**-1.7449** (0.9858)**	**-4.4936*** (0.6762)**	**-1.8166** (0.9876)**	**-4.164*** (0.6593)**	**-1.9264** (0.9893)**	**-4.094*** (0.6590)**	**-1.8228** (0.9873)**
DEP	**-16.513*** (2.5341)**	**-20.27*** (4.4737)**	**-16.104*** (2.4401)**	**-20.126*** (4.4723)**	**-15.56*** (2.4244)**	**-20.68*** (4.4978)**	**-15.91*** (2.4475)**	**-19.86*** (4.5167)**
Constant	**24.083*** (6.6935)**	**4.042*** (0.8802)**	**27.0705*** (8.1063)**	**4.0260 (0.8616)**	**26.579*** (7.9196)**	**4.1189*** (0.8888)**	**26.16*** (7.7219)**	**4.0676*** (0.8867)**

Observations	3,687	3,687	3,682	3,682	3,660	3,660	3,654	3,654
VIF	1.29	1.29	1.28	1.28	1.28	1.28	1.27	1.27
LR test	**4.179.4*** **	**129.3*** **	**4.077.9*** **	**133.8*** **	**4077.9*** **	**132.04*** **	**4.034.6*** **	**131.04*** **
Country level	09.26%	05.55%	9.92%	05.57%	9.86%	05.52%	9.96%	05.44%
Company level	84.32%	46.96%	85.86%	49.26%	85.25%	48.14%	85.40%	47.65%

Notes: *Bold type denotes statistical significance at 10%, 5% or 1% level. All variables are shown in Table 2.*
LR = likelihood ratio; VIF = variance inflation factor.
Source: *Elaborated by the authors.*

The results of column 1 point to a statistically positive and significant relationship between the ESG score and the likelihood of FD, indicating that the greater the social, environmental and governance accountability of firms, the greater their likelihood of experiencing FD (H_1: ESG performance is positively associated with corporate FD). This relationship was also found by Boubaker et al. (2020) for Indian companies. However, when considering the likelihood of companies experiencing FD in the previous year, the ESG score changed to present a negative and significant effect on FD in the current year. The same behavior was also found for the environmental score (columns 3 and 4), the social score (columns 5 and 6), and the governance score (columns 7 and 8), in which the inclusion of the lagged FD variable inverted the relationship between the three ESG components and the likelihood of firms experiencing FD in the current year.

What could these findings indicate? An explanation may be found in the literature cited previously in this study on the relationship between ESG and FD. Boubaker et al. (2020) suggest that, when firms present better ESG performance, it is expected that they will have better access to credit and financing, which could reduce the likelihood of FD. In parallel, Harymawan et al. (2021) highlighted that companies that are already facing FD could adopt social and environmental practices as a valid alternative to obtain access to sources of financing linked to better ESG performance. Velte (2021) defended that, despite the long-term benefits, the high costs of adopting ESG practices could lead to negative financial consequences for companies in the short term.

Based on column 1 – disregarding a scenario where firms have experienced FD in the previous year – if companies decide to implement social and environmental accountability, they are more likely to encounter FD in the short term due to the substantial initial costs required to adapt their structures and production chains to ESG principles. These upfront investments may temporarily pressure liquidity and increase the risk of financial constraints. However, when considering column 2 in which firms have already faced a period of scarcity (t-1) and operate with limited resources, ESG practices may gradually mitigate FD. Over time, the positive effects of ESG engagement tend to consolidate through enhanced reputation, improved operational efficiency, and stronger stakeholder trust. Such factors may facilitate access to cheaper financing and external capital, ultimately reducing the probability of FD and reinforcing the long-term benefits of ESG adoption.

Regarding the control variables, the pandemic crisis (COVID-19) showed a positive (but not significant) relationship with the likelihood of Latin American companies experiencing FD. Therefore, it was not possible to corroborate the study of Habib (2023). SIZE, financial LEV, and TANG showed a positive relationship with the score at the 1% level, indicating that bigger, more leveraged companies with more tangible assets are more likely to face FD. These findings corroborate the evidence found in the literature (Boubaker et al., 2020; Habib, 2023; Jia & Li, 2022). In addition, Crespí-Cladera et al. (2021) found that very indebted companies that own a large volume of assets are more likely to experience FD, especially when their debt is higher than their total assets.

On the other hand, GROWTH, availability of SLACK, and DEP showed a negative and significant relationship with FD at the 1% level. Crespí-Cladera et al. (2021) found the same relationship when studying FD determinants in Spanish companies. The findings also corroborate Boubaker et al. (2020) and Jia and Li (2022), who found that the availability of cash resources, the opportunity for sales growth, and depreciation are factors that reduce the likelihood of companies experiencing FD in the context of emerging countries.

In general, the evidence found in this study provides insights into the effects of adopting social and environmental practices on the likelihood of FD in companies in the

Latin American context. The robustness of the results shows that becoming socially and environmentally accountable could be an important strategy to reverse the challenging scenario of FD. As found by Boubaker et al. (2020), it is possible to state that, in the Latin American context, companies facing FD see the adoption of social and environmental practices as an opportunity to obtain access to credit and financing sources linked to ESG performance. Velte (2021) mentioned that the exponential increase in green investment funds, which are intended exclusively for companies seeking resources to finance sustainable projects, has been attracting the attention of managers. That is because these funds could be the solution to leverage businesses and mitigate the financial pressure that could increase the likelihood of experiencing FD.

In summary, the results of the models with FD lag show that ESG practices reduce the likelihood of corporate FD in cases where companies decide to adopt ESG practices while already undergoing a period of FD. This possibly indicates that managers adhere to social, environmental, and governance accountability in order to obtain access to green funds, seeking to reduce the likelihood of facing FD. On the other hand, when not taking into account the financial situation of companies in year t-1, it was found that ESG practices increase the likelihood of corporate FD. According to the literature, this could be an effect of the high financial cost of becoming socially and environmentally accountable.

4.5 Effects of ESG and FD on the Performance of Companies

In the previous models, this study investigated how the ESG score and its three components influence the likelihood of FD in Latin American companies. However, the impacts of these two factors on company profitability and how FD affects this relationship are still not clear.

According to Wu et al. (2020), there is a theoretical and practical gap in the Latin American context, as discussed in the theoretical framework supporting H_2 (FD exerts a negative moderating effect on the relationship between ESG practices and firm performance in Latin America) and in the methodology. In this context, this study investigated the effect of FD and the ESG score and its three components on the financial performance measured by the ROA. In addition, this investigation performed tests on how corporate performance behaves in a scenario where a company decides to adopt ESG practices while experiencing FD.

As expected, Table 7 shows that FD had a statistically negative relationship with the ROA of companies, indicating that the higher the likelihood of Latin American firms facing FD, the lower their profitability. This finding corroborates the studies addressing the relationship between FD and performance (Ahmad et al., 2020; Rubab et al., 2022) and is not in line with what Wu et al. (2020) found for Chinese companies, for which an increase in Altman's Z-score (1968) increased the ROA.

Table 7

Effects of ESG and its components on the performance (ROA) of Latin American companies

	Model 1	ESG score		Environmental score		Social score		Governance score	
		Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
ESG		**0.0020*** (0.0011)**							
FD*ESG			**-0.0042*** (0.0005)**						
ENV				**0.0037*** (0.0012)**					
FD*ENV					**-0.0031*** (0.0007)**				
SOCIAL						**0.0024*** (0.0091)**			
FD*SOCIAL							**-0.0039*** (0.0021)**		
GOV								**0.0035** (0.0007)**	
FD*GOV									**-0.0041*** (0.0001)**
FD	**-0.0499*** (0.0021)**	**-0.0497*** (0.0025)**		**-0.0500*** (0.0028)**		**-0.0502*** (0.0033)**		**-0.0507*** (0.0027)**	
COVID19	**0.0064*** (0.0023)**	0.0021 (0.0026)	0.0037 (0.0026)	0.0019 (0.0026)	0.0037 (0.0026)	0.0019 (0.0027)	0.00025 (0.0019)	0.0021 (0.0026)	0.0008 (0.0019)
LEV	**-0.1013*** (0.0062)**	**-0.1374*** (0.0076)**	**-0.1295*** (0.0077)**	**-0.1391*** (0.0076)**	**-0.1328*** (0.0076)**	**-0.1379*** (0.0076)**	**-0.1321*** (0.0077)**	**-0.1403*** (0.0077)**	**-0.1318*** (0.0077)**
GROWTH	**0.0018*** (0.0029)**	**0.0025*** (0.0004)**	**0.0024*** (0.0035)**	**0.0025*** (0.0035)**	**0.0023*** (0.0004)**	**0.0024*** (0.00036)**	**0.00235*** (0.0004)**	**0.0025*** (0.0004)**	**0.0024*** (0.00035)**
CR	**-0.0011** (0.0005)**	**-0.0015** (0.0007)**	**-0.0015** (0.0067)**	**-0.0014** (0.0067)**	**-0.0013** (0.0007)**	**-0.0015** (0.0007)**	**-0.0014** (0.0007)**	**-0.0017** (0.0007)**	**-0.0017** (0.0007)**

SLACK	**0.0348*** (0.0112)**	**0.0654*** (0.0136)**	**0.0625*** (0.0137)**	**0.0658*** (0.0136)**	**0.0631*** (0.0137)**	**0.0646*** (0.0137)**	**0.0628*** (0.0136**	**0.0721*** (0.0139)**	**0.0701*** (0.0138)**
SIZE	**0.0135*** (0.0009)**	**0.0103*** (0.0012)**	**0.0122*** (0.0011)**	**0.0091*** (0.0011)**	**0.0112*** (0.0011)**	**0.0099*** (0.0012)**	**0.0120*** (0.0011)**	**0.0094*** (0.0012)**	**0.0118*** (0.0011)**
Constant	**-2.8038*** (0.0082)**	**-2.9013*** (0.0104)**	**-2.8764*** (0.0104)**	**-2.9025*** (0.0107)**	**-2.8748*** (0.0108)**	**-2.8970*** (0.0147)**	**-2.8720** (0.0107)**	**-2.9010*** (0.0105)**	**-2.8744*** (0.0105)**
Observations	8,401	5,298	5,296	5,298	5,298	5,274	5,267	5,274	5,251
VIF	1.14	1.30	1.18	1.30	1.18	1.30	1.18	1.30	1.17
LR Test	**3.106.64*** **	**2.194.87 *** **	**2.308.32*** **	**2.205.35*** **	**2.298.37*** **	**2.165.61*** **	**2.290.26 *** **	**2.216.61*** **	**2.283.6*** **
Country level	0.672% %	03.89%	06.72%	07.47%	08.60%	0.62%	8.35%	1.93.52%	11.11%
Company level	43.06%	50.63%	50.42%	50.75%	50.68%	50.59%	50.30%	53.80%	50.66%

Notes: *Bold type denotes statistical significance at 10%, 5% or 1% level. All variables are shown in Table 2.*
LR = likelihood ratio; VIF = variance inflation factor.
Source: *Elaborated by the authors.*

In line with previous studies (Duque-Grisales & Aguilera-Caracuel, 2019; Nguyen et al., 2020), Models 2, 4, 6, and 8 show that ESG and its three individual components have a positive and statistically significant relationship with ROA. Wu et al. (2020) found the same relationship for Chinese companies and concluded that, by complying with social accountability practices, firms tend to have good financial performance. That is because social and environmental accountability is seen as a positive sign to stakeholders, which consequently may bring multiple benefits to profitability.

By testing the moderating role of FD in the relationship between ESG and corporate financial performance in Models 3, 5, 7, and 9, this study found that the interaction between ESG and FD has a negative effect on ROA, indicating that hypothesis H_2 (FD exerts a negative moderating effect on the relationship between ESG practices and firm performance in Latin America) is not supported. These findings suggest that while firms continue to allocate resources to social and environmental practices during periods of financial constraints, the positive impact of ESG on profitability is attenuated.

In other words, FD reduces the ability of firms to fully capitalize on ESG initiatives, partially neutralizing the expected gains in performance. This result contrasts with the observations of Wu et al. (2020) for Chinese companies but aligns with Jang et al. (2020), who found that FD can negatively moderate the ESG financial performance relationship. Overall, in the Latin American context, FD appears to act as a limiting factor: it constrains the effectiveness of ESG practices in enhancing asset profitability, highlighting the importance of considering financial conditions when assessing the benefits of ESG initiatives.

Regarding the control variables, the pandemic crisis (COVID-19) showed a positive rel*a*tionship with ROA. However, this relationship was statistically significant only in Model 1, which analyzes the effects of FD on firm performance. Corroborating the literature, financial LEV and CR showed a negative and statistically significant relationship with ROA, indicating that the more indebted and liquid the firm, the lower its profitability. Based on the findings of Bravo-Urquiza and Moreno-Ureba (2021) and Habib (2023), it can be said that these companies are liquid and have a high volume of debt. Therefore, they must satisfy their creditors instead of investing in measures that could increase their ROA.

In this context, it can be said that the signs and significance levels observed in the relationship between the control variables are in line with the literature and indicate the robustness of the models tested. In addition, it is important to highlight that the coefficients of the ML tests were all significant, with $p < 0.005$, supporting the multilevel regression model as the best fit for this analysis and providing robust estimators.

In general, based on the evidence found in this study, it is possible to infer that, although FD may have a negative impact on the profitability of Latin American firms, adopting social and environmental practices could provide possibilities for expansion in the volume of assets, since becoming sustainable will lead to benefits and favorable opportunities to improve firm performance. These results corroborate the literature (Duque-Grisales & Aguilera-Caracuel, 2019; Nguyen et al., 2020; Wu et al., 2020). In addition to this isolated relationship, and corroborating the study of Jang et al. (2020), the negative moderating effect of FD on the relationship between ESG and performance indicates that the strategy of becoming sustainable may not be beneficial for firm profitability when companies are already facing FD situations.

4.6 Robustness Test

The relationship between ESG practices and firm performance may be subject to

endogeneity concerns, particularly due to simultaneity and reverse causality between sustainability engagement and financial outcomes. As highlighted by Wu et al. (2020), failing to account for this dynamic structure can bias estimates and weaken empirical validity. To address these concerns, we applied the GMM system, using the lagged values of ROA and FD as internal instruments through the GMM-style specification. Additionally, the control variables were incorporated as external instruments under the IV-style specification. This approach follows Wintoki et al. (2012), who emphasize that firm performance and corporate risk evolve dynamically and therefore must be modeled beyond contemporaneous relationships.

In Table 8, the results confirmed the consistency of our baseline findings. FD continues to negatively affect firm performance, as measured by ROA, supporting the view that financial constraints undermine firms' operational efficiency and profitability. Conversely, ESG engagement and its three pillars (ESG) maintain a positive association with performance, reinforcing the argument that sustainable practices contribute to long-term value creation.

Table 8

The effect of ESG and FD on firm performance – Robustness test

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
ESG		**0.0091***			
		(0.0021)			
ENV			**0.0012***		
			(0.0019)		
SOCIAL				**0.0075***	
				(0.0020)	
GOV					**-0.0056***
					(0.0023)
FD	**-0.0608*****	**-0.0888*****	**-0.0925*****	**-0.0892*****	
	(0.0180)	**(0.0209)**	**(0.0208)**	**(0.0204)**	
ROA (t-1)	**-0.0281*****	**0.1004****	**0.0842****	**0.0982****	**0.0896****
	(0.0351)	**(0.0557)**	**(0.0503)**	**(0.0549)**	**(0.0493)**
FD (t-1)	**-0.0112****	**-0.0159***	**-0.0160*****	**-0.0144****	**0.0068****
	(0.0104)	**(0.0125)**	**(0.0125)**	**(0.0126)**	**(0.0134)**
COVID19	-0.0059	-0.0038	-0.0031	-0.0027	-0.0022
	(0.0025)	(0.0036)	(0.0034)	(0.0039)	(0.0034)
SIZE	**0.0129*****	**0.0085*****	**0.0087*****	**0.0093*****	**0.0095*****
	(0.0014)	**(0.0023)**	**(0.0022)**	**(0.0023)**	**(0.0024)**
LEV	**-0.1018*****	**-0.0825*****	**-0.0799*****	**-0.0801*****	**-0.0825*****
	(0.0150)	**(0.0197)**	**(0.0196)**	**(0.0196)**	**(0.0194)**
TANG	**1.2202*****	**1.7434*****	**0.0036*****	**0.0035*****	**0.0035*****
	(0.1578)	**(0.3157)**	**(0.0014)**	**(0.0014)**	**(0.0015)**
GROWTH	**0.0019*****	**0.0045*****	**0.0021*****	**0.0044*****	**0.0042****
	(0.0062)	**(0.0016)**	**(0.0004)**	**(0.0016)**	**(0.0014)**
SLACK	**0.0155***	**-0.0027 *****	**-0.0045*****	**-0.0066*****	**-0.0035***
	(0.0348)	**(0.0334)**	**(0.0350)**	**(0.0341)**	**(0.0358)**
Constant	**-0.1695*****	**-0.0803*****	**-0.0786 ****	**-0.0326*****	**-0.0978*****
	(0.0282)	**(0.0437)**	**(0.0419)**	**(0.0452)**	**(0.0458)**
Observations	8,210	5,190	5,174	5,155	5,136
VIF	1.45	1.41	1.36	1.33	1.38
Arellano-Bond AR(1)	**50.38*****	**0.35*****	**52.92*****	**65.06*****	**55.40*****

Arellano-Bond AR(2)	0.352	0.309	0.323	0.309	0.317
Hansen test (p-value)	0.109	0.125	0.118	0.128	0.175

Note: *System generalized method of moments (GMM) estimation. Instrument set includes internal lags of ESG, FD, and ROA. Hansen test indicates valid overidentifying restrictions (> 0.10 and < 0.90). Arellano-Bond tests confirm first-order autocorrelation (AR[1], p < 0.01) and no second-order autocorrelation (AR[2], p = 0.41). Standard errors are robust and two-step corrected. Bold type denotes statistical significance at 10%, 5% or 1% level. All variables are shown in Table 2.*
VIF = variance inflation factor.
Source: *Elaborated by the authors.*

To confirm the dynamic structure of the model, the Arellano-Bond test for first-order autocorrelation AR(1) was performed, and the results indicated significant serial correlation at lag 1, as expected in dynamic panel settings. This validates the inclusion of the lagged dependent variable as a regressor. In contrast, the AR(2) results showed no evidence of second-order autocorrelation (p-values between 0.35 and 0.36), indicating that the moment conditions are adequately satisfied and that the internal instruments are valid. These findings reinforce the robustness of the System GMM estimator in addressing endogeneity and dynamic feedback effects in the ESG performance relationship. Consistent with Wu et al. (2020), our results indicate that ESG engagement contributes positively to firm outcomes, while FD exerts a negative effect, and relationships that remain stable even after correcting for endogeneity and autocorrelation concerns.

Overall, these findings highlight the unique dynamics of ESG and firm performance in the Latin American context. The evidence that ESG initially increases FD, but mitigates it once lagged effects are considered, reflects the reality of firms operating in economies with less developed financial markets, greater macroeconomic instability, and fragile regulatory institutions. In such environments, the initial costs of ESG adoption may weigh more heavily on companies, but over time, these practices enhance resilience by improving reputation, strengthening stakeholder trust, and expanding access to financing. The consistency of this pattern across the three ESG pillars reinforces the view that, despite short-term pressures, ESG plays a strategic role in mitigating risks and fostering long-term value creation for firms in Latin America.

5 FINAL CONSIDERATIONS

This study sought to analyze the relationship between the ESG criteria (general score and its three pillars) and FD for Latin American companies in the period from 2011 to 2022. In addition, the study investigated whether ESG practices and FD, in combination, could affect company performance. The method adopted was multilevel regression estimated through ML for a sample of 963 firms, accounting for 11,724 observations/year.

The main findings revealed a positive relationship between ESG and FD in the models with no lagged FD variables. On the other hand, when considering FD in the t-1 period, there was a negative relationship between ESG and FD. Similar trends were observed for the three ESG pillars. In models with no lagged FD, the implementation of ESG responsibilities in the context of FD increases the likelihood of encountering FD due to the substantial investment requirements. However, in the models with lagged FD, the adoption of these practices had the potential to alleviate FD by facilitating access to cheaper financing sources.

Regarding the models addressing the relationship between performance and the ESG scores interacted with the FD variable, there was a negative relationship between the interacted variable and ROA, refuting the study hypothesis. When considering the ESG variable and its three pillars in isolation, there was a positive relationship with ROA. However, when considering the interaction of the ESG variable or the ESG pillars with FD, the results are reversed.

It was found that firms choose to employ resources for social and environmental practices even while experiencing FD, resulting in a reduction in the profitability of their assets, corroborating the studies of Jang et al. (2020), who also found that FD could have a negative moderating effect on the relationship between ESG and financial performance. These findings are in line with the literature, indicating that ESG may mitigate and/or increase the likelihood of FD, and that firms that are in a situation of FD and invest in ESG find themselves experiencing more FD, since the results of the ESG investments happen in the long term.

The findings in this study contribute to the literature and to stakeholders, indicating that strategic investments in ESG may mitigate the likelihood of FD and increase value for shareholders. Companies seek a balance between sustainable practices and profitability, which is often difficult to achieve simultaneously. ESG activities require financial resources but generate social capital and provide market resilience. Therefore, companies should adapt ESG activities to their financial capacity.

In terms of limitations and opportunities for future research, it could be said that Latin American firms still lack data related to the ESG scores, which caused some countries to be left out of this study. Even though Latin America is a relevant scenario for analyzing the relationship between ESG and FD, future studies could investigate different legal and institutional contexts, possibly in a comparative way. We acknowledge that using quantile-based thresholds could provide additional insights into the classification of firms in FD.

Future research could explore alternative classification methods, such as quantiles, to assess the robustness of these findings. In addition, other proxies could be adopted to measure FD, and there could be other ways to measure ESG practices, such as the ESG disclosure score of the Bloomberg database. Future research may explore the use of simultaneous-equation models or hierarchical structural equation modeling, as these approaches can more explicitly account for potential reciprocal relationships between ESG and FD.

Although the Altman Z-score is widely used in the literature and remains a relevant metric for assessing FD, it is important to acknowledge its methodological limitations. The original Z-score model was estimated through linear discriminant analysis, which relies on assumptions such as multivariate normality that may not strictly hold in our sample. Consequently, while the Z-score is retained for comparability with prior studies, we recognize that logistic regression-based approaches offer a more robust functional form. This limitation is noted for transparency and to guide future research.

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Methodology: equal;
Supervision: equal;
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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The entire dataset supporting the results of this study can be made available upon request to the authors.

GENERATIVE AI DISCLOSURE

The authors declare that no generative artificial intelligence was used in any stage of the production of this manuscript (including research, writing, data analysis, formula generation, or the creation of graphic elements).

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