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# Navigating firm financial distress in turbulent times: The impact of the institutional context

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## Abstract

This paper explores the impact of environmental practices on firm financial distress during the COVID-19 pandemic in both emerging and developed countries. Analysing a sample of 12,181 firm observations from 2016 to 2021, our results indicate that adopting of environmental practices leads to reduced financial distress and more crisis-resilient economies. The mitigating effect of environmental practices is more pronounced in developed countries. This study provides crucial implications for governments and policymakers, emphasizing the importance of encouraging firms to adopt environmental practices to reduce the likelihood of default.

**KEYWORDS**
bankruptcy, COVID-19 pandemic, environmental practices, financial distress

## 1 | INTRODUCTION

The spread of the COVID-19 pandemic across the world has caused significant disruptions in global economic growth (Bakry et al., 2023; Uddin et al., 2021). While prior economic crises, such as the one in 2008, and other pandemic diseases (e.g. Spanish Flu, SARS, Ebola and Bird flu) led to considerable volatility in equity markets, COVID-19 has had the most profound impact on global economies (Harjoto et al., 2021). The lockdown restrictions imposed during the pandemic negatively impacted gross domestic product (GDP), consumption, product demand, operations and caused supply chain disruptions (Srivastava et al., 2022). According to the Congressional Research Service (2021), global economic growth fell to an annualized rate of around −3.2% in 2020. These disruptive events have led policymakers, regulatory bodies and researchers to pay closer attention to Corporate Social Responsibility (CSR), particularly the environmental dimension, as a means to enhance firm value (Naeem et al., 2023; Srivastava et al., 2022).

**Abbreviations:** CSR, Corporate Social Responsibility; EP, environmental practices.

The relationship between CSR and firm performance has been extensively researched. Early literature, aligning with Friedman's (1962, 1970) perspective, suggests that CSR might misallocate resources, potentially leading to a decline in profit and shareholder value. However, subsequent management literature has contested Friedman's stance, asserting that profitability and environmental objectives are not mutually exclusive (Porter, 1991). Porter's hypothesis (Porter & Van der Linde, 1995a, 1995b) even proposes that environmental considerations may foster innovation and bolster competitiveness. Despite these debates, empirical evidence varies. Krüger (2015) found that the stock market tends to react unfavourably to CSR initiatives, attributing such reactions to agency problems. In contrast, Flammer and Kacperczyk (2019) observed increased stock prices for firms reporting responsible environmental behaviour, with the opposite effect for those engaging in irresponsible conduct.

Various studies have analysed the effect of environment behaviour in the risk-taking (Badayi et al., 2021; Kabir et al., 2021). Engaging in environmental practices fosters strong stakeholder relationships, reduces cash flow volatility (Srivastava et al., 2022), minimizes perceived societal costs (Gangi et al., 2020) and lowers default risk during

crises (Sun & Cui, 2014). Firms adopting these environmental practices tend to be more resilient during crises due to their loyal customer base and stable product demand (Srivastava et al., 2022). Additionally, these firms enjoy enhanced reputation (Liang & Renneboog, 2017; Seles et al., 2019) and increased access to debt financing during periods of crisis.

While the relationship between CSR and firm performance has been extensively explored (Haanaes et al., 2013; Margolis et al., 2009), the impact of environmental practices on financial distress during crises remains relatively unclear. This study seeks to address this research gap by examining how environmental practices mitigate financial distress, particularly in the wake of the COVID-19 pandemic (Zhang & Fang, 2022). Environmental practices encompass efforts to minimize waste, reduce resource consumption, mitigate pollution and decrease emissions, leading to cost savings and an improved financial position (Amankwah-Amoah & Syllias, 2020). Some scholars agree that sustained investment in these practices can reduce information asymmetry in financial markets (Lee & Suh, 2022), thereby lowering monitoring costs associated with financial constraints. This makes environmentally responsible companies more appealing to lenders, giving them easier access to financing sources (Boubaker et al., 2020) typically associated with lower financial distress scores. In this context, this paper aims to explore whether investments in environmental measures reduce the likelihood of bankruptcy by enhancing firms' environmental performance (Liang & Renneboog, 2017) and strengthening supply chain resilience (Habermann & Fischer, 2023; Vishwanathan et al., 2020).

The contribution of this paper is twofold. Firstly, it provides empirical evidence on the influence of economic cycles on financial distress, particularly highlighting the effects of the COVID-19 pandemic on the relationship between environmental practices and financial distress. While the pandemic raised question about the adoption of environmental practices, investing in these practices enables firms to build reputational capital, enhance financial performance (Barka et al., 2023) and survive during economic crises (Seles et al., 2019).

Secondly, the study conducts cross-national comparisons, examining diverse economic environments including emerging markets and developed economies. While recent research has explored the impact of COVID-19 on firm survival (ElBannan, 2021; Yao & Liu, 2023), most environmental practices research has predominantly focused on individual countries, such as China (Xiong et al., 2020; Yin & Zhang, 2012), and other emerging countries (Bakry et al., 2023). However, limited attention has been given to understanding how a country's level of development influences the impact of environmental practices on financial distress during crises. National economies have unique institutional frameworks and relationships that influence the implementation of environmental practices. Companies encounter enablers or obstacles based on existing norms, regulations and social expectations within their specific environments (Yin & Zhang, 2012). Therefore, comprehensively assessing the effectiveness of environmental practices during a crisis requires examining the diverse contexts and institutions in which companies operate. Our study aims to capture the impact of the COVID-19 pandemic on firm survival in both emerging and developed countries, examining how they were affected in terms of the adoption of environmental practices (Lozano & Martínez-Ferrero, 2022).

Using an ordered probit model and a sample of 12,181 firm observations from 2016 to 2021, the results indicate that adopting environmental practices leads to reduced financial distress, with the effect being more pronounced in developed countries. This study provides crucial implications for governments and policymakers, emphasizing the importance of encouraging firms to adopt environmental practices to reduce the likelihood of default, especially during crisis periods. Such investments can help safeguard a company's image and position it favourably with key stakeholders. Moreover, firms' commitment to these practices should be consistent rather than solely reactive to economic crises. The effectiveness of these practices becomes apparent in the long term, equipping firms to respond to unforeseen crises and ensuring their survival during such periods.

The remainder of this paper is organized as follows. The next section provides the literature review and hypotheses. Next, the data analysis, research methodology and the results of empirical analysis are presented. Finally, theoretical contributions and managerial implications are outlined.

## 2 | THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

### 2.1 | Environmental practices and firm financial distress

Environmentally practices, defined as eco-friendly actions, policies and initiatives aimed at reducing environmental harm through emissions and pollutions reduction and minimizing waste (Amankwah-Amoah & Syllias, 2020), have gained prominence in recent years. These practices are critical not only for sustainability but also for achieving a cost-based competitive advantage by reducing production costs and enhancing process efficiency (Chang & Cheng, 2019). However, the relationship between environmental practices and firms' financial distress remains contentious, with divergent views emerging from different theoretical perspectives.

One perspective is rooted in agency theory (Jensen & Meckling, 1976), which posits that profits are the primary value driver for firms. According to this view, any reduction in earnings resulting from social or environmental initiatives that do not yield complementary benefits destroys shareholder value. Friedman (2007) argued that executives who incur social expenses on behalf of the corporations they manage are disloyal to their principals—the shareholders. From the agency perspective, diverting resources towards social or environmental endeavours places firms at a competitive disadvantage compared with those whose managers focus solely on maximizing shareholder value (Friedman, 2007; McWilliams & Siegel, 2001). Consequently, investments in environmental practices are often perceived as wasteful or resource-intensive (Meles et al., 2023).

Moreover, environmental practices afford managers substantial discretion in decision-making due to the challenges in evaluating the outcomes of these initiatives, leading to inefficiencies in capital allocation. Therefore, managers may be incentivized to overinvest in CSR activities to gain private benefits (Barnea & Rubin, 2010; Gangi et al., 2020) and increase their managerial discretion. Consequently, firms heavily engaged in CSR may face a higher risk of financial distress, as the resources allocated to these initiatives may not translate into immediate or tangible financial returns.

The second perspective aligns with stakeholder theory (Freeman, 1984), which emphasizes the importance of considering the interests and relationships of various parties, such as customers, suppliers, employees and creditors, for the survival and success of corporations (Beauchamp & Bowie, 2004). This view contends that environmental initiatives develop long-lasting relationship with stakeholders and generate value for firms. It is linked to the concept of 'doing well by doing good' (McWilliams & Siegel, 2001), suggesting that adopting environmental practices can mitigate firm risk by enabling deeper relationships with key stakeholders. These practices act as an 'insurance-like protection' for the company's future cash flows, thereby reducing the risk of financial distress (Badayi et al., 2021).

Empirical findings from prior literature support the stakeholder view. For instance, Boubaker et al. (2020) provide evidence that companies with better CSR performance enjoy higher credit ratings, resulting in fewer financial defaults. Moreover, environmental practices are associated with lower financial constraints and often lead to enhanced performance and increased likelihood of survival (Banerjee et al., 2020; Beck et al., 2005). Banerjee et al. (2020) argued that environmentally sustainable firms reduce financial constraints through two channels: greater stakeholder engagements and better sustainable reporting systems. In both scenarios, these firms reduce information asymmetry, leading to lower monitoring costs associated with financial constraints and facilitating easier access to financial markets (Kulkarni, 2000), ultimately resulting in higher economic performance and lower risk.

On the demand side, environmentally friendly companies attract customers and expand into new markets (Salama et al., 2011). Environmental initiatives foster customer loyalty and create barriers against potential new entrants (Khanna, 2001). Additionally, attracting environmentally conscious consumers enables firms to charge higher prices for their products and enhance their reputation in the community among other stakeholders, such as investors (Gronewold, 2010). Sustaining customer loyalty ensures a steady cash flow, thereby diminishing the likelihood of default (Do, 2022). Godfrey et al. (2009) argued that CSR investments provide firms with moral capital, acting as a form of insurance that safeguards firm value against negative events affecting the firm.

Building upon the preceding discussion, where we posited that firms engaged in environmentally responsible activities could attain higher valuations in financial markets and be seen as legitimate sources of long-term investments meeting stakeholders' demands, we formulate our first hypothesis:

**H1.** Environmental practices positively impact the reduction of financial distress in firms.

## 2.2 | Environmental practices and firm financial distress in times of crisis

Research on financial distress points to several environmental factors, such as technological changes, natural disasters, financial shock caused by the COVID-19 pandemic and regulatory changes, as primary causes of business failures (Amankwah-Amoah et al., 2021; Silverman et al., 1997). In particular, the COVID-19 pandemic has highlighted the vulnerability of firms to sudden and severe disruptions (Amankwah-Amoah & Syllias, 2020; Seles et al., 2019) In response to the pandemic, the European Parliament introduced a roadmap in November 2019, known as the European Green Deal, aiming to make EU climate-neutral by 2050, (The Council of the European Union, 2023). This ambitious plan seeks to enhance the efficient use of raw materials, water and energy by transitioning to a clean and circular economy.

Economic crises, such as those induced by pandemics or financial downturns, create uncertainties in firm's investment decisions due to a drop in demand and a decline in government support, often leading to prioritizing budget cuts (Seles et al., 2019). The COVID-19 pandemic, considered a major exogenous shock, affected both small and large firms (Wenzel et al., 2020). It led to a collapse in demand and disruptions in the supply of many products, resulting in mass layoffs, the adoption of new costly processes and bankruptcies (Amankwah-Amoah & Syllias, 2020). This health and economic crisis depleted firms' financial resources, causing financial distress and weakening the financial position of many businesses.

Most studies argue that in times of market uncertainties, companies tend to reduce costs, including environmental initiatives, as a means to mitigate the negative impact on their financial performance (Seles et al., 2018, 2019). During economic crises, financial resources become scarcer and tightly controlled, leading to the reallocation of resources previously dedicated to environmental practices to ensure market survival. In this context, Bansal et al. (2015) suggest that sustainability investments are often eliminated as companies prioritize core strategic issues that directly impact financial performance. However, an increasing number of companies now view environmental sustainability strategies as integral to their long-term success. These companies maintain their sustainability commitments even during economic crises, rather than cutting them. Bansal et al. (2015) and Delmas and Pekovic (2015) argued that while tactical sustainability activities may decline during times of economic constraints, strategic sustainability activities with a long-term focus, such as environmental research and development or environmental management systems, are more likely to increase their resource efficiency strategy. Through practices like energy efficiency and resource optimization, companies can gain a competitive advantage not only by achieving cost leadership but also by appealing to cost-conscious or price-sensitive consumers (Delmas & Pekovic, 2015).

Magrizos and Harris (2023) emphasized that maintaining ongoing CSR practices during the COVID-19 pandemic can be advantageous for companies to garner increased support from public authorities, including the EU Commission. Additionally, it can serve as an opportunity for restructuring and adjusting both business and CSR strategies. Aragón-Correa and Sharma (2003) described sustainability initiatives as dynamic capabilities that can lead to a positive association between proactive environmental strategy and superior performance during economic crisis periods. Amui et al. (2017) emphasize that for dynamic capabilities to generate a competitive advantage, they need to be integrated into the firm's strategy and have a long-term approach (Aragón-Correa & Sharma, 2003). In this context, it can be argued that environmental practices facilitate adaptation to market contingencies, enhance firms' resilience during crisis periods and ensure a higher survival rate in the long term (Amui et al., 2017; Harwood et al., 2011; Ortiz-de-Mandojana & Bansal, 2016). Empirical studies, such as Hsu and Chen (2021), have found that CSR reduces default risk during adverse conditions, such as financial crises. Additionally, firms can enhance their legitimacy with critical stakeholders during recessions by incorporating sustainability messages into their advertising (Green & Peloza, 2015).

Several other authors (Benlemlih & Bitar, 2018; Giannarakis & Theotokas, 2011; Glavopoulos et al., 2014; Seles et al., 2018) have found that CSR activities allow firms to differentiate their products or services by incorporating economically sustainable characteristics. This differentiation helps rebuild trust and foster high loyalty with stakeholders during economic crises, thereby reducing the risk of financial distress. Therefore, we posit that involvement in environmental practices presents additional opportunities for value creation, enhances firm power and helps mitigate the risk of failure.

**H2.** Environmental practices decrease the financial distress in firms during the COVID-19 pandemic crisis.

## 2.3 | Environmentally sustainable practices and firm financial distress in emerging versus developed countries

Numerous studies have examined the impact of COVID-19 on financial markets worldwide, with particular emphasis on emerging countries (Beck et al., 2020). In this study, we conduct a comparative analysis between countries at different levels of economic development to assess the impact of the COVID-19 pandemic on firm financial distress when they implement environmentally sustainable practices. We posit that the level of institutional development of a country can play a determinant role by shaping the ability of company to adopt environmental practices and incorporate them into their core strategy. The integration of environmental sustainability into the company's strategy is therefore conditioned by the infrastructure, institutional pressures, government systems, economic resources and labour quality accessible in the home country (Glover et al., 2014; Gómez-Bolaños et al., 2022; Jennings & Zandbergen, 1995).

Institutional theory suggests that regulatory quality exerts distinct pressures (i.e. coercive, normative or mimetic) prompting firms to adopt CSR initiatives for compliance and legitimacy in their environment (DiMaggio & Powell, 1983). Countries with high regulatory standards have clear guidelines and ethical norms, compelling firms to embrace CSR in alignment with these benchmarks, amplifying their legitimacy and credibility (Amor-Esteban et al., 2018). Environmental legitimacy denotes the 'generalized perception or assumption that a firm's corporate environmental performance is desirable, proper, or appropriate' (Bansal & Clelland, 2004, p. 94). Attaining environmental legitimacy is advantageous for firms, as it can lead to benefits like receiving financial support from environmentally conscious investors or appealing to green consumers who are willing to pay premium prices (Arocena et al., 2023; Berrone et al., 2017). In this context, firms undertake CSR activities not only to enhance the competitiveness and uphold their reputation among diverse stakeholders but also to comply with the regulations (Aguilera et al., 2007). Thus, regions with stringent regulations determine the adoption of CSR in the firms, guiding and validating efforts to promote ethical behaviour and strategic market positioning (Hanim Mohamad Zailani et al., 2012; Phan & Baird, 2015).

Within CSR regulations, environmental practices are considered the norm in developed countries, whereas their adoption in emerging countries differs due to weaker environmental regulations (Lartey et al., 2021). Firms located in emerging markets face less pressure from the public regarding sustainable policies (Lartey et al., 2021). Ali et al. (2017) identified that the primary drivers behind environmental practices in developed countries are pressures from specific stakeholders, such as regulators, shareholders, creditors, investors, environmentalists, and the media, whereas in emerging countries, these practices are more heavily influenced by external forces, such as international buyers, foreign investors, international media and international regulations.

Overall, the institutional framework in emerging economies is expressed by 'greater informality' and 'poorer regulatory structure' (Arocena et al., 2023). Firms in emerging countries are likely to face more financing obstacles, increasing the probability of firm financial distress in these countries. Consequently, transparency, accounting standards, intellectual property rights and market regulation are less reliable compared with developed countries (Marquis & Raynard, 2015). In the same vein, Didier et al. (2021) pointed out that firms entering the pandemic with a high level of indebtedness can experience significant fragility, leading to constraints on their borrowing ability, especially for firms in emerging economies with foreign currency-denominated debt, as many national currencies have depreciated. During crisis period, as resources became scare, companies reallocate resources towards ensuring their survival rather than allocate them towards investment in environmental practices. Before the COVID-19 pandemic, The Real Instituto Elcano (2021) stated that roughly one-third of emerging market economies were burdened with substantial debt levels.

Drawing upon institutional theory (North, 1991) and existing literature highlighting the differing effects of COVID-19 on emerging and

developed countries, we posit that firms in developed countries possess advantages over those in emerging country firms. Developed country firms typically have access to market intermediaries and are subject to higher initial standards and regulations, which incentivize them to prioritize environmentally responsible practices. However, in emerging countries, CSR tends to be less formalized in terms of standards, codes and management models compared with developed counterpart. The lack of formalization may be due to several factors, such as less stringent environmental regulations, lower environmental standards and less pressure from civil society to act as a socially responsible organization. Consequently, emerging economies are frequently perceived as potential 'pollution havens', drawing pollution-intensive production from nations with stricter environmental regulations (Arocena et al., 2023).

According to the resource-based view (RBV), firms gain a competitive advantage through the development of valuable organizational capabilities. A proactive environmental strategy helps companies develop specific capabilities related to environmental management, such as the ability to implement advanced environmental practices, adapt to changes in environmental regulation and effectively manage relationships with environmental stakeholders. In line with these agreements, firms operating in developed countries are typically more prepared to adjust to changes in the overall business environment. This implies that these companies can adapt and respond effectively to changes in the market and their competitive environment. Conversely, firms in emerging countries may face greater challenges in developing and implementing proactive environmental strategies due to various factors such as limited resources, regulatory differences and less developed infrastructure.

Therefore, we propose:

**H3.** . The influence of environmental practices on firm financial distress during crises varies depending on the level of development of a country.

## 3 | METHODOLOGY

### 3.1 | Database

The data for this paper were collected from the Thomson Reuters Datastream, Eikon databases. The study includes 73 countries, including Asia, North America, South America and Europe. Our sample comprises 3764 firms and 12,181 observations spanning from 2016 to 2021.

Our dependent variable is the 'Z-score'. Altman (1983) suggested that the management of distressed firms can utilize the Z-score model as a guide to financial turnaround. The original Z-score model was based on the market value of the firm and was thus applicable only to publicly traded companies. Using financial statements, Altman compiled a list of 22 potentially important financial ratios for evaluation, which he classified into five standard ratio categories: liquidity, profitability, leverage, solvency and activity (Altman et al., 2017). Through multiple discriminant analysis (MDA), a function was developed to assess public firm. However, the original model is unable to accurately forecast financial difficulties for non-manufacturing firms and non-publicly operated firms. To address this, Altman and Hotchkiss (1993) produced a further revised model. Both models are described below.[1] Likewise, both Z-score allows to classify firms into three groups 'Distress', 'Undetermined' and 'Safe' (see Vurro et al., 2022).

The Z-score for manufacturing firms is given by this formula:

$$Z-\text{score} = 1.2^{*}X1 + 1.4^{*}X2 + 3.3^{*}X3 + 0.6^{*}X4 + 0.999^{*}X5$$

where

X1 = Working capital/total Assets; X2 = Retained Earnings/Total assets; X3 = Earnings before interest and taxes/Total assets; X4 = Market value of Equity/Book value of total liabilities and X5 = Sales/Total assets.

Then, the different zones are classified as follows:

Zone 1: Safe zone ($Z > 2.99$)
Zone 2: Undetermined zone ($1.8 < Z < 2.99$)
Zone 3: Distress zone ($Z < 1.8$)

The Z-score for non-manufacturing firms is given by this formula:

$$Z-\text{score} = 6.56^{*}X1 + 3.26^{*}X2 + 6.72^{*}X3 + 1.05^{*}X4$$

where

X1 = Working capital/total Assets; X2 = Retained Earnings/Total assets; X3 = Earnings before interest and taxes/Total assets; X4 = Book value of Equity/Total liability.

Then, the different zones are classified as follows:

Zone 1: Safe zone ($Z > 2.6$)
Zone 2: Undetermined zone ($1.1 < Z < 2.6$)
Zone 3: Distress zone ($Z < 1.1$)

As an independent variable, the database evaluates the environmental practices of firms based on 34 indicators pertaining to the environmental pillar score. These indicators are grouped into three dimensions: resource use efficiency, emission reductions and environmental innovation (Govindan et al., 2021). Resource use efficiency assesses a firm's performance and capacity to reduce the use of materials, energy and water and to find more eco-efficient solutions by improving supply chain management. Emission reduction measures a company's commitment to and effectiveness in reducing environmental emissions during production and operational processes. Finally, environmental innovation reflects a firm's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes or eco-designed products.

[1]For a more detailed explanation, see E. I. Altman et al. (2017).

Our model includes several determinants of financial distress as control variables. At the firm level, we control the variables size, leverage, capital intensity, board gender diversity and board size, firm age and the industry in which a company operates. Size is measured as the logarithm of number of employees. Prior research argues that larger companies are less exposed to financial distress because of their large economic financial profitability and earning power to cope with unexpected financial crisis (ElBannan, 2021). Leverage, defined as the ratio of the sum of long-term debt to book assets, amplifies financial risk of firms correlates positively with default risk (Kabir et al., 2021). We also control capital intensity, which is calculated as the ratio of assets to the total number of employees. Board gender diversity, measured as the percentage of female members on the board, has been linked to better environmental practices (Shahbaz et al., 2020), while board size is the number of the board member at the end of the fiscal year. Firm age is the total number of years since its establishment. Additionally, we introduce a binary variable 'manufacturing' to control for industry variation, assigning a value of 1 to manufacturing firms and 0 to non-manufacturing firms (including services, agriculture and construction).

At the country level, we incorporate the economic development of a country using the dummy variable 'emerging country', which takes the value 1 for firms headquartered in countries classified as emerging by the International Monetary Fund (IMF) and 0 otherwise. Details of developed and emerging countries are provided in Table A1 in Appendix A.

Furthermore, we measure public sector corruption by using the Corruption Perception Index (CPI) from Transparency International. There are extensive literature linking corruption to corporate risk-taking behaviour (Baxamusa & Jalal, 2014; Shleifer & Vishny, 1993; Tran, 2022). The CPI, ranging from 1 to 100, reflects perceptions of public sector corruption, with lower levels indicating higher corruption levels. To ensure consistency, we rescaled the CPI so that higher values indicate higher corruption levels. Finally, to control for the impact of the COVID-19 pandemic, we created a crisis variable that takes the value of 1 for the years 2019–2020, and 0 otherwise. Table A2 in Appendix A outlines the variables used in this study.

## 3.2 | Ordered probit model

The dependent variable 'Z_SCORE' is an ordinal variable with three outcomes; it takes a value of 1, 2 or 3, which indicates the different zones of discrimination, namely, 'Safe', 'Undetermined' and 'Distress', respectively. The first group includes 38.5% of the observations, while the second group includes 26% of the observations. The third group includes the 35.5% of observations.

The ordered probit model is defined on the basis of a latent continuous variable $Y_i$ as follows:

$$Y_i^* = \beta_i X_i + \varepsilon_i \ (i = 1,2,....,n) \qquad \varepsilon_i \sim N(0,1) \tag{1}$$

where $Y_i^*$ is a continuous latent condition of $i^{th}$ $Z$-score, $i = 1, 2, 3$; $X_i = (x_{i1}, x_{i2}, .....x_{ik})$ is a vector of the independent variables, including the control variables mentioned above. The explanatory variables used in this study are summarized in Table 1. $\beta = (\beta_1, \beta_2, \ldots .. \beta_k)$ is the estimated parameter vector of explanatory variables, and $\varepsilon_i$ is the randomly distributed error term, which is assumed to be normally distributed with zero mean and unit variance (Jalayer et al., 2018).

The relationship between the unobserved variable $Y_i^*$ and observed ordinal variable $Y_i$ is established through the cut-points $\mu$ (Equation 2). That is to say if $Y_i^*$ falls into the interval $\left(\mu_{(k-1)} - \mu_{k)}\right.$, the state of $Y_i$ is $k$. According to that, the cut-points $\mu$ divide the continuous latent variable $Y_i^*$ into different states, where $\mu_0 = -\infty$ and $\mu_j = +\infty$.

$$Y_i = k, if\ \mu_{k-1} < Y_i^* < \mu_k \ (k = 1,2,.....,j) \tag{2}$$

By substituting Equation (1) into Equation (2), $Y_i^*$ is unobserved, and the ordered probit model translates the latent variable into the observed $Z$-score outcome $Y_i$ as follows:

$$y_i = 1\ if\ y_i^* < \mu_1$$
$$y_i = 2\ if\ \mu_1 < y_i^* < \mu_2$$
$$y_i = k\ if\ y_i^* < \mu_{k-1}$$

Since the error term $\varepsilon_i$ is assumed to be normally distributed with a mean of 0 and a standard deviation of 1, the probability that $y_i$ equals $k$ can be calculated using the standard normal cumulative distribution function $\Phi$:

$$P(y_i = k) = \Phi\left(\mu_k - \beta' X_i\right) - \Phi\left(\mu_{k-1} - \beta' X_i\right) (k = 1,2,....j) \tag{3}$$

By substituting Equation (3), we use the following equations:

$$Pr\,(y = 1) = \Phi(\mu_1 - \beta X) - \Phi(-\beta X)$$
$$Pr\,(y = 2) = \Phi(\mu_2 - \beta X) - \Phi(\mu_1 - \beta X)$$
$$Pr\,(y = 3) = 1 - \Phi(\mu_2 - X\beta)$$

where $y = 1, 2, 3$ indicate the three discrimination zones: 'safe', 'Undetermined' and 'Distress', respectively.

Since the interpretation solely of the estimated coefficients of an ordered probit model is not straightforward, we report the marginal effects of all independent variables on the probability of being in determined zone (zone 1 to zone 3).

$$\frac{P_i(y = j)}{\partial X} = \left[\varphi\left(\mu_{j-1} - \beta X\right) - \varphi\left(\mu_j - \beta X\right)\right]\beta$$

where $\mu$ represents the upper thresholds corresponding to the outcome $j$ and all other terms are as described previously.

**TABLE 1** Summary statistics and correlations among the variables.

| | | | Correlation coefficients | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **Mean** | ***SD*** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| (1) Z-score | 1.969 | 0.859 | 1 | | | | | | | | | | | |
| (2) EP | 0.355 | 0.291 | −0.016* | 1 | | | | | | | | | | |
| (3) Crisis | 0.531 | 0.499 | 0.043* | 0.008 | 1 | | | | | | | | | |
| (4) Board gender | 19.244 | 13.958 | −0.057* | 0.172* | 0.081* | 1 | | | | | | | | |
| (5) Board size | 9.294 | 3.049 | 0.084* | 0.368* | −0.062* | −0.001 | 1 | | | | | | | |
| (6) Capital intensity | 14.683 | 3.247 | 0.053* | 0.420* | −0.042* | −0.109* | 0.395* | 1 | | | | | | |
| (7) Firm age (ln) | 3.160 | 0.846 | 0.073* | −0.003 | −0.004 | −0.070* | 0.048* | −0.094* | 1 | | | | | |
| (8) Leverage | 0.425 | 0.487 | 0.294* | 0.132* | 0.005 | 0.075* | 0.134* | 0.115* | −0.003 | 1 | | | | |
| (9) Firm size | 8.198 | 2.013 | 0.041* | −0.003 | −0.001 | −0.130* | 0.047* | −0.484* | 0.284* | −0.038* | 1 | | | |
| (10) Manufacturing | 0.344 | 0.474 | 0.506* | 0.039* | 0.002 | −0.108* | 0.095* | 0.116* | 0.171* | −0.041* | 0.112* | 1 | | |
| (11) Corruption | 34.921 | 15.069 | 0.120* | 0.011 | 0.081* | −0.152* | 0.0399* | 0.086* | −0.012* | −0.118* | 0.205* | 0.252* | 1 | |
| (12) Emerging | 0.257 | 0.438 | 0.081* | 0.009 | 0.030* | −0.191* | 0.048* | 0.099* | −0.012 | −0.130* | 0.216* | 0.193* | 0.918* | 1 |
| VIF | | | 2.39 | 2.38 | 2.38 | 2.42 | 2.24 | 2.47 | 2.44 | 2.48 | 2.28 | 2.37 | 1.46 | 1.46 |

Abbreviations: SD, standard deviation; Vif, variance inflation factor.
*$p < 0.01$.

## 4 | RESULTS

Table 1 presents the summary statistics and correlations among the variables. The correlation values among all variables are generally low to moderate, suggesting that there is a low risk of facing collinearity issues. The maximum value of variance of inflation (Vif) test is 2.48 well below the rule of thumb cut-off of 10, indicating that there are no multicollinearity problems (Neter et al., 1996).

Table 2 presents the estimation results for ordered probit for the whole sample and emerging and developed countries, respectively. The last column of Table 2 shows the results of the Chow test to test whether the independent variables display differential impacts on different sub-samples (i.e. emerging and developed countries), which allows us to test Hypothesis 3.

Models 1, 3 and 5 show that the coefficients of environmental practices have a negative and significant effect on the firm financial distress for whole sample ($\beta = -0.369$; $p < 0.01$) and both emerging ($\beta = -0.569$; $p < 0.01$) and developed ($\beta = -0.335$, $p < 0.01$) countries, indicating that firms with higher environmental practices (EP variable) are less prone to financial distress, which support H1. This finding aligns with a previous study (Gangi et al., 2019) indicating that companies more committed to environmental issues tend to experience lower levels of risk. Looking at the difference between both sub-samples, the coefficient environmental practices is larger for developed countries than for emerging countries. The Chow test result ($F = 4.49$, $p < 0.05$) confirms a significant difference between both sub-samples.

The sign of the regression coefficients in an ordered dependent variable model gives the direction of the effect of the explanatory variables in the latent dependent variable. Since the latent variable cannot be observed, the calculation of the average marginal effects (AMEs) (Janeiro et al., 2013) from explanatories on the probability of financial distress in determined zone (safe zone, undetermined zone and distress zone) is more elucidative. Therefore, for whole sample and both sub-samples (emerging and developed), we have calculated the AMEs on the probability of being in a determined zone. The AMEs

**TABLE 2** Ordered probit.

| | Whole sample | | Emerging countries | | Developed countries | | |
|---|---|---|---|---|---|---|---|
| | (1) Direct effect | (2) Indirect effect | (3) Direct effect | (4) Indirect effect | (5) Direct effect | (6) Indirect effect | Chow test $\chi^2$ H3 Emerging vs. Developed |
| H1. EP | −0.369*** (0.077) | −0.347*** (0.077) | −0.569*** (0.097) | −0.576*** (0.165) | −0.335*** (0.052) | −0.308** (0.089) | 4.49** |
| Crisis | 0.123*** (0.017) | 0.127*** (0.017) | 0.105** (0.045) | 0.104*** (0.038) | 0.131*** (0.026) | 0.135*** (0.020) | 0.25 |
| Board gender | −0.261* (0.140) | −0.263* (0.139) | −0.186 (0.195) | −0.187 (0.308) | −0.262*** (0.100) | −0.267* (0.160) | 0.12 |
| Board size | 0.020*** (0.006) | 0.020*** (0.006) | 0.017** (0.008) | 0.017 (0.013) | 0.022*** (0.004) | 0.022*** (0.008) | 0.27 |
| Capital intensity | −0.024** (0.009) | −0.024** (0.009) | −0.026** (0.012) | −0.027 (0.022) | −0.027** (0.005) | −0.027*** (0.010) | 0.00 |
| Firm age | −0.022 (0025) | −0.022 (0025) | −0.216*** (0052) | −0.217** (0094) | 0.004 (0015) | 0.004 (0026) | 16.72*** |
| Leverage | 1.113*** (0.071) | 1.116*** (0.071) | 1.811*** (0.134) | 1.810*** (0.172) | 0.998*** (0.045) | 1.003*** (0.073) | 32.72*** |
| Firm size | −0.027** (0.013) | −0.027** (0.013) | 0.018 (0.019) | 0.018 (0.034) | −0.037*** (0.008) | −0.038*** (0.014) | 6.80*** |
| Manufacturing | 1.513*** (0.047) | 1.513*** (0.047) | 1.900*** (0.063) | 1.900*** (0.097) | 1.415*** (0.031) | 1.416*** (0.056) | 47.32*** |
| Corruption | 0.004 (0.003) | 0.004 (0.003) | 0.006 (0.004) | 0.006 (0.008) | 0.004** (0.002) | 0.004 (0.003) | |
| Emerging | −0.022 (0.107) | −0.021 (0.107) | - | - | - | - | |
| Interaction effect | | | | | | | |
| H2. EP*Crisis | | −0.206*** (0.060) | | | 0.050 (0.131) | | −0.274*** (0.068) |
| No. observations | 12,181 | 12,181 | 3139 | 3139 | 9042 | 9042 | |
| Wald chi$^2$ | 1264.46*** | 1264.35*** | 447.78*** | 450.70*** | 823.96 | 823.96 | |

*Note*: Standard errors are in parentheses.
*Significant at 5%.
**Significant at 1%.
***Significant at 0.1%.

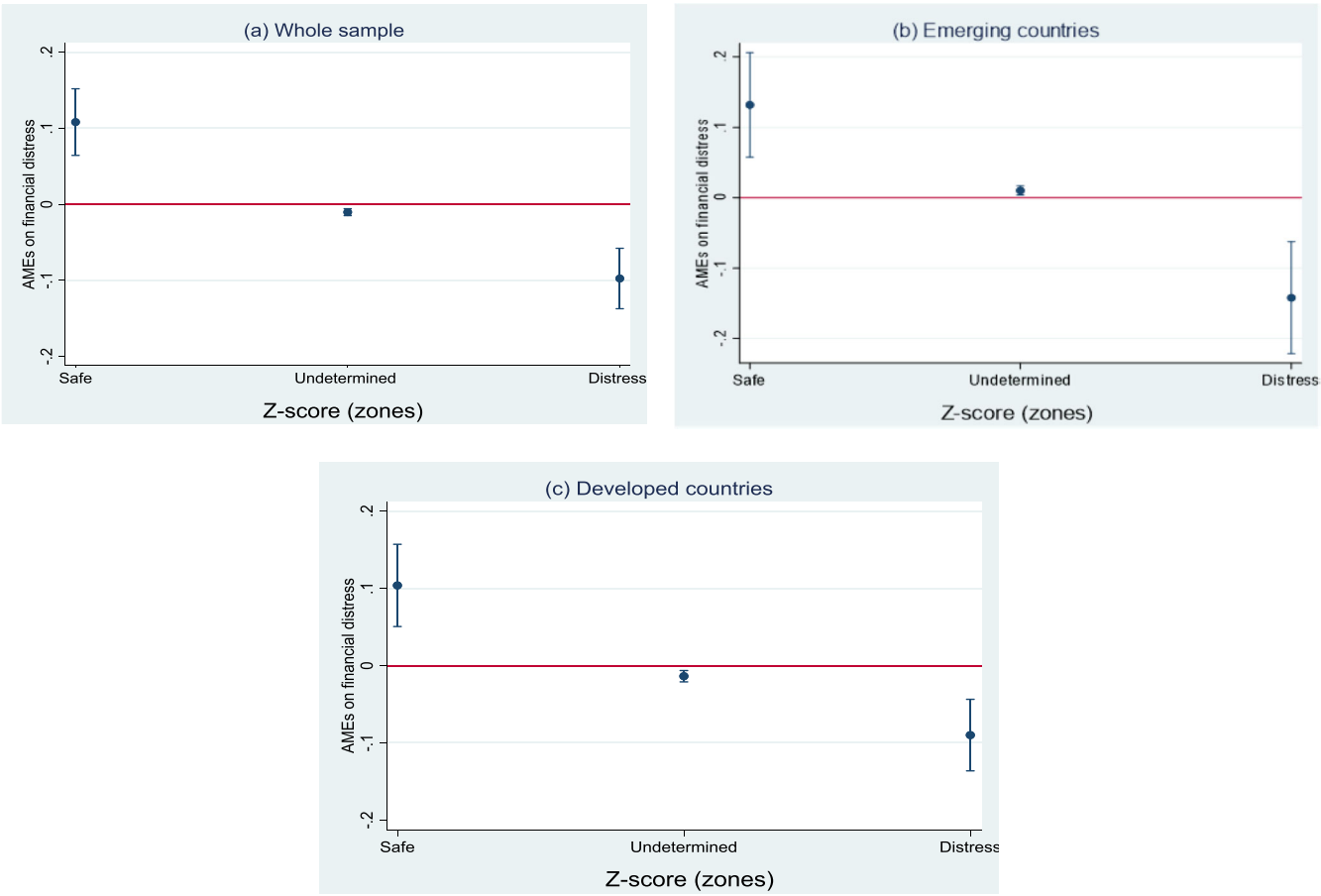


**FIGURE 1** Average of the marginal effects of EP on the probability of being in determined zone (safe, undetermined and distress).

are obtained to indicate the percentage change in the probability of financial distress in response to a 1% change in the covariates. The estimation of the AMEs of environmental practices (EP) and their confidence intervals of the three categories of *Z*-score discussed above are reported in Figure 1 for whole sample and emerging and developed countries. For whole sample, the results indicate that all else equal, a 1% increase in the EP of a firm, increases the probability of being in the 'safe zone' by 10.8 percentage points and decreases the probability of being in the 'undetermined zone' by 1.04 percentage points and in the 'distress zone' by 9.76 percentage points (Figure 1a).

For emerging countries, the probability of being in a 'safe zone' increases by 13.2% and the probability of being in a 'distress zone' decreases by 14.2% (Figure 1b). Likewise, for 'developed countries', when the environment practices increase a 1%, the probability of being in the safe zone increases by 10.4% and the probability of being in a distress zone decreases by 9% (Figure 1c).

As regards to the crisis variable, our results show that the crisis variable is positive and significant for the whole sample and both subsamples (developed vs. emerging countries), suggesting that the COVID-19 crisis increased the risk of business failure. The Chow test indicates that the impact of the crisis on firm distress is equal for emerging and developed countries. This interpretation of these results is confirmed by Figure 2 that shows the estimation of the AMEs of the crisis variable on firm's financial distress and their confidence intervals. As Figure 2 shows, a crisis increase of 1% decreases the probability of being in 'safe zone' by 3.6%, 2.4% and 4.06% in whole sample and emerging and developed countries, respectively. Nevertheless, when the crisis increases by 1%, the probability of being in 'distress zone' increases by 3.3%, 2.6% and 3.5% in whole sample and emerging and developed countries, respectively.

Regarding control variables, estimations obtained show that board gender diversity diminishes the probability of a firm's financial distress (Table 2). We find that the negative association between firm financial distress and the proportion of female directors on the board is significant and negative at the 1% level for whole sample and developed countries but is not statistically significant in emerging countries. These results are consistent with the study by Lee and Thong (2023) who found that greater participation of women on the board of directors lowers the risk of financial distress during the COVID-19 crisis and the proportion of female directors on board is more pronounced in countries with stronger regulation in shareholder rights as developed economy countries. In such countries, the involvement of female directors in the board decision making process contributes to the financial stability of the financial firms. However, we found a positive relationship between board size and the likelihood of financial distress. García and Herrero (2021) argued that large boards may be

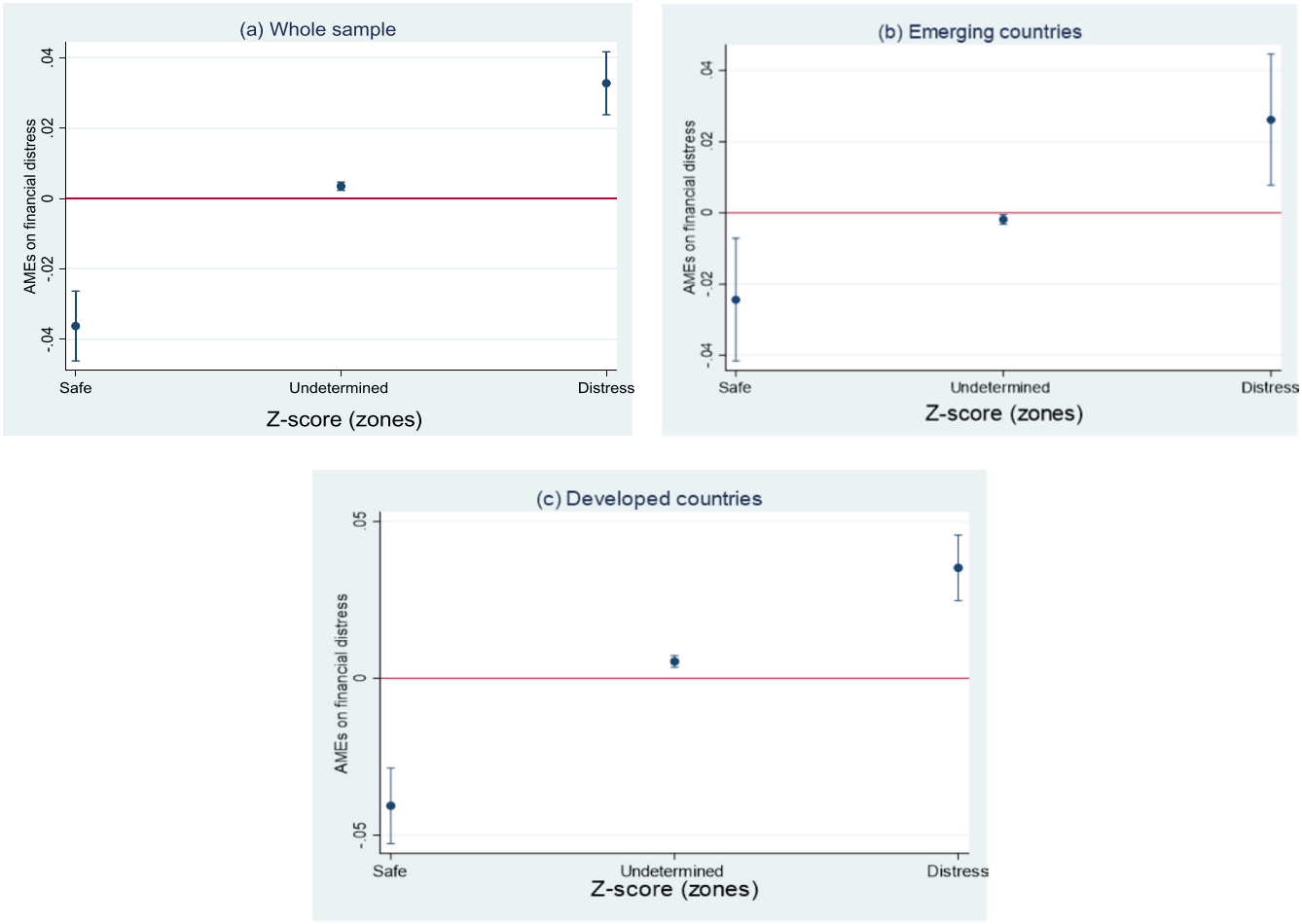


**FIGURE 2** Average of the marginal effects of crisis on the probability of being in determined zona.

characterized by lack of coordination and lack of consensus and poor monitoring and coordination when implementing the decisions required to overcome financial situations. As expected, the results show that the likelihood of financial distress decreases with capital intensity and increases with leverage.

As regards sector activity, results confirm that manufacturing industries are more exposed to high risk of distress than non-manufacturing sectors. During the last pandemic, manufacturing supply chains have been interrupted in industries such as auto and electronics. Likewise, market demand has revealed great deal of uncertainty and cannot be fulfilled because of the logistics setbacks. Moreover, many companies and more especially the small- and medium-sized enterprises are at higher risk of bankruptcy than ever (Cai & Luo, 2020). Finally, the level of corruption in the country is the main determinant of firm financial distress in developed countries. This finding supports ElBannan (2021), in that underdeveloped financial markets and high levels of corruption lead to financial distress.

To capture the effect of EP on financial distress over two crisis periods, Table 2 (Models 2) adds the interaction term between environmental practices and crisis to explain firm financial distress for whole sample. The results show that the interaction coefficient was negative and significant for whole sample ($\beta = -0.206$, $p < 0.01$). This negative interaction coefficient means that the total effect of EP and CRISIS (which is the of individual effects of EP $= -0.347$ plus the interaction effect plus the interaction effect of EP $\times$ CRISIS $= -0.548$) remained negative and increased in absolute value. This finding indicates that the implementation of environmental practices has a positive impact on a firm's survival during COVID-19 pandemic. To properly interpret our results, the AMEs are calculated for EP in the three determined zones (safe, undetermined and distress), contrasting the difference of AMEs between the crisis period (i.e. out of the crisis vs. during crisis). Figure 3 shows that EP increases the probability of firms being in a safe zone by 13.6% during crisis period and by 7.7% in the period out of crisis and decreases the probability of firms being in distress zone by 12.6% in crisis period and by 6.7% in the period out of crisis (Table 3). These results confirm H2 that environmental practices are more positively and significantly related to the survival of companies during crisis period. Indeed, the AME of EP is greater in magnitude during crisis period compared with the out crisis period; the difference was not statistically significant between the two crisis periods at the 95% level for safe zone ($chi^2 = 11.19$, $p < 0.001$) and distress zone ($chi^2 = 13.32$, $p < 0.001$); however, for undermined zone, the difference between both periods was significant ($chi^2 = 0.04$, *ns*).

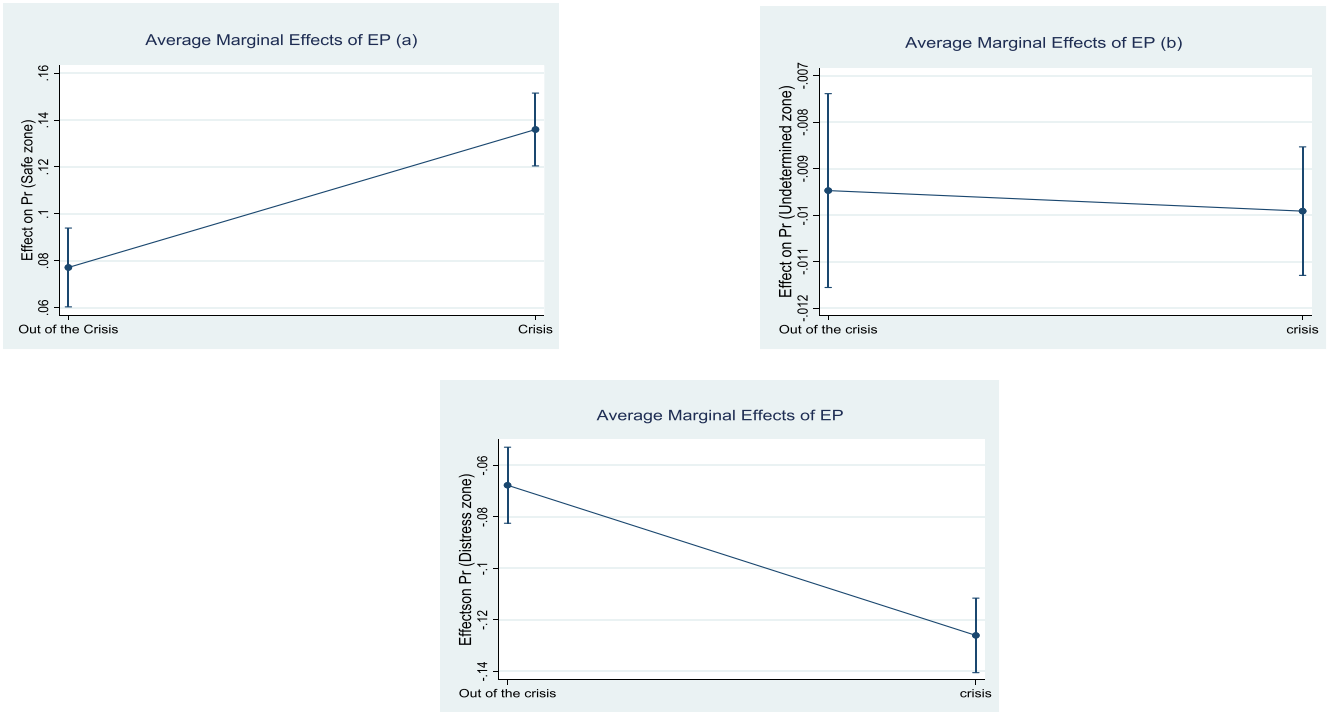


**FIGURE 3** Average marginal effect of EP on firm financial distress in (a) safe, (b) undetermined and (c) distressed zones at the two crisis periods for whole sample.

**TABLE 3** Average marginal effects of EP on firm's financial distress at two periods of crisis for whole sample.

| | AME of EP | *p*-value | *t*-test (*p*-value) |
|---|---|---|---|
| Safe zone | | | |
| Out of crisis | 0.077 | 0.002 | 0.001 |
| Crisis | 0.136 | 0.000 | |
| Undetermined zone | | | |
| Out of crisis | −0.010 | 0.000 | 0.843 |
| Crisis | −0.009 | 0.002 | |
| Distress zone | | | |
| Out of crisis | −0.067 | 0.002 | 0.003 |
| Crisis | −0.126 | 0.000 | |

**TABLE 4** Average marginal effects of EP on firm's financial distress at two periods of crisis for emerging countries.

| | AME of EP | *p*-value | *t*-test (*p*-value) |
|---|---|---|---|
| Safe zone | | | |
| Out of crisis | 0.139 | 0.001 | 0.632 |
| Crisis | 0.125 | 0.001 | |
| Undetermined zone | | | |
| Out of crisis | 0.008 | 0.025 | 0.285 |
| Crisis | 0.012 | 0.004 | |
| Distress zone | | | |
| Out of crisis | −0.147 | 0.001 | 0.744 |
| Crisis | −0.136 | 0.001 | |

Looking more closely at the difference between emerging and developed countries, our results confirm that the impact of EP on firm financial distress during the crisis differs depending on the institutional context in which the two markets operate (H3 is supported). Table 2 (Models 4 and 6) adds the multiplicative variable EP*CRISIS in emerging and developed countries, respectively. For emerging countries, the interaction effect between EP and crisis is not significant; the difference is seen as not significant between crisis and out of crisis periods as shown in Table 4. These results confirm that the effect of environmental policies remains the same out of and during crisis in mitigating business risk. Interestingly, for developed countries, the results showed that the interaction coefficient between EP and crisis was negative and significant (Model 6, $\beta = -0.274$, $p < 0.01$); this negative interaction coefficient means that the total effect of EP and crisis (which is the sum of individual effects of EP $= -0.308$ plus the interaction effect of EP $\times$ CRISIS $= -0.582$) remained negative and increased in absolute value. Figure 4 shows the probability of changes in EP vis-`a-vis the two-crisis period in the three *Z*-score zones. The results demonstrate that during the crisis period, EP raise twice the probability of being in a safe zone by 14.4% with respect to period out crisis (6.1%). Additionally, this positive effect of environmental practices in diminishing firm financial distress is found to be larger during the crisis period (12.9%) compared with the out crisis period (5.1%). The magnitude of difference between the two periods was

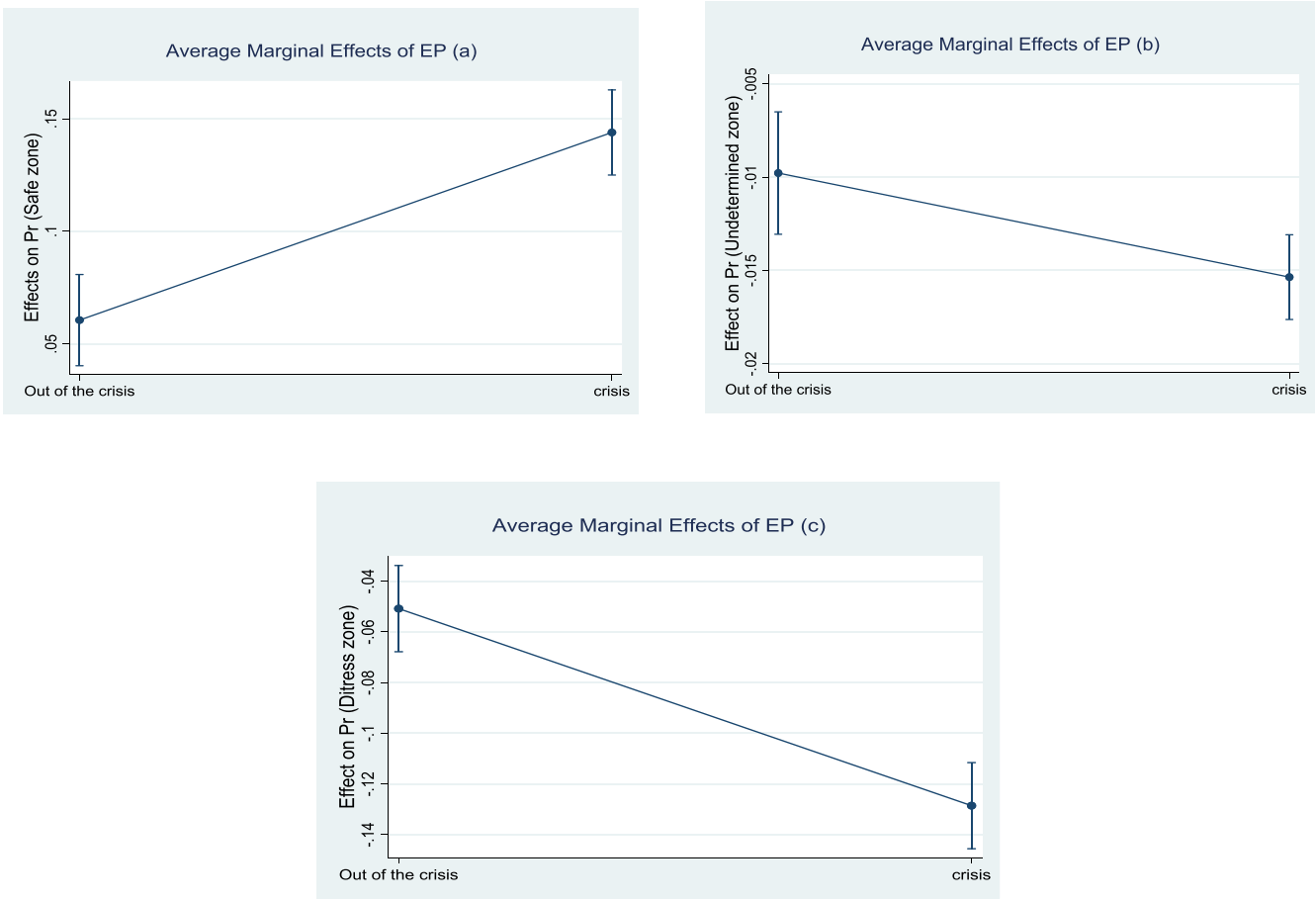


**FIGURE 4** Average marginal effect of EP on firm financial distress in (a) safe, (b) undetermined and (c) distressed zones at the two crisis periods for developed countries.

significant at the 95% level (Table 5) for safe and distress zones. However, the magnitude of difference between the two periods of time is significant for an undetermined zone. Taken all together, our results highlight that the effectiveness of environmental practices in mitigating firm financial distress during crisis period is mostly evident in the case of developed countries compared with emerging countries. These results support H3 that the country's level of development influences impact of environmental practices on financial distress during crisis time.

**TABLE 5** Average marginal effects of EP on firm's financial distress at two periods of crisis for developed countries.

| | AME of EP | *p*-value | *t*-test (*p*-value) |
|---|---|---|---|
| Safe zone | | | |
| Out of crisis | 0.061 | 0.044 | 0.001 |
| Crisis | 0.144 | 0.000 | |
| Undetermined zone | | | |
| Out of crisis | −0.010 | 0.044 | 0.100 |
| Crisis | −0.015 | 0.000 | |
| Distress zone | | | |
| Out of crisis | −0.051 | 0.044 | 0.000 |
| Crisis | −0.129 | 0.000 | |

## 4.1 | Robustness check

To examine the empirical validity of our results discussed above, several tests have been problems due to reverse causality; first, all independent and control variables are lagged by 1 year to mitigate the issue of multicollinearity. The results validate the positive relationship between EP and firm's survival. Second, we employed instrumental variables and two-stage least squares (IV-2SLS) technique 2SLS to mitigate possible endogeneity problem. An appropriate instrumental variable should meet some requirements; it should be closely related to our independent variables (environmental performance score) and uncorrelated with the dependent variable (*Z*-score). Following Liu et al. (2023), we employ the industry average of environmental performance as the instrumental variable for EP.

The next set of equations might serve as a representation of the framework:

$$x_i = \rho_0 + \rho_1 z_i + \nu_i \quad (4)$$

$$y_i = \varphi_0 + \varphi_1 \widehat{x}_i + \sigma_i \quad (5)$$

where $z$ represents the instrumental variable for our endogenous variables named $x$ (EP) and $y$ stands the dependent variable ($Z$-score). $\nu$ and σ denote the error terms of the models.

Moreover, the relevance of our instrument can be checked using a first-stage estimation of EP on the instrumental variable and all the other covariates used in the equations above. The results show that the instrumental variable and independent variable have a positive relationship with $F$-statistics far above (the standard threshold in the case of a single endogenous regressor) (Soytas et al., 2019), indicating that our instrumental variable is relevant.[2]

## 5 | DISCUSSION

In recent years, environmental practices have gained considerable attention from investors and policymakers. However, there is currently limited empirical evidence on whether companies deploy environmental practices to deal with disruption impacts in the COVID-19 context (Zhang & Fang, 2022) and how country institutional development plays in shaping the relationship between environmental practices and firm financial distress. Furthermore, empirical evidence on the environmental practices–financial distress relationship are mixed and inconclusive, which motivated our study to deepen our understanding of this relationship.

This paper examines the influence of environmentally sustainable practices on firms' financial distress amidst and beyond the COVID-19 pandemic crisis, particularly in emerging and developed countries. Through the analysis of 12,181 firm observations spanning from 2016 to 2021, our findings reveal that firms ranking high in environmental practices mitigate their risk of default and that this effect is contingent upon the country institutional development. Firstly, firms scoring highest on environmental practices exhibit less prone to financial distress. This finding aligns with existing literature, suggesting that the adoption of environmental practices serves as a mechanism to adapt to market contingencies, enhance firms' resilience during crises and ensure long-term survival (Amui et al., 2017; Harwood et al., 2011; Ortiz-de-Mandojana & Bansal, 2016).

Secondly, our findings highlight that the effectiveness of environmental practices in mitigating firm financial distress during crisis period is mostly evident in the case of developed countries compared with emerging countries. According to Lartey et al. (2021), environmental practices are greater in developed countries compared with emerging ones due to stringent environmental regulations (Lartey et al., 2021). Additionally, firms in emerging countries tend to reduce more their environmental investments during crisis time (Albitar et al., 2023). Faced with heightened competition, these firms prioritize resource allocation towards growth and image-building initiatives, reducing their inclination to invest in environmental projects due to lesser pressure from the public policies (Lartey et al., 2021). Furthermore, firms in emerging countries are likely to encounter more financing obstacles, thereby increasing financial constraints and risk of financial distress.

The disparity between environmental contexts (i.e. emerging and developed countries) can be attributed to the fact that companies in developed economies are subject to more rigorous environmental regulations and pressures to respond adequately to the expectations of the public and specific stakeholders than their peers from less developed countries. Firms in developed markets are accustomed to coping with stronger stakeholder scrutiny and the need to gain market legitimacy (Gómez-Bolaños et al., 2022), rendering them better equipped to navigate crises while maintaining a strong competitive position in national and international markets.

Conversely, firms in emerging countries have experienced increased financial constraints due to high levels of indebtedness pre-pandemic, leading to greater post-pandemic economic fragility and a heightened distress risk (Didier et al., 2021). Many of these companies still face significant challenges in implementing modern sustainable strategies (Lartey et al., 2021) where the development of environmental practices is not yet considered a core part of their strategy (Amankwah-Amoah & Syllias, 2020) potentially diminishing its effectiveness compared to developed countries.

In conclusion, our findings underscore that the effectiveness of environmental practices in mitigating firm financial distress during crisis period is mostly evident in developed countries compared with emerging countries.

## 6 | CONCLUSIONS

Our results suggest that firms can mitigate their risk exposure through effective environmental policies, such as product innovation and resource reduction practices. Better environmental practices are rewarded with lower risk of financial distress. This could encourage managers to invest in environmental policies as they come with less distress default, arising from lower fines, less stakeholder scrutiny and lower unbooked liabilities (Banerjee et al., 2020).

The onset of the COVID-19 pandemic crisis precipitated a notable re-evaluation of environmental policies among firms, as they contended with unprecedented economic turmoil. Throughout this period of economic adversity, both emerging and developed country corporations tended to curtail environmental investments, particularly those initiatives not deeply integrated into the core operational frameworks of the organization. However, our research suggests that firms should be encouraged to invest in environmentally sustainable practices even during crisis periods, for several compelling reasons. Firstly, such investments can help safeguard a company's image and position it favourably with key stakeholders. By incorporating sustainable messaging into their advertising, firms can enhance their legitimacy and differentiate their products or services by integrating environmentally sustainable characteristics. This not only presents opportunities for value creation but also helps mitigate the risk of financial distress

[2]Full results of the robustness checks are available on request.

(Gangi et al., 2020). Secondly, while the onset of the pandemic led to volatility and a temporary reduction in environmental policies by companies striving to survive, the long-term impact on environmental policies is expected to be positive. Environmental practices often require time to yield tangible benefits to financial performance. Therefore, firms' commitment to these practices should be consistent and not solely reactive to economic crises. Over the long term, the effectiveness of these practices becomes evident, preparing firms to respond to unforeseen crises and ensuring their survival during such periods. Indeed, these practices can serve as a distinguishing factor for the survival of companies and facilitate a swift recovery from the impacts of crises. Therefore, companies, in both developed and emerging countries, should incorporate environmental practices into their strategic planning, ensuring resilience and sustainability in the face of future challenges. Furthermore, engaging in environmental practices can help companies operating in emerging economies to achieve environmental legitimacy when deciding to operate abroad, as these countries face pressure from negative perceptions regarding their low environmental concerns.

Finally, this study has useful implications for policymakers and financial regulators with long-term investment horizons. Encouraging environmental practices remains crucial, even during economic crisis, as neglecting these practices can pose threats to both the economy and society at large. Government support is essential during such periods to assist companies in overcoming economic challenges. Policymakers should consider increasing incentives for companies that embrace environmental practices to facilitate economic recovery. Environmental policies could be an opportunity for emerging countries to access international markets and secure external financing during challenging times. Emerging countries urgently need to transition to sustainable practices, prompting institutions to allocate greater financial resources, such as large scale investments in R&D activities, to promote the adoption of green practices over the long term (Bakry et al., 2023).

Our paper has some limitations that can open fruitful avenues for future research. Firstly, we focus on an environmental performance score to reflect companies' efforts to reduce the impact on the environment through responsible use of resources, emission reductions and development of environmental innovation. Although this score is widely used in the literature (Albitar et al., 2023; Govindan et al., 2021), future research may also consider other variables that could be used as proxy of environmental practices, such as resource reduction, energy efficiency, waste reduction and ISO14000, among others, to capture the separate impact of each practice on firm's distress.

Secondly, this paper has examined the impact of environmental practices during crisis periods on the risk of financial distress, considering institutional development when differentiating between developed and emerging countries. However, it has not explicitly addressed the influence of institutional factors related to institutional quality, such as rule of low, judicial system efficiency and creditor's rights (De Jong et al., 2008; La Porta et al., 2000, among others) on this relationship. Thus, future studies could explore the moderating effect of institutional environment factors on the relationship between environment practices on financial distress.

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## CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare that is relevant to the content of this article.

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## APPENDIX A.

**TABLE A1** Emerging and developed countries.

| Emerging countries | Developed countries |
|---|---|
| Argentina | Austria |
| Azerbaijan | Belgium |
| Brazil | Canada |
| Chile | Cyprus |
| China | Denmark |
| Colombia | Finland |
| Hungary | France |
| India | Germany |
| Indonesia | Greece |
| Kazakhstan | Hong Kong |
| Malaysia | Iceland |
| Mexico | Ireland |
| Oman | Israel |
| Pakistan | Italy |
| Peru | Japan |
| Philippines | Luxembourg |
| Poland | Malta |
| Qatar | Netherlands |
| Romania | Norway |
| Russia | Portugal |
| Thailand | Singapore |
| Turkey | Slovenia |
| Ukraine | Spain |
| United Arab Emirates | Sweden |
| | Switzerland |
| | United Kingdom |
| | United States |
| **3139 observations** | **9042 observations** |

**TABLE A2** Description of variables.

| Variables | Type | Definitions |
|---|---|---|
| *Z*-score | Ordinal | Variable takes a value of 1, 2 or 3, which indicates the different zones of discrimination:<br>1: Safe zone (*Z*-score > 2.6)<br>2: Undetermined zone (1.1 < *Z*-score < 2.6)<br>3: Distress zone (*Z*-score < 1.1) |
| EP | Continuous | A score that reflects a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies |
| Crisis | Dichotomous | Variable takes the value of 1 for crisis years (2019 and 2020), and zero otherwise |
| Board gender diversity | Continuous | Proportion of female board members to board size |
| Board size | Continuous | Number of board members |
| Capital intensity | Continuous | Ratio of assets to the total number of employees |
| Firm age | Continuous | Number of years since the company was established |
| Leverage | Continuous | The ratio of the total debt to total assets |
| Firm size | Continuous | Number of employees (Ln) |
| Manufacturing | Dichotomous | Variable takes a value of 1 if the firm belongs to manufacturing sector and 0 if the firm belongs to non-manufacturing sector |
| Corruption | Continuous | Variable ranges between 0 and 100, where low values indicate high levels of public sector corruption, and high values denote low levels of public sector corruption. |
| Emerging | Dichotomous | Dummy variable used to identify whether the home country of a firm is an emerging economy. It takes a value of 1 for firm whose country of origin is classified as an emerging economy and 0 otherwise |