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ESG Resilience Amid Financial Distress: the Role of Board Gender Diversity in EU Firms

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Abstract:

Investors often view financial distress, defined as a company's inability to pay its debts on time, as a sign of declining creditworthiness. However, they also consider non-financial data, such as the environmental, social, and governance (ESG) activities of firms, when making decisions. This study investigates the impact of financial distress on ESG scores among European Union (EU) firms, using firm fixed effects (FE) and random effects (RE) models, along with Pooled Ordinary Least Squares (OLS), Common Correlated Effects Mean Group (CCEMG), and Augmented Mean Group (AMG) estimators. The panel data covers the years from 2013 to 2023. To examine the relationship between financial distress and ESG scores, the study employs the board gender diversity variable, which reflects the ratio of female to male representation on a firm's board of directors, as a moderating factor. The Altman Z-score is used as an indicator of financial distress. The findings indicate that firms experiencing higher financial distress tend to have higher ESG scores. However, a higher percentage of women on the board of directors during periods of financial distress appears to mitigate this relationship in ESG scores overall, as well as for individual components. To the best of the authors' knowledge, a high percentage of women on the managerial boards of firms during financial distress has a negative impact on ESG scores across the sampled EU firms. This research adds valuable insights into how financial distress and board gender diversity interact, contributing to the existing literature on the subject.

Keywords: ESG score, Gender Diversity, Financial Distress, EU firms.

JEL Code: G30, C58, G32

1. Introduction

Investors often take into account financial distress, which refers to a firm's inability to meet its debt obligations on time and its subsequent loss of creditworthiness. This inability to fulfill obligations prompts investors to also consider non-financial data, particularly the environmental, social, and governance (ESG) activities of firms. Environmental (E) activities encompass a firm's initiatives aimed at positively impacting the environment through compliance with existing regulations and awareness of future consequences. Social (S) activities pertain to the equitable treatment of stakeholders and the safeguarding of the social ecosystem within which the firm operates. Governance (G) involves the ethical practices and integrity of the firm, including principles such as transparency, fair dealing, and the effective functioning of the board of directors (Koh et al., 2016). These three components serve as critical indicators for investors assessing a business's long-term sustainability and social responsibilities. Generally, firms with high ESG scores are viewed as having a robust financial structure (Lisin et al., 2022; Adeneye et al., 2023). Furthermore, businesses that are attuned to environmental, social, and governance factors are more likely to make sustainable decisions.

Financial distress is when a company's cash flow falls short of covering its current liabilities (Wruck, 1990). This issue is crucial for both investors and businesses alike. In periods of financial distress, in addition to implementing cost-cutting measures and restructuring debt, improving a company's ESG performance can significantly strengthen its financial resilience (Wang et al., 2024). When exploring the relationship between financial distress and ESG scores in this study, the variable of board gender diversity-which reflects the male and female representation on a firm's board of directors-is used as a moderating factor. In this context, the board's structure and gender diversity data are pivotal in the dynamics between ESG performance and financial resilience. Greater representation of women on corporate boards fosters more ethical and inclusive long-term decision-making processes. Consequently, these strategic choices enhance the effectiveness of ESG practices and improve the overall quality of crisis management (Sandretto et al., 2025). In this context, member states of the European Union (EU) have been actively proposing and implementing policies to increase female representation on corporate boards as part of their corporate governance frameworks. Consequently, the impact of these policies on ESG performance has become a significant area of research. This study investigates the effects of financial distress experienced by enterprises operating within EU countries on their ESG performance while examining the moderating role of board

gender diversity in this dynamic. Specifically, it aims to analyze how financial distress faced by EU firms between 2013 and 2023 influences their ESG scores, employing a dynamic panel model methodology. The research utilizes data on board gender diversity (BGD) reflecting the representation of male and female members on boards of directors and the Altman Z-score to quantify financial distress. The significance of this study lies in its exploration of how financial distress influences ESG performance and how this relationship is mediated by board gender diversity, particularly from the perspective of enterprises within EU countries.

The subsequent sections will include a literature review and hypothesis development, identification of research gaps, methodology in the third section, findings in the fourth, policy implications, and conclusion in the final section.

2. Literature Review and Hypotheses Development

ESG score and Financial Distress

The relationship between ESG scores and financial distress can be explained by stakeholder theory, information asymmetry, and agency theory. According to the stakeholder theory, it is based on the assumption that businesses with ESG practices have stronger relationships with stakeholders. This leads to a decrease in their financial risks. Information asymmetry and agency theory, on the other hand, point out that the presence of Governance (G) practices, which is one of the ESG scores, will lead managers to be more transparent in making their decisions, which will increase the trust of investors and thus reduce financial distress. In this context, Citterio and King (2023) tried to reveal the predictive power of ESG score indicators for bank financial distress by examining 362 commercial banks headquartered in the US and EU-28-member countries for the period 2012–2019. The study concluded that ESG accurately predicts financial distress. Examining 1970 US businesses for the period 2016–2020, Habib (2023) found that businesses with a good cost leadership strategy have high ESG scores, and this reduces the likelihood of financial distress. Analysing 304 Saudi Arabian enterprises for the period 2014–2021, Almubarak et al. (2023) found that enterprises in financial distress are more inclined to ESG practices. Singh (2024) investigated whether the enterprises included in the ESG index experience less financial distress than the enterprises not included in the ESG index for the enterprises included in the Bombay Stock Exchange (BSE) 100 index of India. In the study, it was found that being included in the ESG index is important in terms of financial stability, and businesses that are not included in the ESG index are exposed to more financial distress. Song et al. (2024) analysed the vocabulary, topics, and sentiments in the ESG and social responsibility reports of 80 energy enterprises listed on the Chinese Shanghai and Shenzhen

stock exchanges. The study revealed that the text words, topics, and emotions derived from these reports are effective in predicting financial distress in energy companies. Suprabha et al. (2024) investigated 223 manufacturing enterprises in the Nifty 500 index for the period 2010–2019. In the study, the possibility that the adoption of ESG will reduce financial distress was determined. Liwa et al. (2024) investigated the relationship between ESG score and financial distress for non-financial enterprises traded on the Indonesian stock exchange for the period 2019–2021, taking into account sector sensitivity. The higher the Altman Z score of an enterprise, the lower the risk level of financial distress. In the study, a positive relationship was found between Altman Z score and financial distress. Binesh et al. (2025), who investigated the relationship between ESG score and financial distress in 1,572 enterprises, found that increasing ESG score leads to an increase in Z score (decrease in financial distress). Truong et al. (2025), who examined whether the ESG score of US enterprises reduces financial distress within the scope of the 2005–2020 period, found that a high ESG score reduces financial distress. Lohmann et al. (2025) examined US enterprises within the scope of the 2003–2022 period and found that there is a U-shaped relationship between financial distress and ESG scores. It was concluded that enterprises with high financial distress have high ESG scores. When empirical studies are analysed, it is generally observed that having an ESG score or having a high ESG score reduces the risk of financial distress. Thus, based on the above discussion, the study proposes the following hypotheses.

H1: Lower financial distress reduces ESG performance in the EU firms.

ESG score and Board Gender Diversity

The focus of business is on sustainable growth while maximising stakeholder wealth. Stakeholders focus on various environmental, social, and governance issues, such as a low-carbon economy, adaption of climate adaptation, and transparency in governance. This situation increases the interest and attention of investments on ESG factors (Bhatia et al., 2022). This leads to the view that female managers pay more attention to environmental, social, and governance practices. While gender diversity plays an important role in decision-makers having a different perspective, it is important for businesses to determine sustainable strategies. However, Husted et al. (2019) investigated the impact of board structure on ESG score in Latin America. Contrary to the results of European or American studies, a negative relationship was found between BGD and ESG score. In the study, this situation is explained by the fact that 53 of the 176 enterprises in the sample have at least one woman on the board of directors. Romano et al. (2020), who investigated non-financial enterprises in Mercato Telematico Azionario (MTA), analysed

128 enterprises in their study. In the study, it was concluded that BGD positively affects ESG performance. Bhatia et al. (2022) examined the relationship between board structures and ESG scores of 327 companies traded on the Indian stock exchange. The study found that board size and gender diversity in the board positively affect ESG performance. Alkhawaja et al. (2023) examined the relationship between gender diversity and ESG scores in 48 countries for the period 2005–2019. A positive relationship was found between gender diversity and ESG scores. This relationship is interpreted as stakeholder regimes and information environments become more effective in countries with weaker regimes, and the number of female managers increases. Khemakhem et al. (2023), who examined the relationship between gender diversity in the board of directors and main committees and ESG scores in enterprises operating in Canada, found a positive relationship between female representation in the board of directors and committees and ESG scores. The study concludes that women can better contribute to board decisions by taking part in committees. Wasiuzzaman and Subramaniam (2023) investigated 48 countries (developing and developed countries) for the period 2024–2016 in order to examine the impact of gender diversity in the board of directors on the ESG disclosure quality of energy enterprises. In the study, it was generally concluded that female directors positively affect the disclosure quality of ESG and its components (except governance). Odriozola et al. (2024) investigated the relationship between gender diversity in the board of directors (BGD) and ESG scores according to transactions in Spain, France, Germany, and the UK stock exchanges for the period 2022–2020. In the study where a positive relationship was found between social and corporate governance scores and BGD, the relationship between BGD and environmental score was found only for Spain, France, and Germany. Paolone et al. (2024) examined the relationship between BGD and ESG score in the European banking sector and found a positive relationship between the variables. They interpreted this situation as BGD will improve ESG performance in the banking sector. Al-Shaer et al. (2024) examined the relationship between female managers in leadership positions and ESG performance in the London Stock Exchange for the period 2011–2019. The study found that young female managers have a positive impact on ESG performance. It was also found that female managers with short tenure are more likely to improve ESG performance. Makhija et al. (2025) investigate the moderating effect of board gender diversity on an enterprise's ESG performance and Economic value added (EVA) in the context of the 2015–2020 period of 331 enterprises listed on the National Stock Exchange (NSE). The study finds that board gender diversity has a moderating effect in the chemical and financial services sectors, but not in the healthcare and consumer goods sectors. Thus, based on the above discussion, the study proposes the following hypotheses.

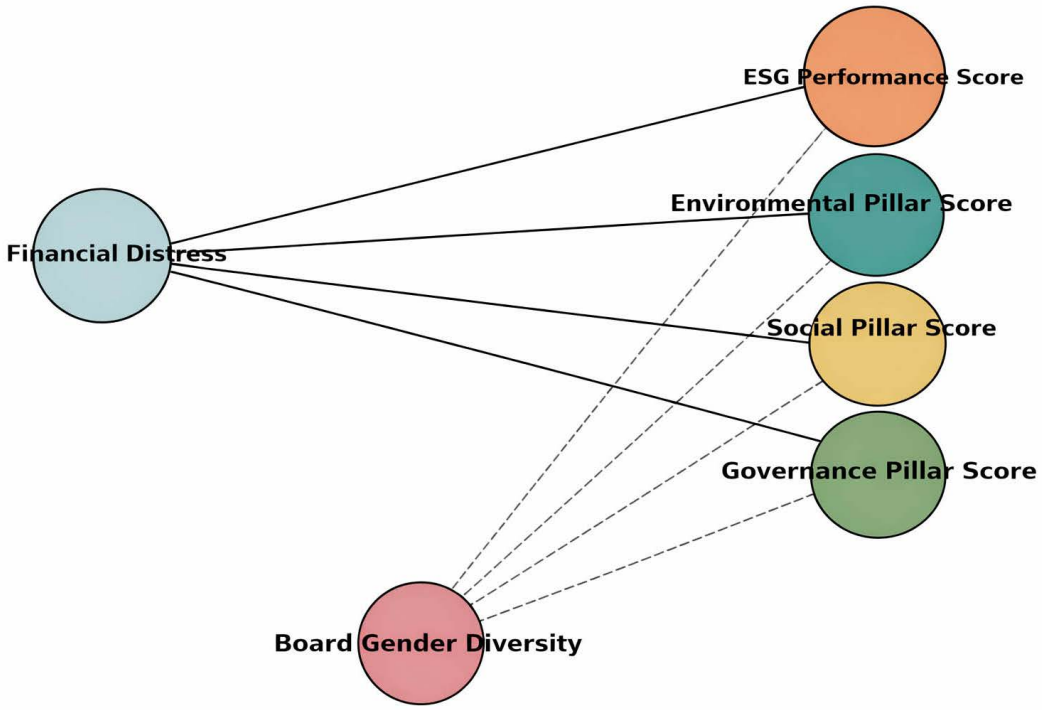
H2: BGD moderates the relationship between ESG and financial risk in EU firms.

ESG score and Control Variables (Tangibility, Liquidity, Market value, and Human Rights Score)

ESG performances provide insight to both policymakers and investors in revealing the interaction with the financial structures of enterprises, and taking into account the sustainable development goals. In this context, tangibility, which represents the intensity of tangible fixed assets, is included as a control variable in the model. The effect of this variable on ESG performance is important in the environmental dimension. According to the Resource-Based View proposed by Hart (1995), physical assets can provide a competitive advantage to businesses, but it is important that this advantage is sustainable and integrated with the environment. Russo and Fouts (1997), who found that businesses with high environmental performance achieved higher profitability levels, revealed that there is a positive relationship between the effective use of business resources and environmental sustainability. In contrast to this situation, Busch and Hoffmann (2007) concluded that the intensity of tangible fixed assets will increase energy consumption and carbon emissions, which in turn will increase environmental risks. However, Sumiati and Isnaini (2024) revealed that supporting tangible assets increases the ESG performance of enterprises and has positive effects. On the contrary, Lanzalonga et al. (2025) found no significant result between tangibility and ESG performance. There is no general conclusion in the literature between liquidity, which is expressed as the ability of an enterprise to fulfill its short-term obligations, and ESG performance. Meng-tao et al. (2023) found that the flexibility of enterprises with high liquidity to finance ESG-related investments positively affects ESG performance. Wang et al. (2023), Liu and Xie (2024) found similar results in their studies. In the literature, there are generally positive relationship between market value, which reflects investors' expectations about the future profitability and risk method of the enterprise, and ESG performance. This relationship is generally due to the increasing importance given by investors to sustainability practices and the expectation that businesses with high ESG performance will have lower risk and high added value in the long term (Eccles et al., 2014). Similarly, Ionescu et al. (2019) and Zhou et al. (2022) found that the stock returns of enterprises with high ESG performance are high. The human rights score, which is considered within the social dimension of ESG performance, expresses the commitment of enterprises to ethical values and social responsibility. The fact that businesses that are sensitive to human rights practices determine policies in this direction lead to results that will have a direct impact on the reputation of the business (Sullivan and Mackenzie, 2017). This situation will lead to an environment of trust for investors and trigger the idea of investment. Schwartz and Cragg (2017) and Edeigba (2023) found a positive relationship between the human rights score and ESG performance.

This study investigates the moderating role of BGD in management in the relationship between ESG scores and financial distress. In this context, the conceptual framework is presented in Figure 1.

Figure 1. Conceptual Framework: ESG Scores, Financial Distress, and Moderating Role of BGD



Source: Author's own work

2.1 Research Gap

Although studies investigating the relationship between ESG performance and financial distress have started to increase in the literature, there are still some gaps. Firstly, while studies generally focus on a single country and examine companies or sectors operating in that country, the fact that all companies in the EU countries for which data can be accessed are considered in this study clearly reveals the contribution of this study to the literature. Secondly, BGD is recognised as an important governance factor. However, in the reviewed literature, the relationship between ESG scores and BGD is generally analysed. However, this study is expected to contribute to the literature by revealing the moderating role of BGD between ESG scores and financial distress. Finally, the EU's mandatory compliance with ESG practices through initiatives such as the Sustainability Reporting Directive (CSRD) and the Green Deal, and the penalisation of businesses that do not have these practices, affect investors and cause financial distress

in businesses. Considering these situations, it is thought that revealing the general situation of enterprises in EU countries will contribute to the literature.

3. Methodology

3.1 Data

In the study, the data of 4690 firms that continue their commercial activities in the EU countries for the period 2013–2023 are analysed. All data, especially the ESG performance data used in the study, were obtained from Refinitiv Eikon Datastream. Refinitiv Eikon Datastream is the most trustworthy and comprehensive international database of financial and accounting data. The database was formerly known as Thomson Reuters Eikon. The sectoral distribution of the enterprises constituting the sample of the study is shown in Table 1, and the country-wise distribution is shown in Table 2.

Table 1: Sample distribution by industry

Industry	Total observations
Basic Materials	562
Consumer Cyclicals	775
Consumer Non-Cyclicals	344
Energy	216
Financials	142
Healthcare	410
Industrials	1007
Real Estate	269
Technology	702
Utilities	263
Total	**4690**

Source: Author's own work.

Table 2: Sample distribution by country

Industry	Total observations
Austria	200
Belgium	284
Cyprus	18
Finland	273
France	993
Germany	1098
Greece	96
Ireland	276
Italy	435
Lithuania	1
Luxembourg	134
Netherlands	386
Portugal	95
Spain	401
Total	**4690**

Source: Author's own work.

A total of 4690 EU firms operating in Basic Materials, Consumer Cyclicals, Consumer Non-Cyclicals, Energy, Financials, Healthcare, Industrials, Real Estate, Technology, and Utilities sectors constitute the sample of the study. The variables used in the study are shown in Table 3.

Table 3: Descriptions of variables

Dependent variables			
Variable	**Code**	**Measurement**	**Source**
ESG performance	ESG	Refinitiv's ESG Combined Score is an overall company score based on the reported information in the environmental, social, and corporate governance pillars (ESG Score) with an ESG Controversies overlay.	Refinitiv (Datastream)
Environmental Pillar Score	E	Refinitiv's Environment Pillar Score is the weighted average relative rating of a company based on the reported environmental information and the resulting three environmental category scores.	Refinitiv (Datastream)
Social Pillar Score	S	Refinitiv's Social Pillar Score is the weighted average relative rating of a company based on the reported social information and the resulting four social category scores.	Refinitiv (Datastream)
Governance Pillar Score	G	Refinitiv's Governance Pillar Score is the weighted average relative rating of a company based on the reported governance information and the resulting three governance category scores.	Refinitiv (Datastream)
Independent variable			
Variable	**Code**	**Measurement**	**Source**
Financial distress	FD	Altman Z score *	Refinitiv (Datastream)
Moderating variables			
Variable	Code	Measurement	Source
Board Gender Diversity	BGD	Percentage of female on the board.	Refinitiv (Datastream)
Control variables			
Variable	**Code**	**Measurement**	**Source**
Tangibility	Tang	The ratio of tangible assets to total assets	Refinitiv (Datastream)
Liquidity	Liq	Liquidity = (current assets – current liabilities) / total assets	Refinitiv (Datastream)
Market value	MV	{(market value of a firm + assets – equity) / assets}	Refinitiv (Datastream)
Human Rights Score	HR	Human rights category score measures a company's effectiveness towards respecting the fundamental human rights conventions.	Refinitiv (Datastream)

Notes: *The original Altman Z score is calculated using the following formula:

$$Z = 1.2\left(\frac{Working\ capital}{Total\ Assets}\right) + 1.4\left(\frac{Retained\ Earnings}{Total\ Assets}\right) + 3.3\left(\frac{EBIT}{Total\ Assets}\right)$$
$$+ 0.6\left(\frac{Market\ Value\ of\ Equity}{Total\ Liabilities}\right) + 1.0\left(\frac{Sales}{Total\ Assets}\right)$$

Firms with a Z-score greater than 2.99 are considered financially secure, firms between 1.81 and 2.99 are considered grey, and firms with a Z-score less than 1.81 are considered financially distressed.

The Altman Z-score, while widely adopted as a proxy for financial distress, has notable limitations. Its predictive power declines across industries, firm sizes, and institutional environments, as it was originally calibrated for manufacturing firms in stable market conditions. The model relies heavily on accounting-based ratios, which may be subject to managerial discretion, reporting heterogeneity, or timing distortions. Moreover, the Z-score does not incorporate contemporary drivers of firm risk such as ESG exposure, innovation intensity, or governance structures, potentially reducing its relevance in modern corporate settings.

Source: Author's own work.

3.2 Econometric Model

To assess the impact of financial distress on overall ESG scores and on each component of the ESG scores individually, as shown in Figure 1, we developed four models (Models 1 to 4) that incorporate both firm and year fixed effects. After conducting the fixed effects models, we also performed robustness checks using random effects, along with the Common Correlated Effects Mean Group (CCEMG) and Augmented Mean Group (AMG) approaches.

$$\mathrm{ESG} = \beta_{01} + \beta_{11}\mathrm{FD_{i,t}} + \beta_{21}FD \times BGD_{i,t} + \beta_{31}BGD_{i,t} + \beta_{41}Tang_{i,t} + \beta_{51}Liq_{i,t} + \beta_{61}MV_{i,t} + \beta_{71}HR_{i,t} + FixedEffects_{i,t} + \varepsilon_{11i,t} \quad \textbf{Model (1)}$$

$$\mathrm{E_{i,t}} = \beta_{02} + \beta_{12}\mathrm{FD_{i,t}} + \beta_{22}FD \times BGD_{i,t} + \beta_{32}BGD_{i,t} + \beta_{42}Tang_{i,t} + \beta_{52}Liq_{i,t} + \beta_{62}MV_{i,t} + \beta_{72}HR_{i,t} + FixedEffects_{i,t} + \varepsilon_{22i,t} \quad \textbf{Model (2)}$$

$$\mathrm{S_{i,t}} = \beta_{03} + \beta_{13}\mathrm{FD_{i,t}} + \beta_{23}FD \times BGD_{i,t} + \beta_{33}BGD_{i,t} + \beta_{43}Tang_{i,t} + \beta_{53}Liq_{i,t} + \beta_{63}MV_{i,t} + \beta_{73}HR_{i,t} + FixedEffects_{i,t} + \varepsilon_{33i,t} \quad \textbf{Model (3)}$$

$$\mathrm{G_{i,t}} = \beta_{04} + \beta_{14}\mathrm{FD_{i,t}} + \beta_{24}FD \times BGD_{i,t} + \beta_{34}BGD_{i,t} + \beta_{44}Tang_{i,t} + \beta_{54}Liq_{i,t} + \beta_{64}MV_{i,t} + \beta_{74}HR_{i,t} + FixedEffects_{i,t} + \varepsilon_{44i,t} \quad \textbf{Model (4)}$$

To begin with, we will present both Fixed Effects (FE) models and Random Effects (RE) models in our analysis. The application of a Fixed Effects model, even when integrating a reinforcement dummy variable (i.e., FD × BGD), produces efficient results as indicated by Giesselmann and Schmidt-Catran (2020). Our findings demonstrate that there is no dynamic relationship between the dependent variable and the independent variables; in other words, past experiences do not significantly influence the current ESG scores across the sampled firms. Therefore, the FE model is the more pertinent methodological choice (Imai and Kim, 2019). FE models mitigate selection bias by accounting for time-invariant confounding variables, thereby reducing variance in the independent variables (Mummolo and Peterson, 2018). Conversely, the assessment of RE

among the sampled firms presents challenges (Spinelli and Pandis, 2020; Wood, 2013; Berkey, 1995). Nonetheless, we shall conduct the Hausman test to ascertain the most appropriate estimator for our four models.

We investigated the relationship between ESG scores and financial distress, while also considering the role of BGD. Specifically, we examine how the percentage of women on the board interacts with financial distress. We control factors such as tangibility, liquidity, market value, and human rights scores when analysing the data. This approach allows us to understand how financial distress, when a high percentage of women are on the board, affects ESG scores across the sampled firms. We not only analyse overall ESG performance but also examine its individual components: the E score, S score, and G score, as separate dependent variables, to provide a more comprehensive overview of our findings. The following Table 4 shows the descriptive statistics of the variables used.

Table 4. Descriptive statistics

Variables	N	mean	sd	p50	min	max
ESG	4690	59.01	15.74	60.41	28.05	83.16
E	4690	60.41	22.20	64.05	15.32	92.33
S	4690	66.97	19.16	70.77	28.93	93.38
G	4690	54.38	21.04	55.90	17.25	86.85
FD	4690	2.62	1.83	2.14	0.62	7.78
BGD	4690	30.70	12.37	33.33	4.35	50.00
Tang	4690	0.61	0.20	0.62	0.00	1.00
Liq	4690	0.10	0.16	0.08	-0.56	0.94
MV	4690	1.72	1.38	1.30	0.39	28.81
HR	4690	60.59	30.84	68.75	0.00	95.15

Source: Author's own work.

Standard deviation across variables was quite high, so the variables winsored before the analysis (i.e. %5). There are 4690 observations for each variable in total, capturing years from 2013 to 2023, but with gaps, which makes the 680 panel unbalanced.Overall, the mean ESG score is around 59.01, where the mean value of individual segments of esg_win score varies from 60.41, 66.97, and 54.38, respectively. (i.e., E, S, G).

As part of our descriptive analysis, we examined the correlation matrix to identify any meaningful correlations between variable pairs. This examination will help us understand these relationships and guide our interpretation of the results. Additionally, the correlation matrix will indicate the direction of any existing relationships. As shown in Table 5, the ESG score and its components are positive and highly correlated. Since these variables are our dependent variables for the four models—while the independent and control variables remain consistent, this correlation enhances the robustness of our findings. Additionally, it is noteworthy that human rights scores are also positively and highly correlated with the ESG score, E score, G score, and particularly with the S score.

Table 5. Pairwise correlations

Variables	ESG	E	S	G	FD	BGD	Tang	Liq	MV	HR
ESG	1									
E	0.74***	1								
S	0.78***	0.67***	1							
G	0.60***	0.33***	0.36***	1						
FD	−0.13***	−0.21***	−0.11***	−0.12***	1					
BGD	0.27***	0.25***	0.24***	0.22***	−0.07***	1				
Tang	0.08***	0.10***	0.06***	0.07***	−0.33***	0.01	1			
Liq	−0.16***	−0.20***	−0.14***	−0.12***	0.53***	−0.09***	−0.63***	1		
MV	−0.09***	−0.16***	−0.08***	−0.08***	0.69***	−0.01	−0.22***	0.27***	1	
HR	0.62***	0.55***	0.78***	0.28***	−0.07***	0.23***	−0.02	−0.09***	−0.08***	1

Notre: *** p < 0.01, ** p < 0.05, * p < 0.1

Source: Author's own work. To assess collinearity, we apply the Variance Inflation Factor (VIF) test after running the regression model. A VIF score greater than 10 is concerning, as it suggests an R-squared value exceeding 0.90. However, as shown in the results Table 6 below, there is no indication of collinearity in any of our models (1) through (4).

Table 6. VIF Table

Variable	VIF	1/VIF
FD	2.51	0.399175
Liq	2.14	0.466344
MV	1.96	0.511329
Tang	1.69	0.592199
HR	1.08	0.928568
BGD	1.07	0.936776
Mean VIF	1.74	

Source: Author's own work.

4. Empirical Results

To begin, Ordinary Least Squares (OLS) regressions are conducted for Models 1 through 4 and the results are shown Table 7. Model 1 is an aggregated version that combines the dependent variables of Models 2 to 4, while the control variables remain consistent across all four models. In Model 1, the dependent variable is the ESG score, whereas Models 2, 3, and 4 focus on the dependent variables of the E score, S score, and G score, respectively. In examining Model 1, we find a significant negative impact of financial distress on ESG scores, which indicates that organizations with higher ESG scores are more likely to experience higher levels of financial distress. Control variables remain the same across four models where Model (1) have ESG score as dependent variables, and Model (2) to (4) have dependent variables of E score. S score and G score, respectively. When looking at Model (1), we observe a significant and negative impact of financial distress on ESG scores which confirms that higher ESG scores are more likely to experience higher level of financial distress. (Citterio and King, 2023, and Giese et al., 2019) The pattern repeats for models (2) through (4).

In terms of BGD, we find that a 1% increase in the percentage of women on the board is associated with an increase in ESG scores of approximately 11% to 18% across four models, at a 5% significance level. Regarding the interaction between financial distress and BGD specifically, the presence of women on the board during periods of financial distress we observe a significant effect, leading to a decrease in ESG scores of about 1% to 3%. According to the findings, there is a significant positive relationship between tangibility and ESG scores,

observed at a 5% significance level. This suggests that a 1-unit increase in tangibility results in an increase of approximately 6 to 6.5 units in ESG scores and their components. Regarding liquidity and market value, while we found an increasing impact on ESG scores and their components, this impact was not statistically significant in nearly all models. Additionally, concerning human rights scores, as highlighted in the literature for their relevance to ESG scores, we discovered a highly significant and positive effect on ESG scores, suggesting a 1 unit increase in tangibility results in around 6 to 6.5 unit increase in ESG scores and its components individually.

Table 7. Ordinary Least Square Results for Model (1)-(4)

Variables	Model (1)	Model (2)	Model (3)	Model (4)
	OLS1	OLS2	OLS3	OLS4
FD	−0.816*** (0.261)	−1.366*** (0.313)	−0.793*** (0.224)	−0.866** (0.392)
FD × BGD	0.0151** (0.00686)	0.0295*** (0.00809)	0.0132** (0.00582)	−0.00220 (0.0102)
BGD	0.139*** (0.0239)	0.181*** (0.0282)	0.105*** (0.0203)	0.360*** (0.0355)
Tang	6.011*** (1.803)	6.482*** (2.398)	6.299*** (1.680)	5.229* (2.861)
Liq	1.813 (2.020)	3.019 (2.522)	4.129** (1.793)	4.112 (3.102)
MV	0.309 (0.197)	0.192 (0.240)	0.628*** (0.171)	0.180 (0.298)
HR	0.258*** (0.00600)	0.214*** (0.00709)	0.394*** (0.00510)	0.136*** (0.00894)
Constant	34.24*** (1.563)	35.69*** (2.033)	33.95*** (1.428)	31.62*** (2.444)
Observations	4,690	4,690	4,690	4,690
Number of panelno	680	680	680	680

Standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

Source: Author's own work.

Table 8. Fixed Effect and Random Effect Results

Variables	(FE)	(RE)	(FE)	(RE)	(FE)	(RE)	(FE)	(RE)
	Model 1		Model 2		Model 3		Model 4	
FD	−.484*	−.680***	−.700**	−1.11***	−.569**	−.719***	−.62	−.524
	(.291)	(.26)	(.318)	(.309)	(.234)	(.221)	(.421)	(.388)
FD × BGD	.02***	.017**	.034***	.031***	.02***	.017***	.007	.002
	(.007)	(.007)	(.008)	(.008)	(.006)	(.006)	(.011)	(.01)
BGD	.044	.1***	.018	.079***	−.036	.002	.219***	.256***
	(.028)	(.026)	(.031)	(.03)	(.023)	(.022)	(.041)	(.038)
Tang	7.08***	5.718***	7.957***	7.614***	7.099***	5.387***	3.234	4.615
	(2.649)	(1.789)	(2.9)	(2.38)	(2.128)	(1.668)	(3.833)	(2.836)
Liq	4.677*	.299	7.483***	1.985	4.934**	2.375	3.218	.578
	(2.481)	(2.016)	(2.716)	(2.5)	(1.993)	(1.777)	(3.589)	(3.077)
MV	.194	.076	.287	−.012	.407**	.353**	−.298	−.29
	(.234)	(.2)	(.256)	(.243)	(.188)	(.173)	(.339)	(.302)
HR	.22***	.25***	.151***	.19***	.344***	.37***	.082***	.104***
	(.007)	(.006)	(.008)	(.008)	(.006)	(.005)	(.01)	(.01)
_cons	35.5***	34.39***	39.56***	36.7***	35.84***	34.43***	39.26***	35.08***
	(2.053)	(1.593)	(2.247)	(2.048)	(1.649)	(1.441)	(2.97)	(2.47)
Obs	4690	4690	4690	4690	4690	4690	4690	4690
R^2	.366	.z	.31	.z	.65	.z	.187	.z
Adj R^2	.255	.z	.19	.z	.589	.z	.045	.z
Hausman	6.78 (0.4696)		592.47(0.000)		256.13(0.000)		262.25 (0.000)	

Standard errors are in parentheses *** p < .01, ** p < .05, * p < .1

Source: Author's own work.

Due to the presence of 680 unbalanced panels with a total of 4,960 observations, conducting a unit root test or a cointegration test was not feasible. Recognizing the potential diagnostic issues related to stationarity and cointegration, as well as cross-dependency tests, we employed multiple methodologies to address these concerns. We first run both FE and RE models with industry and year fixed effects for Models 1 to 4. The results are shown in Table 8. The results

indicate that an increase in financial development appears to decrease the ESG score to a 5% significance level. Additionally, as BGD increases, the ESG score tends to rise, suggesting that a higher representation of females on corporate boards may enhance the productivity of firms. To further investigate potential reinforcement effects between financial development and BGD, we included a reinforcement dummy variable as a control. The results confirm that this variable significantly impacts the ESG scores of firms. Firms experiencing lower financial distress that have a higher percentage of women on their boards tend to show improved ESG scores. Conversely, financial distress itself impacts these scores. This suggests that having women on the board may alleviate financial security, thereby enhancing both overall ESG scores and their individual components.

Robustness Checks

The results confirm the existing literature and theories. However, due to certain limitations, we carefully considered the need for diagnostic tests to conduct comprehensive robustness checks. Firstly, we employed second-generation panel ARDL methods, specifically Common Correlated Effects Mean Group (CCEMG, short-run) and Augmented Mean Group (AMG, long-run). The results are shown in Table 9. These second-generation ARDL estimators address potential cross-dependency issues. Additionally, we applied Pooled OLS (POLS) to assess the robustness of our results. The results are shown in Table 10.

To begin with, the short-run outcome of the CCEMG, we do not observe any significant impact of financial distress on ESG scores or their individual components, nor does the high percentage of females on boards during financial distress have any impact on the ESG scores. When looking at the board gender diversity effect, having diverse genders on the board itself is found to increase the ESG scores at 5% significance level. When thinking about the short-run outcomes, not finding a significant relationship between the ESG scores or independent / control variables makes sense, as building the ESG scores requires a certain time period to play out. Another finding that can be highlighted is the human right score in which is significant at 5% level and has an increasing impact on the ESG scores of the firms sampled in the short run. Human rights scores are such an important motivation for firms in order to keep the stability of the production as transparent as possible, even in the short run. When it comes to the long-run AMG results, we observe the significant impact of gender diversity on the board that increases the ESG scores, so having diversity on the board promotes the firm's ESG scores in the long run for model (1) and (4), non-significant for Model (2) and (3). The results generally portray similar outcomes in terms of magnitude and the sign compared to OLS, FE, and RE estimators, which confirms the robustness of the outcomes.

Table 9. CCEMG and AMG Results as Robustness Checks

Variables	Model (1)		Model (2)		Model (3)		Model (4)	
	CCEMG	AMG	CCEMG	AMG	CCEMG	AMG	CCEMG	AMG
D.FD		0.563 (0.761)		0.416 (0.501)		−0.0976 (0.386)		0.505 (0.893)
D.FD × BGD		−0.0114 (0.0181)		−0.00801 (0.0119)		0.00797 (0.00920)		−0.00726 (0.0213)
D.BGD		0.136** (0.0542)		0.0453 (0.0357)		−0.0107 (0.0275)		0.268*** (0.0636)
D.Tang		−0.785 (4.496)		1.499 (2.959)		5.433** (2.281)		−0.699 (5.272)
D.Liq		1.327 (4.102)		2.687 (2.699)		5.241** (2.081)		0.373 (4.810)
D.MV		0.278 (0.720)		0.0888 (0.474)		0.513 (0.365)		−0.406 (0.844)
D.HR		0.150*** (0.0141)		0.0304*** (0.00926)		0.334*** (0.00714)		0.0304* (0.0165)
FD	7.764 (5.842)		−1.145 (2.878)		2.121 (3.743)		2.797 (5.222)	
FD × BGD	−0.236 (0.269)		−0.0805 (0.128)		−0.0569 (0.175)		0.139 (0.317)	
BGD	0.793 (0.572)		0.574 (0.382)		0.368 (0.352)		−0.342 (0.719)	
Tang	−1.040 (5.233)		5.339 (3.272)		−4.224 (2.578)		14.23** (6.816)	
Liq	−4.444 (3.597)		−2.376 (2.147)		−1.005 (2.111)		4.871 (5.919)	
MV	−1.936 (5.424)		2.865 (2.823)		−3.288 (2.526)		−20.48*** (7.277)	
HR	0.0101 (0.228)		0.301** (0.142)		0.268** (0.108)		−0.355 (0.289)	
Constant	−14.75 (40.87)		6.310 (25.15)		−16.41 (20.22)		8.957 (49.55)	
Obs	2,706	2,170	2,706	2,170	2,706	2,170	2,706	2,170
R^2		0.090		0.062		0.557		0.056
Panel no	263		263		263		263	

Source: Author's own work.

As another robustness check, we performed Pooled OLS in case there are no unobserved firm-specific or year-specific effects, as we initially assumed that there is. When running the Pooled OLS, the results resemble the OLS outcomes. Lower Financial distress is, again, reducing the ESG scores and E score and S scores at 5% significance level. Having a high diversity on the board found to increase the ESG scores at 5% significance level for model (1) and (4), while having females on the board during financial distress does not necessarily have a significant impact on ESG scores, although it is all positive. Both tangibility and human right scores found to increase the ESG scores at 5% significance level, just as we found in our OLS, FE, and RE models, all confirming the robustness of our findings.

Table 10. Poled OLS Model 1-4 as Robustness Checks

Variables	Model (1)	Model (2)	Model (3)	Model (4)
	POLS1	POLS2	POLS3	POLS4
FD	−0.680** (0.268)	−2.367*** (0.456)	−0.886** (0.293)	0.132 (0.461)
FD × BGD	0.00852 (0.00902)	0.0356* (0.0163)	0.0116 (0.0124)	−0.0284** (0.00997)
BGD	0.142** (0.0464)	0.124 (0.0892)	0.0468 (0.0529)	0.351*** (0.0565)
Tang	4.274** (1.592)	3.624* (1.963)	5.396*** (0.818)	3.955* (1.955)
Liq	−3.969** (1.747)	−7.966** (2.862)	−1.059 (2.694)	−4.066* (2.128)
MV	0.128 (0.196)	−0.470 (0.362)	0.421*** (0.125)	0.0601 (0.338)
HR	0.297*** (0.0115)	0.362*** (0.0236)	0.477*** (0.00903)	0.161*** (0.0192)
Constant	35.35*** (3.440)	37.49*** (6.941)	34.13*** (2.811)	33.67*** (3.526)
Obs	4,690	4,690	4,690	4,690
R^2	0.413	0.352	0.621	0.116
Number of groups	680	680	680	680

Standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

Source: Author's own work.

5. Discussion

The existing literature demonstrates that financial distress has a significant and detrimental impact on ESG scores, including their individual components. Firms experiencing financial distress or instability often prioritise the preservation of capital inflows and outflows by minimising costs and avoiding risks at any possible expense. This study empirically investigates this relationship by utilising a panel of 680 European firms from 2013 to 2023, with firm and year fixed effects accounted for. Our findings reaffirm the conclusions of previous research while presenting a more extensive data set. More critically, our study examines how results may differ in the presence of a high percentage of gender diversity on corporate boards, specifically assessing the reinforcing effect of female representation during financial distress on ESG scores. Overall, the research identifies a positive and significant impact of women on corporate boards. However, this study is not without limitations regarding the methodologies employed. The unbalanced panel of data, consisting of 680 firms over a span of 21 years, contained missing observations that constrained our ability to perform essential diagnostic tests, such as unit root tests and cross-dependency tests, as well as utilizing certain relevant methodologies, including FMOLS, DOL, PMG, and short-run AMG estimators. In addition to data-related constraints, an important limitation arises from the use of the Altman Z-score as the sole measure of financial distress. The original Z-score model was designed for manufacturing firms in a single-country context; therefore, its application across heterogeneous industries and multiple EU countries may reduce its predictive accuracy. Differences in accounting standards, capital structures, and sectoral business models can lead to inconsistent interpretations of Z-score thresholds, potentially attenuating the precision of distress estimates in a cross-industry, multi-country sample. Future research that incorporates more robust data sets will facilitate the application of more comprehensive methodologies. Additionally, subsequent studies should explore firms from diverse continents, including Asia, the Middle East, and America, for comparative analysis. The dynamics of the relationship between financial distress and ESG scores are likely to vary significantly across different regions, particularly where governance norms, gender equality, and disclosure environments differ, as gender remains a contentious issue in several communities.

6. Conclusion and managerial implications

This study examines the impact of financial distress faced by firms in the EU on their ESG scores, utilizing the dynamic panel model method from 2013 to 2023. In exploring the relationship between financial distress and ESG scores, the study incorporates board gender diversity, as indicated by the ratio of male to female representation on a firm's board of directors, as a moderating variable. Financial distress is assessed using the Altman Z-score as an indicator.

This study examines the impact of financial distress faced by firms in the EU on their ESG scores, utilizing the dynamic panel model method from 2013 to 2023. In exploring the relationship between financial distress and ESG scores, the study incorporates BGD, as indicated by the ratio of male to female representation on a firm's board of directors, as a moderating variable. Financial distress is assessed using the Altman Z-score as an indicator. The varying perspectives of men and women can bolster a company's resilience in the face of financial distress, thereby enhancing the management of ESG practices. Our study supports the proposed hypothesis and aligns with existing literature regarding the relationship between ESG scores and BGD. Moreover, our findings suggest that having women on corporate boards plays a significant role in alleviating stress during financial downturns, optimizing the decision-making process for managing financial risks, and improving the ESG scores of the firms analyzed. In light of these findings, corporate boards should prioritize recruiting more female members or strive for a more balanced representation of gender diversity within their governance structures to enhance decision-making effectiveness.

The study offers valuable insights for both business leaders and policymakers. Business managers should closely monitor not only financial indicators but also their enterprises' sustainability performance. This is essential, as a decline in ESG performance during financial distress can negatively affect businesses. Such deterioration may harm a company's reputation and erode stakeholder trust, making it imperative for organizations to consider these factors. Furthermore, having a greater representation of women on boards of directors can mitigate the adverse effects of financial challenges on ESG performance. This highlights the critical role of gender diversity in corporate governance, positioning it as a strategic necessity for organizations aiming to build more inclusive structures. The diverse perspectives women bring to decision-making processes can lead to formulating more balanced and sustainable responses, particularly during periods of uncertainty and crisis. Moreover, the evidence presented in this study offers actionable guidance for EU policymakers designing sustainability and governance frameworks. The finding that gender diversity impacts on ESG outcomes under financial pressure supports the rationale behind EU-wide gender quota initiatives and reinforces the importance of embedding gender-balanced governance into future regulatory directives. Likewise, the association between financial distress and ESG performance highlights the need for targeted policy instruments such as ESG-linked financial incentives or resilience-support mechanisms to ensure that firms do not deprioritize sustainability during downturns. Therefore, organizations should develop their managerial strategies with an eye toward economic objectives and consider ESG score and the composition of their boards. Enhancing gender diversity at the board level and integrating ESG practices into corporate strategies are vital for strengthening firms' resilience in times of crisis. Corporate boards, particularly in the EU, can use these insights to reinforce

sustainable governance structures, while policymakers can align regulatory expectations with evidence-based practices that link board composition, financial stability, and ESG performance. Future researchers in this field might explore varying country contexts or contribute to the literature through sectoral comparisons.

References

Adeneye, Y. B., Kammoun, I., Ab Wahab, S. N. A. (2023). Capital structure and speed of adjustment: the impact of environmental, social and governance (ESG) performance. *Sustainability Accounting, Management and Policy Journal*, *14*(5), 945-977. https://doi.org/10.1108/SAMPJ-01-2022-0060

Alkhawaja, A., Hu, F., Johl, S., Nadarajah, S. (2023). Board gender diversity, quotas, and ESG disclosure: Global evidence. *International Review of Financial Analysis*, *90*, 102823. https://doi.org/10.1016/j.irfa.2023.102823

Almubarak, W. I., Chebbi, K., Ammer, M. A. (2023). Unveiling the connection among ESG, earnings management, and financial distress: Insights from an emerging market. *Sustainability*, *15*(16), 12348. https://doi.org/10.3390/su151612348

Al-Shaer, H., Zaman, M., Albitar, K. (2024). CEO gender, critical mass of board gender diversity and ESG performance: UK evidence. *Journal of Accounting Literature*. https://doi.org/10.1108/JAL-10-2023-0181

Antunes, J., Wanke, P., Fonseca, T. and Tan, Y., 2023. Do ESG risk scores influence financial distress? Evidence from a dynamic NDEA approach. *Sustainability*, *15*(9), p.7560. https://doi.org/10.3390/su15097560

Berkey, C.S., Hoaglin, D.C., Mosteller, F. and Colditz, G.A., 1995. A random-effects regression model for meta-analysis. *Statistics in medicine*, *14*(4), pp.395-411. https://doi.org/10.1002/sim.4780140406

Bhatia, S., Marwaha, D. (2022). The influence of board factors and gender diversity on the ESG disclosure score: a study on Indian companies. *Global Business Review*, *23*(6), 1544-1557. https://doi.org/10.1177/09721509221132067

Binesh, F., E-Vahdati, S., Ozdemir, O. (2025). ESG performance and financial distress during COVID-19: the moderating effects of innovation and capital intensity. *Asia-Pacific Journal of Business Administration*, *17*(1), 212-238. https://doi.org/10.1108/APJBA-12-2022-0515

Busch, T., Hoffmann, V. H. (2007). Emerging carbon constraints for corporate risk management. *Ecological Economics*, *62*(3-4), 518-528. https://doi.org/10.1016/j.ecolecon.2006.05.022

Citterio, A., King, T. (2023). The role of Environmental, Social, and Governance (ESG) in predicting bank financial distress. *Finance Research Letters*, *51*, 103411. https://doi.org/10.1016/j.frl.2022.103411

Eccles, R. G., Ioannou, I., Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management science*, *60*(11), 2835-2857. https://doi.org/10.1287/mnsc.2014.1984

Edeigba, J. (2023). Firms human rights practices and resource use: Impacts on firms ESG and financial performance. *Available at SSRN 4456512*. http://dx.doi.org/10.2139/ssrn.4456512

Giese, G., Lee, L.E., Melas, D., Nagy, Z. and Nishikawa, L., (2019). Foundations of ESG investing: How ESG affects equity valuation, risk, and performance. *Journal of portfolio management*, *45*(5), pp.69-83. DOI:10.3905/jpm.2019.45.5.069

Giesselmann, M. and Schmidt-Catran, A.W., 2022. Interactions in fixed effects regression models. *Sociological Methods & Research*, *51*(3), pp.1100-1127. https://doi.org/10.1177/0049124120914934

Habib, A. M. (2023). Do business strategies and environmental, social, and governance (ESG) performance mitigate the likelihood of financial distress? A multiple mediation model. *Heliyon*, *9*(7). https://doi.org/10.1016/j.heliyon.2023.e17847

Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review, 20*(4), 986–1014. https://doi.org/10.5465/amr.1995.9512280033

Husted, B. W., de Sousa-Filho, J. M. (2019). Board structure and environmental, social, and governance disclosure in Latin America. *Journal of Business Research*, *102*, 220-227. https://doi.org/10.1016/j.jbusres.2018.01.017

Imai, K. and Kim, I.S., 2019. When should we use unit fixed effects regression models for causal inference with longitudinal data?. *American Journal of Political Science*, *63*(2), pp.467-490. https://doi.org/10.1111/ajps.12417

Ionescu, G. H., Firoiu, D., Pirvu, R., Vilag, R. D. (2019). The impact of ESG factors on market value of companies from travel and tourism industry. *Technological and Economic Development of Economy*, *25*(5), 820-849. https://doi.org/10.3846/tede.2019.10294

Khemakhem, H., Arroyo, P., Montecinos, J. (2023). Gender diversity on board committees and ESG disclosure: evidence from Canada. *Journal of Management and Governance*, *27*(4), 1397-1422. https://doi.org/10.1007/s10997-022-09658-1

Lanzalonga, F., Oppioli, M., Calandra, D., Secinaro, S. (2025). The impact of ESG performance on intangible assets and intellectual capital in the food and beverage industry. *Management Decision*, *63*(2), 423-442.

Limkriangkrai, M., Koh, S., Durand, R. B. (2017). Environmental, social, and governance (ESG) profiles, stock returns, and financial policy: Australian evidence. *International Review of Finance*, *17*(3), 461-471.

Lisin, A., Kushnir, A., Koryakov, A. G., Fomenko, N., Shchukina, T. (2022). Financial stability in companies with high ESG scores: Evidence from North America using the Ohlson O-Score. *Sustainability*, *14*(1), 479. https://doi.org/10.3390/su14010479

Liu, J., Xie, J. (2024). The effect of ESG performance on bank liquidity risk. *Sustainability*, *16*(12), 4927. https://doi.org/10.3390/su16124927

Liwa, K. H., Daromes, F. E., Asri, M. (2024). The Effect of ESG disclosure on risk of financial distress: Role of industry sensitivity. *AJAR*, *7*(02), 208-235. https://doi.org/10.35129/ajar.v7i02.522

Lohmann, C., Möllenhoff, S., Lehner, S. (2025). On the Relationship between financial distress and ESG scores. *Available at SSRN 4751503*. http://dx.doi.org/10.2139/ssrn.4751503

Makhija, H., Raghukumari, P. S., Sethiya, A. (2025). Does board gender diversity moderate the impact of ESG on firms' economic value added? Evidence from an emerging economy. *International Journal of Productivity and Performance Management*, *74*(3), 819-840. https://doi.org/10.1108/IJPPM-12-2023-0664

Meng-tao, C., Da-peng, Y., Wei-qi, Z., Qi-jun, W. (2023). How does ESG disclosure improve stock liquidity for enterprises—empirical evidence from China. *Environmental Impact Assessment Review*, *98*, 106926. https://doi.org/10.1016/j.eiar.2022.106926

Mummolo, J. and Peterson, E., 2018. Improving the interpretation of fixed effects regression results. *Political Science Research and Methods*, *6*(4), pp.829-835. https://doi.org/10.1017/psrm.2017.44

Odriozola, M. D., Blanco-González, A., Baraibar-Diez, E. (2024). The link of ESG performance and board gender diversity in European firms. *Corporate Social Responsibility and Environmental Management*, *31*(6), 5656-5669. https://doi.org/10.1002/csr.2881

Paolone, F., Pozzoli, M., Chhabra, M., Di Vaio, A. (2024). Cultural and gender diversity for ESG performance towards knowledge sharing: empirical evidence from European banks. *Journal of Knowledge Management*, *28*(11), 106-131. https://doi.org/10.1108/JKM-05-2023-0445

Romano, M., Cirillo, A., Favino, C., Netti, A. (2020). ESG (Environmental, Social and Governance) performance and board gender diversity: The moderating role of CEO duality. *Sustainability*, *12*(21), 9298. https://doi.org/10.3390/su12219298

Russo, M. V., Fouts, P. A. (1997). A resource-based perspective on corporate environmental performance and profitability. *Academy of management Journal*, *40*(3), 534-559. https://doi.org/10.5465/257052

Sandretto, D., Rizzi, A., Esposito, G. (2025). Gender diversity leadership and ESG performance: The influence of women on boards and in management. *Business Strategy and the Environment*. https://doi.org/10.1002/bse.4241

Sastroredjo, P. E., Suganda, T. R. (2025). ESG and financial distress: the role of bribery, corruption, and fraud in FTSE All-Share companies. *Risks*, *13*(3), 41. https://doi.org/10.3390/risks13030041

Schwartz, M. S., Cragg, W. (2017). *Corporate social responsibility*. In *Business Ethics*. Routledge

Singh, K. (2024). Listing on environmental, social and governance index and financial distress: does the difference-in-differences matter?. *Asian Review of Accounting*, *32*(2), 302-326. https://doi.org/10.1108/ARA-07-2023-0197

Song, Y., Li, R., Zhang, Z., Sahut, J. M. (2024). ESG performance and financial distress prediction of energy enterprises. *Finance Research Letters*, *65*, 105546. https://doi.org/10.1016/j.frl.2024.105546

Spineli, L.M. and Pandis, N., 2020. Fixed-effect versus random-effects model in meta-regression analysis. *American Journal of Orthodontics and Dentofacial Orthopedics*, *158*(5), pp.770-772.

Sullivan, R., Mackenzie, C. (2017). Responsible investment: Guide to ESG data providers and relevant trends. *The Journal of Sustainable Finance & Investment*, *7*(2), 131-143.

Sumiati Isnaini, A. (2024). The effect of tangible assets and green intellectual capital on profitability: The mediating role of esg performance (study on go public companies in Indonesia). (2024). *IBAF E-Proceedings*, *11*(1), 852-870. https://doi.org/10.33102/ck83zg48

Suprabha, K. R., Sreepriya, J., Prasad, K. (2024). The impact of ESG disclosure on mitigating financial distress: exploring the moderating role of firm life cycle. *International Journal of Disclosure and Governance*, 1-14. https://doi.org/10.1057/s41310-024-00225-8

Suprabha, K.R., Sreepriya, J. and Prasad, K., 2024. The impact of ESG disclosure on mitigating financial distress: exploring the moderating role of firm life cycle. *International Journal of Disclosure and Governance*, pp.1-14. https://doi.org/10.1057/s41310-024-00225-8

Truong, Q. T., Tran, Q. N., Srivuttichan, T., Chen, R. (2025). The significance of ESG performance for financial distress: new evidence. *Applied Economics Letters*, 1-7. https://doi.org/10.1080/13504851.2025.2471553

Wang, H., Jiao, S., Ma, C. (2024). The impact of ESG responsibility performance on corporate resilience. *International Review of Economics & Finance*, *93*, 1115-1129. https://doi.org/10.1016/j.iref.2024.05.033

Wang, K., Li, T., San, Z., Gao, H. (2023). How does corporate ESG performance affect stock liquidity? Evidence from China. *Pacific-Basin Finance Journal*, *80*, 102087. https://doi.org/10.1016/j.pacfin.2023.102087

Wasiuzzaman, S., Subramaniam, V. (2023). Board gender diversity and environmental, social and governance (ESG) disclosure: is it different for developed and developing nations?. *Corporate Social Responsibility and Environmental Management*, *30*(5), 2145-2165. https://doi.org/10.1002/csr.2475

Wood, S.N., 2013. A simple test for random effects in regression models. *Biometrika*, *100*(4), pp.1005-1010. https://doi.org/10.1093/biomet/ast038

Zhou, G., Liu, L., Luo, S. (2022). Sustainable development, ESG performance and company market value: Mediating effect of financial performance. *Business Strategy and the Environment*, *31*(7), 3371-3387. https://doi.org/10.1002/bse.3089

Data availability: The data used in this study may be obtained through the Thomson Reuters (Eikon) database at https://eikon.refinitiv.com/index.html , last accessed on 10.02.2025. The data and materials used in this paper are available from the corresponding author on reasonable request.

Statements and Declarations

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