The Stabilizing Effect of ESG: Evidence from European Firms

Abstract

This study examines how ESG performance affects the likelihood of financial distress in European companies between 2011 and 2021. By using the Altman Z-score as an indicator of financial distress and logit models, we find that ESG engagement is generally associated with greater financial stability. However, the effect is not linear: high ESG scores do not always provide greater protection than low or medium scores. The stabilizing effect is most pronounced for moderately leveraged companies, while highly leveraged or small companies benefit less. Our results imply that ESG can act as insurance against financial distress, but only given the right structural and economic conditions.

1. Introduction

In recent decades, corporate sustainability has become increasingly important as companies are forced to integrate environmental, social and governance (ESG) factors into their business strategies in order to implement sustainable and socially responsible business practices (Cohen, 2023; Mushafiq et al, 2023) and minimize ESG risks (Cohen, 2023; Kölbel et al., 2017; Sassen et al., 2016) due to increasing pressure from various stakeholders and regulatory requirements (Rezaee, 2016; Sassen et al., 2016; Shiu and Yang, 2016). The role of ESG in shaping the financial performance, risk management and long-term resilience of companies has become a focus of academic discussion (Truong et al., 2025). At the same time, the reduction of corporate default risk is moving to the center of research in the face of increasing geopolitical uncertainties. In this context, the influence of various financial data, including profitability and leverage ratio (Jiang et al., 2023), as well as macroeconomic indicators, e.g. inflation rate and interest rates (Song et al., 2024; Mare, 2015), on default risk has been investigated.

However, this study focuses on one factor that has not yet been sufficiently investigated: the protective effect of ESG exposure. The focus of this study is to investigate the impact of ESG engagement and the level of ESG scores on the risk for companies to slip into financial distress, taking into account various company characteristics and macroeconomic conditions. There are several reasons why ESG engagement can influence the probability of financial distress. First, ESG engagement can have long-term effects on overall company performance and thus also on companies' financial metrics (Eccles et al., 2014; Cohen, 2023; Truong et al., 2025). One of the most important reasons is that ESG engagement can lead to better credit ratings and ultimately lower capital costs, as well as opening up alternative sources of financing (Alves and Meneses, 2024; Cohen, 2023), which increases financial stability through access to liquid resources and enables capital investment. Another important reason is that companies that are actively committed to ESG benefit from improved investor confidence and a better reputation (Atif and Ali, 2020; Weber et al., 2010), which allows for more time in financial difficulties. Furthermore, an ESG strategy can make a company less vulnerable to financial distress through operational efficiency, compliance with regulations or good governance, and an improved brand image (Mushafiq et al., 2023; Shiu and Yang, 2016; Choi, 2024). Finally, several studies argue that ESG engagement can have an insurance-like effect on a company's stock price (Godfrey, 2005; Godfrey et al., 2009; Shiu and Yang, 2016; Jo and Na, 2012) and generally reduces price volatility (Ouchen, 2022). Despite the supposed positive impact of ESG on companies' financial stability, ESG commitments can also entail significant upfront costs

that strain financial resources and lead to liquidity bottlenecks, especially for companies with limited capital reserves (Habib, 2023). Thus, no uniform or linear effect of ESG can be assumed; it must be examined for different groups of companies, as certain company characteristics have different potentials for financial stability and thus for the likelihood of financial difficulties. The significance of these interactions has not yet been sufficiently investigated in previous studies.

We find that a company's ESG engagement influences the likelihood of financial distress. In particular, we find that ESG engagement is associated with a lower probability of financial distress, confirming the hypothesized "insurance-like" role of ESG.

We also find that the level of ESG exposure has an impact on the likelihood of a company experiencing financial distress. In particular, we find that this effect is not linear: a high ESG rating does not automatically mean better protection against financial distress than a lower ESG rating and therefore has a partially diminishing marginal effect. This suggests that the benefits of high ESG exposure may be stagnating, especially for low to medium leveraged companies. This nuance contrasts with the assumption of linear ESG benefits and highlights the trade-off between the costs of ESG initiatives and their positive effects.

Finally, we examine how the moderating effect of company size, debt ratio, and economic growth explicitly affects the relationship between ESG and financial difficulties. We find that the protective effect of ESG engagement is particularly strong for large and medium-sized firms and that ESG reduces the likelihood of financial distress, especially for firms with low to medium leverage. In contrast, small and highly leveraged firms do not show a corresponding improvement in their financial resilience, suggesting that ESG compliance and associated costs are an additional burden for small and already highly leveraged firms. We can also show that ESG provides particular protection against financial distress during periods of economic recovery, i.e. high GDP growth. The results suggest that the financial impact of ESG exposure can be amplified or mitigated depending on the economic environment. For example, the stabilizing effect of ESG is weakened during periods of low to moderate GDP growth. These effects help to identify the channels through which ESG engagement influences the likelihood of financial distress in certain groups of companies and economic environments. The importance of this study lies in its contribution to the literature on financial distress and insolvency.The study provides practical implications for both corporate strategy and financial policy. It highlights that while ESG engagement can be costly in the short term, it improves

financial resilience in the long term. These findings are particularly relevant for European companies, which are subject to stricter ESG disclosure requirements and stakeholder expectations than their global peers.

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The structure of the paper is as follows. Section 2 provides a comprehensive literature review, followed by the development of hypotheses. Section 3 describes the data and methods used, and Section 4 presents the descriptive statistics and empirical results and confirms these results in the robustness analysis in Section 5. Section 6 contains the conclusion.

2. Literature review

While ESG engagement has been widely studied in the context of corporate financial performance (Friede et al., 2015; Gillan et al., 2021; Sassen et al., 2016), the evidence on its direct impact on corporate financial distress is limited, mixed and controversial (Liu et al., 2021; Postiglione et al., 2025; Dumitrescu et al., 2020). The academic literature highlights two main effects - one positive and one negative - of corporate ESG engagement that affect the likelihood of financial instability. On the positive main effect: several studies point to a negative correlation between ESG performance and financial distress (Al-Hadi et al., 2019; Chang et al, 2013), suggesting that companies with strong ESG engagement are better able to mitigate financial instability and improve their long-term resilience (Liu et al, 2021; Sassen et al, 2016; Chiaramonte et al, 2022; Chava, 2014; Godfrey, 2005; Starks, 2009; Goss and Roberts, 2011). The reasons for this are the positive impact on the financial performance of companies due to the rise in operational efficiency through ESG strategies (Mushafiq et al., 2023; Sheikh, 2019; Chava, 2014; Goss and Roberts, 2011) as well as lower capital costs (Wong et al., 2021; Sheikh, 2019) and, for example, an improved reputation (Jiao, 2010). Companies with higher ESG ratings are also associated with better corporate governance (Dimson et al., 2015), lower operational risks and better long-term growth prospects (Ramírez-Orellana et al. 2023). Companies that actively invest in ESG tend to attract a larger investor base and benefit from greater market liquidity and stability (Sheikh 2019; Liu et al., 2021). This effect is reinforced by the fact that ESG-oriented companies generally have a lower cost of capital due to better

credit ratings and higher investor confidence (Wong et al. 2021; Sheikh 2019; Atif and Ali, 2020; Weber et al, 2010; Dumitrescu et al, 2020) and have access to alternative financing options (Wong et al. 2021, Chava 2014; Liu et al., 2021), which helps to reduce operational risks and thus increase financial stability (Chiaramonte et al. 2022). Lins et al. (2017) argue that the competitive advantage of companies with high CSR ratings is based on their better growth prospects and higher operational efficiency, which translates into greater resilience during financial downturns. Another factor pointing to a positive impact of ESG on financial stability is the assumption that ESG-committed companies are perceived as less risky (Starks, 2009). ESG engagement can therefore have an insurance-like character (Godfrey, 2005).

Based on Godfrey's (2005) insurance hypothesis, it has been shown that ESG engagement can mitigate the financial consequences of negative events. Godfrey et al. (2009) confirmed that companies with high ESG performance suffer lower losses during reputational crises due to accumulated "moral capital". Similarly, Shiu and Yang (2016) found that ESG engagement reduces the volatility of stock and bond prices during negative events, although the protective effect may diminish after repeated shocks. Sassen et al. (2016), using a European sample, found that ESG performance - particularly the social component - reduces both overall risk and idiosyncratic risk, highlighting governance and stakeholder engagement as the most important channels and attributing the effect primarily to improved engagement and management efficiency. Cohen (2023) demonstrated that increased ESG risks have a negative impact on the Altman Z-score, especially for smaller companies, and reduce their chances of financial survival. They justify these results with the negative impact of ESG risks on company value. Similarly, Habib et al. (2023) found that a commitment to ESG can lead to improvements in corporate strategies, which in turn leads to better adaptability and long-term effectiveness. Truong et al. (2025), analyzing US companies, found a particularly strong relationship between ESG and financial distress among small companies and those in highly competitive industries, which they attribute to the fact that these companies are increasingly supported by improved sales growth and long-term institutional investors. However, in addition to these findings, there are also studies that found no significant impact of ESG on financial stability (Habermann and Fischer, 2023; Gramlich and Finster, 2023). In addition, Dumitrescu et al. (2020) found that the social dimension of ESG in particular can increase the likelihood of future financial distress. The reasons for this are management focus and financial constraints. The literature cited above suggests that fundamental ESG engagement has a significant impact on resource inflows, risk perceptions and governance structures. If we also assume that ESG performance lowers

companies' cost of capital, improves their reputation and increases efficiency, (Sheikh, 2019; Chava, 2014; Goss and Robert, 2011; Wong et al, 2021; Sheikh, 2019; Jiao, 2010; Atif and Ali, 2020), the following hypothesis can be formulated:

H1. Companies with an ESG score and thus ESG engagement have a lower risk of financial distress than companies without an ESG score.

On the other hand, according to shareholder theory, a very high level of ESG engagement could lead to high costs that are not offset in the short term by the positive effects of ESG described above (e.g. Champagne et al, 2021; Cornell and Damodaran, 2020; Dumitrescu et al, 2020; Kuo et al, 2021; Gillan et al, 2021). Such additional costs reduce the financial performance of companies and at the same time their financial stability (Champagne et al. 2021, Cornell and Damodaran, 2020). Companies that allocate significant resources to ESG initiatives risk diverting capital away from their core business, leading to inefficiencies and weaker financial results (Kuo et al., 2021) and, especially for companies with limited capital reserves, liquidity constraints (Habib, 2023). As ESG activities are often seen as agency issues, there is a possibility that they are not in the best interest of shareholders and thus reduce profitability (Gillan et al. 2021). Di Giuli and Kostovetsky (2014) reported that companies with higher ESG ratings have lower future stock returns and lower returns on equity, while Shahbaz et al. (2020) found similar patterns of lower financial performance. Furthermore, Zhang (2015) showed that companies with significant investments in research and development are more prone to financial distress, with this effect being particularly pronounced during economic downturns and for companies with limited financial flexibility. Applying this argument to ESG, companies that allocate significant resources to sustainability initiatives may find themselves in a similar financial predicament, particularly if these investments do not generate immediate economic benefits. Humphrey et al. (2012) found no significant relationship between corporate social performance scores and risk-adjusted firm performance, suggesting that ESG engagement does not generally reduce financial risk.

Given these contradictory perspectives, a linear impact of ESG on the likelihood of financial instability cannot be automatically assumed. While ESG engagement may provide stability benefits for some companies, it may also impose financial burdens on others (Champagne et al., 2021; Cornell and Damodaran, 2020). Therefore, the following hypothesis is proposed:

H2. Higher ESG ratings are associated with a lower probability of financial distress, but the marginal benefit decreases with high ESG exposure.

The impact of ESG performance on the likelihood of financial distress is not the same for all companies. Various company-specific characteristics, such as debt, can influence the extent to which ESG engagement affects financial stability (Postiglione et al., 2025; Mushafiq et al., 2023). For example, companies with high levels of debt (Opler and Titman, 1994; Campbell et al., 2008) and low market capitalization are already more prone to financial distress (Campbell et al., 2008), which may amplify or mitigate the impact of ESG engagement. In addition, the level of debt can influence how ESG engagement affects financial stability. Highly indebted companies are generally considered riskier, and their ESG performance can be strategically deployed to positively influence investor perception and risk assessment (Goss and Roberts, 2011; Chava, 2014; Alves and Meneses, 2024). While ESG performance can also reduce financing costs and improve credit ratings (Sheikh, 2019; Goss and Roberts, 2011), highly indebted companies face limited financial flexibility, which may limit their ability to invest in or fully realize the benefits of ESG (Hennessy and Whited, 2005). Previous research suggests that highly indebted companies benefit more from ESG engagement and the associated lower cost of capital (Alves and Meneses, 2024), but these effects may also lead companies to take on even more debt (Dumitrescu et al., 2020), which may limit their ability to invest in ESG initiatives. (Hennessy and Whited, 2005). In contrast, companies with lower debt levels have greater financial flexibility, which allows them to invest in ESG strategies without jeopardizing their financial stability (Sheikh, 2019). Companies with a strong financial position may be able to integrate ESG initiatives more effectively and use them to create long-term value and sustainability. Given these dynamics, ESG investments are expected to provide financial stability benefits, but their effectiveness depends on a company's overall debt burden and financial flexibility.

H3. The leverage level of companies influences the impact of ESG performance on the likelihood of financial difficulties.

3. Data and Methods

3.1 Data

The analysis uses ESG scores from Refinitiv Eikon (formerly Thomson Reuters ASSET4 ESG), microeconomic data from Datastream and macroeconomic indicators from Datastream, the Federal Reserve Bank of St. Louis, Eurostat, the World Bank and central bank publications. The study design uses annual data for all variables, including ESG scores and macroeconomic indicators. The sample is based on the MSCI Europe Index and includes companies from 15 European countries between 2011 and 2021. The sample covers a wide range of economic sectors, with the exception of the financial sector (GICS sector 40), as the financial ratios for these companies are not comparable to those of non-financial companies. To reduce the influence of outliers, all raw microeconomic data - with the exception of ESG data - was winsorized at the 1-5% and 95-99% levels. In addition, values that are not directly comparable due to absolute values in different currencies were standardized by Z-score normalization at country level. This approach also mitigates the problem of size-related distortions between different countries. In addition, the sample has been adjusted by excluding illiquid companies, in particular those for which no total return data is available or whose total return has remained unchanged for more than three months.

Our final sample contains a maximum of 80,883 observations per company-year for 8,294 companies, of which 25.6% have an ESG rating. We use adjusted samples for the specific analysis of the impact on inactivity and the likelihood of financial distress. However, the sample size varies to analyze different subsamples. Tables A4 and A5 show the geographical distribution of companies and the breakdown by sector. This shows, among other things, that most of the companies analyzed are from the United Kingdom, Spain and Sweden and that the industrial, consumer discretionary and healthcare sectors dominate.

We find that the number of observations in the critical company category is significantly lower than that of stable companies according to the Altman Z score. Only about 14% of the companies in the sample are categorized as critical according to the Altman Z score. Therefore, we use the Propensity Score Matching (PSM) technique to 1. match each financially critical company with a comparable active and financially stable company based on several metrics, including country, industry, market capitalization and profitability, to ensure comparability of the companies included in our analysis. The PSM method developed by Rosenbaum and Rubin (1983) is particularly well suited to ensure comparability between treatment and control groups by equalizing observable characteristics. This is particularly important in our study as it helps

to isolate the impact of ESG engagement on the likelihood of financial distress and corporate inactivity by controlling for firm-specific and contextual differences that could bias the results. This approach improves the robustness of our analysis by ensuring that the observed differences are more likely to be due to ESG engagement than to other factors. To estimate the propensity scores, we run a logistic regression that predicts the probability of being classified as a critical company based on the matching variables mentioned above: market capitalization, ROA, country and industry. We then apply the Nearest Neighbor Matching technique. Companies with financial distress (FD) form the treatment group, while the control group consists of similar companies and remains stable. This matching ensures that the matched pairs operate in a similar institutional, regulatory and economic environment, which further increases the validity of the comparison.

The focus of the study is on the relationship between the ESG score and the risk of financial distress of companies. The Refinitiv Eikon ESG score used in our study (score 0-100) has already been used in numerous academic studies. Among others, Flammer (2021) and de la Fuente et al. (2022) have empirically validated the data set and found it to be verifiable, objective and systematically structured. There are various measures of the risk of financial distress (Alves and Meneses, 2024), this paper uses the original Altman Z-score formula. The Altman Z-score model is a widely used approach to assess the insolvency risk of companies (Altman, 1968; Alves and Meneses, 2024; Habib et al., 2023; Pandey, Andres, & Kumar, 2023) and measures the probability that a company will go bankrupt (Choi et al., 2024). The higher the probability that a company will go bankrupt, the lower the Altman Z-score (Altman, 1968; Choi et al., 2024; Liu et al., 2021). Since its first publication almost 50 years ago, numerous studies have tested its predictive power for corporate insolvencies and confirmed the validity and robustness of the model (Altman, 2018; Habib et al., 2023; Alves and Meneses, 2024). We also include selected macroeconomic control variables that have been discussed extensively in the literature in the context of financial distress or ESG, as described above (Liu et al., 2021; Atif and Ali, 2020). These include various indicators of the size and development of economies (GDP growth rate, inflation rate and interest rate) (Shin et al. 2022). In addition, the political environment of the country is controlled by the variable "political stability". Previous studies have already confirmed that the degree of democracy and political stability can not only have an influence on the ESG performance of companies, but that this relationship is moderated in particular by the profitability of companies (Mooneeapen et al. 2022), which in turn has an influence on financial stability (Campbell et al., 2008). In addition, factors such as institutional

quality, press freedom and minority shareholder protection, which can be categorized under political stability, mediate the influence of ESG on corruption risk (Liu et al., 2021). Table A3 in the Appendix contains the descriptive statistics for the variables used in this study. For example, the average ESG score of the assessed companies is 51.10 points, and the average Altman z-score is 3.68. The table also shows that within the overall sample, many companies do not have an ESG rating or were only assessed during the period under review, which is reflected in the relatively low number of observations. In addition, Table A6 contains the exact definition and derivation of the variables used.

3.2 Methods

In this paper, Altman's model for predicting financial distress, the Altman Z-Score (Altman, 1968, 1984), is used, which was developed by discriminant analysis on a sample of listed companies and contains five key figures. The following equation (1) is used:

$$Z = 1.2_{X1} + 1.4_{X2} + 3.3_{X3} + 0.6_{X4} + 1_{X5} \tag{1}$$

where the individual variables represent the ratio of operating capital to total assets (x1), the ratio of retained earnings from previous years to total assets (x2), earnings before interest and taxes (EBIT) to total assets (x3), the market value of equity to debt (x4), and the ratio of sales to total assets (x5). The classification and interpretation of the Z-score can be carried out as follows: if $Z > 2.99$, the company is considered stable; if $Z < 1.81$, the company is at risk of bankruptcy. Values of $1.81 < Z < 2.99$ represent the so-called gray area, in which it is not clear whether the company is healthy, but it is also not clear that the company is expected to go bankrupt. On this basis, the companies examined in this study are classified as "critical" companies ($Z < 1.81$) and "non-critical" companies ($Z > 1.81$).

We use logistic regressions to estimate the financial distress risk of companies. $P(\text{FD}=1)_{it}$ represent the probabilities that a company is in the group of financially distressed companies (FD). The corresponding logit model can be specified as follows:

$$P(FD = 1)_{it} = F_{\gamma}\left(\beta_1 ESG_{it} + \sum_{m=1}^{M} \beta_2 MacroControl_c^m + \theta_t + \varepsilon_{it}\right) \tag{2}$$

The dependent variable is defined as follows:

- $(FD = 1)_{it} = 1$ if company i is in a critical financial condition in year t, 0 otherwise.

Specification (2) uses the independent variable ESG to take into account the additive effect of the existence of ESG engagement on the one hand to test hypotheses H1 and the level of the ESG rating on the probability of a company getting into financial difficulties to test hypotheses H2 on the other. In this study, ESG engagement is simplified by the presence of an ESG rating. The absence of an ESG rating in the sample can be interpreted as a possible indicator of lower ESG engagement. This is partly due to the fact that ESG rating agencies rely on publicly available information when preparing a rating. Companies that disclose no or less ESG information - and thus potentially less engagement - are therefore considered less or not at all (Berg et al., 2022). Furthermore, the likelihood of financial distress is not only influenced by the presence of ESG engagement, but also by the level of ESG engagement. We use different ESG categories, a set of dummy variables representing four ESG rating levels: no ESG score (reference group), low, medium and high. This categorical specification allows us to assess whether different levels of ESG exposure are associated with different probabilities of financial distress without assuming a linear relationship. Using categorical dummies instead of a continuous ESG score allows for a more flexible estimation and accounts for potential non-linear effects, as recommended in the literature (Wooldridge, 2010; Bouten et al., 2011). The "no ESG score" category was used as a reference group to analyze whether a low ESG score is also associated with lower risk compared to no ESG score. Additionally, we added macroeconomic variables (GDP growth rate, inflation, interest rate and political stability). In addition, annual fixed effects were integrated to control for time-dependent global shocks and economic developments. Since the data are structured as a panel with repeated observations of firms over several years, the standard errors are clustered at the firm level to account for possible serial correlations and heteroscedasticity. We do not use panel regressions in the model because in some cases the time dimension for certain companies, especially inactive companies, is relatively short and a perfect prediction would be made for many companies. The calculations were performed using the maximum likelihood method with the OLS estimator as the standard estimator.

To test hypotheses H3, we estimate the logit model with the matched sample separately for company subgroups by level of leverage. To assess the impact of leverage, subgroups are defined using percentile thresholds to distinguish between low, medium and high leverage (leverage on capital). Highly leveraged companies often face financial constraints that may limit their ability to invest in ESG initiatives. However, they can also use ESG information as a signal to reduce perceived risk and the cost of capital (Chava, 2014; Goss and Roberts, 2011;

Hennessy and Whited, 2005). In contrast, companies with low leverage have greater financial flexibility to proactively implement ESG strategies (Sheikh, 2019). To investigate moderating effects, we also include interaction terms between ESG performance and leverage in the logit regression described above.

Four additional stratifications are introduced to ensure the robustness of the results and to account for external influences. First, the sample is divided into two periods: 2012-2016, which represents the early ESG standardization phase (including the Paris Agreement in 2015), and 2017-2021, which is characterized by stricter regulation, increasing shareholder pressure and increased ESG awareness, especially after the COVID-19 crisis (Eccles et al., 2014). The 2011 exclusion allows for balanced subperiods. Second, companies are divided into three size groups based on their total assets (standardized z-scores). The bottom 33% of companies are categorized as small, the middle 34% to 66% as medium and the top 33% as large. This segmentation reflects differences in access to resources, exposure to ESG regulations and visibility to stakeholders (Sheikh, 2019). While large companies tend to be more closely monitored and better positioned to leverage ESG for reputational benefits (Jain et al., 2016), smaller companies can use ESG engagement strategically to differentiate themselves or build legitimacy, especially in times of increasing stakeholder pressure (Truong et al., 2025). Thirdly, for the macroeconomic context, companies are categorized according to the average GDP growth rate of their country in the respective year, again using a percentage breakdown (low, medium, high growth). In a high-growth environment, companies may have more scope to invest in ESG and realize its long-term benefits. Conversely, in a low-growth or recessionary environment, ESG engagement may be perceived as less important or a financial burden (Habermann and Fischer, 2023; Chava, 2014; Truong et al., 2025). Finally, the sample is divided into ESG-sensitive and non-sensitive industries, as suggested by Bruna et al. (2022) and Ramirez-Orellana et al. (2023). Sensitive industries such as energy, materials and manufacturing are subject to stricter environmental and regulatory controls, making ESG particularly relevant for risk mitigation, stakeholder confidence and long-term resilience (Jo and Na, 2012). All empirical analyses were conducted using STATA 17.

4. Results

The results of the empirical analysis are presented below. First, the influence of ESG engagement and the level of ESG ratings on the probability of financial distress is determined. In addition, the moderating effect of debt is shown and the robustness of the previous results is demonstrated by extending the models to include specific company characteristics and the time

factor. To improve the interpretability of the logit results, we calculate the marginal effects based on the coefficients in relation to the probability of financial distress. These are presented below as they allow an interpretation of the partial effects of the individual variables on the probability of financial distress.

4.1 ESG engagement and the likelihood of financial distress

Table 1 lists the marginal effects of our logit-based regressions using a matched sample. The results show that ESG engagement significantly reduces the probability of corporate financial distress. Specifically, companies with ESG engagement are 0.44 to 0.42 percentage points less likely to be categorized as "critical" financially (Models 1-2), all significant at the 1% level. These results support hypothesis H1, which states that ESG engagement serves as a stabilizing factor that reduces the risk of corporate financial failure. This is consistent with the insurance-like function of ESG previously discussed by Godfrey (2005) and Godfrey et al. (2009) and empirically confirmed in more recent work (Atif and Ali, 2020; Liu et al., 2021).As for the macroeconomic control variables, the results also show that political stability significantly reduces the likelihood of financial distress. This result confirms the importance of institutional quality for firms' financial resilience and is in line with previous studies (Mooneeapen et al., 2022; Liu et al., 2021). Inflation, GDP growth and interest rate, on the other hand, have no significant impact on the probability of becoming critical. Overall, these results provide robust evidence that ESG engagement is negatively associated with corporate vulnerability to financial distress and positively associated with financial stability. These findings support the interpretation of ESG as a strategic tool that goes beyond regulatory compliance and supports long-term continuity and investor confidence (Godfrey, 2005; Liu et al., 2021). This supports the view that ESG is not only a reputational or compliance factor, but also a risk mitigation and business continuity tool for companies.

Table 1. Impact of ESG engagement on financial distress, logit model, 2011-2021, using PSM matched sample

Dependent variable	critical (critical=1 | stable=0)	
Independent variables	(1)	(2)
ESG-score	-0.440***	-0.423***
	(0.095)	(0.096)
GDP growth rate		-0.031
		(0.020)
Inflation rate		0.025
		(0.051)
Interestrate rate		-0.059
		(0.111)
Political stability		-0.397**
		(0.131)
Time dummies	Yes	Yes
Pseudo R-squared	0.015	0.019
Observations	3,917	3,917
Percent of critical firms	38%	38%

Note: This table shows the results of the marginal effects of the logit model with a subsample formed using the propensity score matching (PSM) method. Dependent variable: "critical" companies classified as problematic according to the Altman Z-score of <1.8. Independent variable of interest: "esgscore" represents the existence of an ESG rating that reflects the companies' existing ESG engagement. Other independent variables: Macroeconomic control variables and year fixed effects. The significance levels of the coefficients are marked with *, ** and *** and stand for 10%, 5% and 1% respectively. Standard errors are given in brackets.

4.2 Level of ESG engagement and the likelihood of financial distress

Table 2 shows the marginal effects of our logistic regressions, which reveal the influence of three different levels of ESG engagement: Companies with low, medium and high ESG engagement. Companies without an ESG rating form the reference group (use of dummy variables). The results consistently show that ESG engagement is negatively associated with the likelihood of financial distress in companies. Importantly, even low ESG engagement is significantly associated with a reduction in the likelihood of distress. For companies with a low ESG rating, the probability of financial distress is reduced by 0.37 to 0.34 percentage points, and for companies with medium ESG ratings by over 5 percentage points, relative to the baseline category of unrated companies. The impact for companies with low and medium ESG exposure is consistently stronger in this model than for companies with high ratings. The effect for companies with high ESG ratings only has a slightly significant negative impact on the probability of financial instability in model 2. This indicates that ESG performance is beneficial at all levels, but the marginal benefit does not increase linearly with ESG intensity. Thus, these results confirm our hypothesis H2. A similar pattern of diminishing marginal effects has been observed in previous studies on ESG and risk (Brogi et al., 2022), where the adoption of ESG practices improves outcomes, but further expansion of ESG ratings leads to more modest incremental gains. Our results add to the existing literature by showing that even minimal ESG adoption appears to provide significant protection and that this protective effect appears to be

less pronounced in the context of financial stability with higher ESG ratings. Furthermore, the robustness of these effects is underlined by their persistence after controlling for macroeconomic variables and political stability. Among the control variables, political stability is again the only variable in both models to show a significant negative relationship with the risk of financial instability. This pattern suggests that macroeconomic conditions may play a larger role in explaining actual business exit, while ESG factors contribute more consistently to financial resilience in ongoing operations.

Table 2. Impact of level of ESG engagement on financial distress, logit model, 2011-2021, using PSM matched sample

Dependent variable	critical (critical=1 | stable=0)	
Independent variables	(1)	(2)
low ESG-score	-0.370***	-0.343**
	(0.112)	(0.113)
mid ESG-score	-0.545***	-0.521***
	(0.153)	(0.154)
high ESG-score	-0.395	-0.428*
	(0.209)	(0.208)
GDP growth rate		-0.032
		(0.020)
Inflation rate		0.024
		(0.051)
Interestrate rate		-0.055
		(0.110)
Political stability		-0.396**
		(0.131)
Time dummies	Yes	Yes
Pseudo R-squared	0.016	0.020
Observations	3,917	3,917
Percent of critical firms	38%	38%

Note: This table shows the results of the marginal effects of the logit model with a subsample formed using the propensity score matching method (PSM). Dependent variable: "critical" companies classified as problematic according to the Altman Z-score of <1.8. Independent variable of interest: The ESG variables represent different levels of ESG rating, from none (reference group) to a very high rating (dummy variables). The classification was based on percentiles. Other independent variables: Macroeconomic control variables and year fixed effects. The significance levels of the coefficients are marked with *, ** and *** and stand for 10 %, 5 % & 1 % respectively. The standard errors are given in brackets.

4.3 ESG score and the likelihood of financial distress: Effect of leverage

Table 3 shows the marginal effects from the logit regressions estimated separately for low, medium and high leverage companies. These stratified models allow us to assess how the impact of ESG performance on financial vulnerability varies by company leverage. Overall, both low and medium leverage companies benefit from ESG, with the impact being particularly pronounced in the medium segment. In the low leverage sub-sample, medium and high ESG exposure in particular appear to reduce the likelihood of financial distress, with the medium ESG score showing the stronger siginificance. For companies with a medium level of indebtedness, the protective effect remains consistent across all ESG categories, even though here again the effect appears to be strongest for companies with a medium ESG rating, with a

1.9 and 1.8 percentage point reduction in the probability of being classified as critical in relation to the reference group without an ESG score. The ESG score does not appear to have a significant influence on companies with a high debt ratio. The results suggest that companies with a moderate leverage ratio derive the greatest risk-mitigating benefit from ESG engagement, for example through reputation signals and stakeholder alignment (Jain et al., 2016). The findings are consistent with the insurance perspective (Godfrey et al., 2009) and with theories that ESG enhances corporate creditworthiness and investor and creditor confidence, especially when companies are not already financially constrained (Chava, 2014; Goss and Roberts, 2011).

The interaction model in Table 4 supports this interpretation as it shows positive and statistically significant interaction terms between ESG score and debt. These interactions suggest that the protective effect of ESG decreases as debt increases - presumably because ESG-related benefits are offset by increased financial risks and capital costs. This suggests that high leverage may either limit the financial flexibility required to effectively implement ESG strategies (Hennessy and Whited, 2005) or dampen the signaling effect of ESG in the eyes of stakeholders (Cornell and Damodaran, 2020). Taken together, these findings support hypothesis 3, which states that the relationship between ESG engagement and financial stability depends on leverage. ESG has the strongest and most consistent stabilizing effects on medium and low leverage firms and statistically insignificant effects on high leverage firms. These results are also consistent with hypothesis H2: A high ESG score alone does not provide greater protection against financial distress. Instead, the benefits of ESG depend on the financial structure of firms, which is consistent with a contingency-based view of ESG performance (Kölbel et al., 2017; Liu et al., 2021).

Table 3. Impact of level of ESG engagement on financial distress: Effect of leverage level, logit model, 2011-2021, using PSM matched sample

	low leverage		mid leverage		high leverage	
Dependent variable	critical (critical=1 | stable=0)					
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
low ESG-score	-0.161	-0.204	-0.597***	-0.526**	-0.285	-0.304
	(0.194)	(0.188)	(0.177)	(0.178)	(0.220)	(0.223)
mid ESG-score	-1.187***	-1.226***	-1.865***	-1.796***	-0.408	-0.412
	(0.304)	(0.296)	(0.257)	(0.256)	(0.229)	(0.230)
high ESG-score	-1.642*	-1.695*	-1.185**	-1.161**	-0.524	-0.529
	(0.732)	(0.730)	(0.367)	(0.371)	(0.298)	(0.304)
GDP growth rate		-0.012		0.010		-0.011
		(0.041)		(0.036)		(0.041)
Inflation rate		0.055		0.127		0.086
		(0.092)		(0.091)		(0.083)
Interestrate rate		0.352		-0.313		-0.024
		(0.202)		(0.258)		(0.192)
Political stability		-0.482*		-0.777***		0.056
		(0.231)		(0.207)		(0.249)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.031	0.04	0.066	0.079	0.023	0.024
Observations	1,237	1,237	1,339	1,339	1,281	1,281
Percent of critical firms	22%	22%	26%	26%	65%	65%

Note: This table shows the results of the marginal effects of the logit model with a subsample formed using the propensity score matching method (PSM). Dependent variable: "critical" companies classified as problematic according to the Altman Z-score of <1.8. The model was applied according to the leverage on capital of the companies for low, mid and high leveraged companies, divided into percentiles per sample. Independent variable of interest: The ESG variables represent different levels of ESG rating, from none (reference group) to a very high rating (dummy variables). The classification was based on percentiles. Other independent variables: Macroeconomic control variables and year fixed effects. The significance levels of the coefficients are marked with *, ** and *** and stand for 10 %, 5 % and 1 % respectively. The standard errors are given in brackets.

Table 4. Impact of level of ESG engagement on financial distress: Interaction effect of leverage, logit model, 2011-2021, using PSM matched sample

Dependent variable	critical (critical=1 | stable=0)	
Independent variables	(1)	(2)
low ESG-score	-1.603***	-1.618***
	(0.221)	(0.218)
mid ESG-score	-3.722***	-3.707***
	(0.467)	(0.466)
high ESG-score	-5.418***	-5.407***
	(0.989)	(0.975)
esglow x leverage	0.033***	0.033***
	(0.005)	(0.005)
esgmid x leverage	0.066***	0.066***
	(0.009)	(0.009)
esghigh x leverage	0.096***	0.095***
	(0.018)	(0.018)
GDP growth rate		-0.029
		(0.022)
Inflation rate		0.091
		(0.051)
Interestrate rate		-0.075
		(0.116)
Political stability		-0.339*
		(0.132)
Time dummies	Yes	Yes
Pseudo R-squared	0.094	0.098
Observations	3,780	3,780
Percent of critical firms	38%	38%

Note: This table shows the results of the marginal effects of the logit model with a subsample formed using the propensity score matching method (PSM). Dependent variable: "critical" companies classified as problematic according to the Altman Z-score of <1.8. Independent variable of interest: The ESG variables represent different levels of ESG rating, from none (reference group) to a very high rating (dummy variables). The classification was based on percentiles. Other independent variables: Macroeconomic control variables and year fixed effects. The significance levels of the coefficients are marked with *, ** and *** and stand for 10 %, 5 % and 1 % respectively. The standard errors are given in brackets.

5. Robustness check

5.1 ESG score and likelihood of financial distress and inactivity: Effect of time

As part of a robustness check, the sample was split into two time periods: 2012-2016 and 2017-2021. The years 2012 to 2016 reflect the resource-intensive initial phase of many ESG regulations and reporting requirements (Eccles et al., 2014), and since 2017, transparency requirements in Europe have become even more stringent. Table A1 shows that ESG engagement had a stabilizing effect in both periods, with more consistent results after 2017. In the earlier period, only high ESG scores were significantly associated with lower financial distress, while from 2017 onwards only medium and low ESG scores significantly reduced the likelihood of financial distress. This suggests that ESG has become a broader signal of financial resilience over time. This is consistent with the findings of Kansoy and Stasiulaitis (2025), who report that ESG companies have benefited more following the Paris Agreement in 2015 and that ESG is increasingly becoming a protective feature. These results also confirm previous

findings in the literature that the ESG effect is not static but evolves over time in response to institutional and market changes (Gao and Zhang, 2015). We also show that not only extreme ESG levels (high/low) but also intermediate ESG levels have a significant impact on corporate stability, especially under tighter market conditions (Gao and Zhang, 2015; Eccles et al., 2014).

5.2 ESG score and likelihood of financial distress: Effect of firm size

As a second robustness check, the sample was divided into three size-based subsamples based on tertiles of total assets: small, medium and large companies. Table A2 shows that the relationship between ESG engagement and financial distress varies by company size. For large companies, ESG engagement is significantly associated with a lower likelihood of financial distress at all levels. This suggests that ESG strategies are particularly effective in reducing corporate risk in large companies, where implementation capacity, stakeholder oversight and the integration of ESG into strategic management are likely to be more advanced (Rezaee, 2016; Brogi et al., 2022). In contrast, for medium-sized companies, especially medium and low ESG scores are significantly associated with lower financial distress, possibly reflecting diminishing returns on high ESG investments in resource-constrained companies (Zhang, 2015; Jain et al., 2016; Champagne et al., 2021). No significant effect is observed for small companies across all ESG levels. The different strength of ESG effects in the different company size groups underlines the importance of company-specific capabilities, the institutional environment and the scalability of ESG strategies (Kölbel et al., 2017; Habib et al., 2023). These results reflect the conclusions of Postiglione et al. (2025), who, based on a European sample, also identified company size as an important moderating variable in the ESG distress nexus and observed the strongest effects in large companies.

5.3 ESG score and likelihood of financial distress: Effect of GDP growth

To test for macroeconomic moderation effects, the sample was divided into low, medium and high GDP growth environments. Table A3 shows that ESG exposure can at least slightly reduce the probability of financial distress in all macroeconomic conditions, but the magnitude and significance vary. During periods of low GDP growth, low and medium ESG scores are weakly significantly associated with a reduction in the risk of financial distress, supporting the view that ESG provides a stabilizing mechanism during recessionary periods, for example by fostering stakeholder confidence. This is consistent with the findings of Sheikh (2019), Goss and Roberts (2011) and Lins et al. (2017), who highlight the stabilizing function

of ESG in times of economic uncertainty. Similarly, Krüger (2015) finds that ESG promotes resilience during market downturns as stakeholders interpret it as credible insurance. In times of high growth, the strongest effects are seen particularly at medium and high ESG levels. This suggests that in a booming environment, ESG engagement tends to act as a strategic positioning and differentiation tool. These findings are consistent with the idea that ESG acts both as reputational protection in crises and as a strategic amplifier in expansion phases (Postiglione et al., 2025).While ESG can be used as a strategic differentiation tool in growing markets, it plays an important role in risk buffering in stagnating or declining phases, especially with regard to critical corporate situations. This is consistent with the idea that ESG acts both as a reputational safeguard in crises and as a strategic amplifier in expansion phases (Postiglione et al., 2025).

5.4 ESG score and likelihood of financial distress and inactiv: Effect of industry

To investigate industry-specific differences, we ran separate regressions for companies in ESG-sensitive industries (e.g. energy, industrials, materials) and less sensitive sectors, following the classification of Bruna et al. (2022). The results (Table A4) show that ESG is significantly associated with lower risk of financial distress, especially in non-sensitive sectors - only for medium and high ESG scores. In sensitive industries, on the other hand, only minor stabilizing effects can be observed at low ESG scores. This is likely due to the already institutionalized ESG expectations in these industries, where compliance with ESG requirements is perceived as a basic requirement rather than a strategic differentiator (Ramírez-Orellana, 2023; García et al., 2019). In addition, capital intensity and structural risk factors could weaken the stabilizing role of ESG in these industries (Altman and Hotchkiss, 2005). Overall, the results indicate that ESG tends to act as a basic requirement in highly regulated industries, while it fulfils a stabilizing and strategic function in less exposed sectors.

6. Conclusion

This study provides a comprehensive and nuanced analysis of the relationship between ESG engagement and financial distress of companies by taking into account factors such as company size, leverage level, GDP growth, industry sensitivity and time. The results confirm that ESG engagement is significantly associated with a lower probability of financial distress, supporting the view that ESG is a stabilizing factor that contributes to long-term business continuity. This effect remains significant even after controlling for macroeconomic factors. Importantly, the analyses show that this effect is not uniform. Our models show that the

stabilizing effect of ESG depends on firm-specific and contextual characteristics. While low to moderately leveraged companies benefit from ESG engagement and are less likely to be classified as financially critical, ESG engagement has no significant stabilizing effect on highly leveraged companies. This suggests that financial flexibility may be a prerequisite for ESG strategies to lead to improved resilience. At the same time, our robustness checks show that large companies benefit most from ESG engagement, likely due to greater institutional pressure, stakeholder visibility and implementation capacity, and smaller companies do not experience a significant effect. A similar asymmetry can be observed among the macroeconomic subgroups: While ESG reduces the risk of distress, especially under weak growth conditions, and acts as a buffer against external shocks, it supports strategic positioning in a high-growth environment. The influence of ESG has increased over time, especially since 2017, likely due to institutional changes and rising stakeholder expectations. In addition, ESG is more effective in non-sensitive sectors, where it acts as a strategic signal, than in sensitive sectors, where it can only serve as a basis for compliance.

Overall, our findings highlight that ESG does not always act as insurance against financial vulnerability and that, in particular, the extent of ESG engagement can have a different impact in different circumstances. The protective effect depends on various company-specific and market-specific factors. These findings call for a more nuanced understanding of the role of ESG in corporate risk management. Future research should further investigate the interaction of ESG with other strategic variables and institutional frameworks in order to better assess its long-term value contribution.

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Appendix

Table A 1. Impact of level of ESG engagement on financial distress: Effect of time, logit model, 2012-2021, using PSM matched sample

	2012 - 2016		2017 - 2021	
Dependent variable	critical (critical=1 | stable=0)			
Independent variables	(1)	(2)	(3)	(4)
low ESG-score	-0.297	-0.291	-0.401**	-0.390**
	(0.171)	(0.174)	(0.130)	(0.131)
mid ESG-score	-0.290	-0.260	-0.745***	-0.749***
	(0.196)	(0.200)	(0.175)	(0.175)
high ESG-score	-1.026**	-1.039***	0.000211	-0.0807
	(0.312)	(0.309)	(0.242)	(0.246)
GDP growth rate		-0.003		-0.028
		(0.033)		(0.024)
Inflation rate		0.112		0.015
		(0.082)		(0.074)
Interestrate rate		-0.221		0.096
		(0.181)		(0.171)
Political stability		-0.322		-0.443*
		(0.179)		(0.190)
Time dummies	Yes	Yes	Yes	Yes
Pseudo R-squared	0.016	0.02	0.021	0.027
Observations	1,516	1,516	2,031	2,031
Percent of critical firms	36%	36%	39%	39%

Note: This table shows the results of the marginal effects of the logit model with a subsample formed using the propensity score matching method (PSM). The model was applied for the years 2012 - 2016 and the years 2017 - 2021. Dependent variable: "critical" companies classified as problematic according to the Altman Z-score of <1.8. Independent variable of interest: The ESG variables represent different levels of ESG rating, from none (reference group) to a very high rating (dummy variables). The classification was based on percentiles. Other independent variables: Macroeconomic control variables and year fixed effects. The significance levels of the coefficients are marked with *, ** and *** and stand for 10 %, 5 % and 1 % respectively. The standard errors are given in brackets.

Table A 2. Impact of level of ESG engagement on financial distress: Effect of firm size, logit model, 2011-2021, using PSM matched sample

	small companies		mid size companies		large companies	
Dependent variable	critical (critical=1 | stable=0)					
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
low ESG-score	-0.158	-0.163	-0.675***	-0.571**	-0.690**	-0.675**
	(0.166)	(0.168)	(0.198)	(0.201)	(0.240)	(0.240)
mid ESG-score	-0.53	-(0.487)	-1.800***	-1.793***	-0.920***	-0.944***
	(0.297)	(0.296)	(0.284)	(0.292)	(0.240)	(0.243)
high ESG-score	-0.191	-0.198	-1.698	-1.687*	-1.037***	-1.095***
	(0.734)	(0.745)	(0.884)	(0.822)	(0.277)	(0.278)
GDP growth rate		-0.016		-0.163***		0.007
		(0.037)		(0.046)		(0.032)
Inflation rate		-0.022		0.172		-0.001
		(0.070)		(0.111)		(0.098)
Interestrate rate		-0.160		-0.390		0.235
		(0.184)		(0.259)		(0.186)
Political stability		-0.457*		-0.720**		-0.283
		(0.390)		(0.239)		(0.262)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.008	0.013	0.058	0.078	0.041	0.044
Observations	1,256	1,256	1,297	1,297	1,308	1,308
Percent of critical firms	38%	38%	34%	34%	42%	42%

Note: This table shows the results of the marginal effects of the logit model with a subsample formed using the propensity score matching method (PSM). The model was applied according to the total assets of the companies for small, medium-sized, and large companies, divided into percentiles per sample. Dependent variable: "critical" companies classified as problematic according to the Altman Z-score of <1.8. Independent variable of interest: The ESG variables represent different levels of ESG rating, from none (reference group) to a very high rating (dummy variables). The classification was based on percentiles. Other independent variables: Macroeconomic control variables and year fixed effects. The significance levels of the coefficients are marked with *, ** and *** and stand for 10 %, 5 % and 1 % respectively. The standard errors are given in brackets.

Table A 3. Impact of level of ESG engagement on financial distress: Effect of GDP growth, logit model, 2011-2021, using PSM matched sample

	low gdp growth		mid gdp growth		high gdp growth	
Dependent variable	critical (critical=1 | stable=0)					
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
low ESG-score	-0.460**	-0.437*	-0.508*	-0.445*	-0.133	-0.137
	(0.172)	(0.173)	(0.216)	(0.220)	(0.194)	(0.198)
mid ESG-score	-0.502*	-0.484*	-0.366	-0.352	-0.800**	-0.767**
	(0.243)	(0.243)	(0.275)	(0.271)	(0.275)	(0.279)
high ESG-score	-0.118	-0.114	-0.259	-0.280	-1.045**	-1.086**
	(0.283)	(0.282)	(0.462)	(0.453)	(0.369)	(0.369)
GDP growth rate		0.011		0.011		-0.086
		(0.030)		(0.072)		(0.048)
Inflation rate		-0.109		0.101		0.108
		(0.082)		(0.091)		(0.087)
Interestrate rate		-0.185		-0.045		0.010
		(0.197)		(0.178)		(0.220)
Political stability		-0.308		-0.443		-0.535*
		(0.227)		(0.231)		(0.252)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.022	0.025	0.021	0.026	0.027	0.036
Observations	1,442	1,442	1,206	1,206	1,269	1,269
Percent of critical firms	42%	42%	38%	38%	34%	34%

Note: This table shows the results of the marginal effects of the logit model with a subsample formed using the propensity score matching method (PSM). The model was applied according to the GDP growth for low, mid and high GDP growth, divided into percentiles per sample. Dependent variable: "critical" companies classified as problematic according to the Altman Z-score of <1.8. Independent variable of interest: The ESG variables represent different levels of ESG rating, from none (reference group) to a very high rating (dummy variables). The classification was based on percentiles. Other independent variables: Macroeconomic control variables and year fixed effects. The significance levels of the coefficients are marked with *, ** and *** and stand for 10 %, 5 % and 1 % respectively. The standard errors are given in brackets.

Table A 4. Impact of level of ESG engagement on financial distress: Effect of sector, logit model, 2011-2021, using PSM matched sample

	sensitiv industry		non sensitiv industry	
Dependent variable	critical (critical=1 | stable=0)			
Independent variables	(1)	(2)	(3)	(4)
low ESG-score	-0.499*	-0.501*	-0.214	-0.153
	(0.200)	(0.203)	(0.146)	(0.148)
mid ESG-score	-0.453	-0.453	-0.521**	-0.495**
	(0.280)	(0.278)	(0.185)	(0.185)
high ESG-score	-0.0766	-0.140	-0.519	-0.549*
	(0.331)	(0.327)	(0.282)	(0.279)
GDP growth rate		-0.036		-0.026
		(0.031)		(0.026)
Inflation rate		-0.085		0.030
		(0.109)		(0.072)
Interestrate rate		0.677**		-0.415*
		(0.229)		(0.188)
Political stability		-0.466		-0.501*
		(0.259)		(0.195)
Time dummies	Yes	Yes	Yes	Yes
Pseudo R-squared	0.019	0.034	0.015	0.021
Observations	1,181	1,181	2,133	2,133
Percent of critical firms	35%	35%	39%	39%

Note: This table shows the results of the marginal effects of the logit model with a subsample formed using the propensity score matching method (PSM). The model was applied for companies in sensitiv and non sensitiv industries. Dependent variable: "critical" companies classified as problematic according to the Altman Z-score of <1.8. Independent variable of interest: The ESG variables represent different levels of ESG rating, from none (reference group) to a very high rating (dummy variables). The classification was based on percentiles. Other independent variables: Macroeconomic control variables and year fixed effects. The significance levels of the coefficients are marked with *, ** and *** and stand for 10 %, 5 % and 1 % respectively. The standard errors are given in brackets.

Table A 5. Descriptive statistics

Table A 6. Proportion of countries in sample

Table A 7. Proportion of industries in sample

Table A 8. Variable description