ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

FINANCIAL DISTRESS PREDICTION AND CORPORATE SOCIAL RESPONSIBILITY EVIDENCE FROM A HIGH CARBON MANUFACTURING SECTOR

Dr. Unbreen Arif [1*]
[1]*Assistant Professor, UE Business School, Division of Management & Administrative Sciences, University of Education Lower Mall Campus, Lahore.*
Maryam Sohail[2]
[2]*Lecturer, Department of Commerce & Finance, Government College University, Lahore.*
Dr. Muhammad Naeem[3]
[3]*Assistant Professor, Department of Economics, Division of Management & Administrative Sciences University of Education, Lahore*
****Corresponding Author: Unbreen.arif@ue.edu.pk***

Abstract
Corporate social responsibility has emerged as an increasingly important consideration within financial literature. It is viewed as strategic resource to strengthen firm credibility, investors trust and long term resilience. Although traditional distress models rely heavily on accounting ratios less is known about whether CSR engagement is associated with lower financial vulnerability. This study investigates the relationship between corporate social responsibility(CSR) and Corporate default risk(CDR) examining panel data from the firms listed on the Pakistan Stock Exchange covering the period 2015 to 2024. Financial distress is measured using the Altman Z-score, and CSR engagement is identified from sustainability related disclosures in annual reports. Pooled OLS, random effect and fixed effects panel regressions are employed with the model selection guided by Hausman test. The results show that CSR engagement is positively and significantly associated with financial stability with CSR active firms exhibiting Z-scores that are on average 1.15 points higher than non CSR firms ($\beta \approx 1.15$, $p < 0.01$). In contrast financial leverage has a strong negative effect on Z-scores ($\beta \approx -2.30$, $p < 0.01$), indicating a higher likelihood of financial distress among more highly leveraged firms. The findings are consistent across pooled OLS, random-effects and fixed-effects estimations and the Hausman test supports the use of the random-effects model.The study contributes to the financial distress literature by demonstrating that sustainability related practices are meaningfully linked to firm financial stability and can complement traditional distress prediction models. These results offer important implications for investors, corporate managers and policymakers seeking to incorporate sustainability considerations into financial risk evaluation and early warning systems.

Keywords: *Financial distress, Corporate social responsibility (CSR), Default risk, Sustainability, Emerging Economy.*

Introduction:

Corporate financial distress remains a key concern for investors, regulators, creditors and policy makers due to its significance in firm capital allocation, employment stability and economic growth. A company's failure and default not only causes losses to the shareholders and the financiers, but it also has spillover consequences (Abdelkader & Wahba, 2024; Tron, 2021). As such, the issue of early detection of the risk of default is an area that has long been the focal point of research by corporate finance. Traditional models of financial distress, particularly the Altman Z-Score model, are the most significant components that have contributed to this field by using accounting data to forecast the likelihood of failure of the firm (Altman, 1968, 2018, 2019; Altman

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

et al., 2014). Traditional models of financial distress are based almost entirely on accounting ratios(Mehmood & De Luca, 2025; Mulyaningsih, Sarmidi, & Cahyadin, 2023). These ratios are useful and cover very comprehensively the profitability and solvency positions of the firm. However, such ratios are unable to capture the forward-looking nature of the firm. Financial disruptions, together with financial crises, have revealed the existence of discrepancies in the default patterns of those entities with equivalent balance-sheet orientations, illustrating the point that financial ratios alone might not necessarily be sufficient proxies for measuring the risk associated with an enterprise (Lins, Servaes, & Tamayo, 2017).

Its Corporate Social Responsibility (CSR) has been identified as strategic decisions that impact positively upon firm risk, profitability, as well as firm Sustainability. It has been observed that companies that exhibit higher levels of engagement related to CSR tend to perceive lower levels of downside risk as well as stock crash risk, along with greater external financing especially during conditions of higher stock market stress(Khan et al., 2021; Lins, Servaes, & Tamayo, 2017). This observed phenomena bring forth an important yet unresolved query that is 'whether CSR engagement affects the risk of financial distress as well as default risk as estimated by standard distress prediction models'. It is significant to address this query specifically in emerging markets. This is because emerging markets along with higher levels of Information Asymmetry, are characterized by inadequate investor protection as well as higher levels of firm related Macroeconomic Volatility. Under these conditions, it is mostly likely that various stakeholders of emerging markets' companies tend to focus more upon visible company related actions, including Sustainability Engagement as an indication of company soundness & resilience. However, the empirical literature on the role played by CSR in financial distress has been found fragmented with some studies arguing that CSR has been associated with both risk-reducing and risk-enhancing effects (Farooq & Noor, 2025; Utami & Hasan, 2021). This ambiguity raises the need for further analysis on this topic using standardized measures of financial distress and appropriate panel data analysis techniques.

The CSR-CDR nexus is based on signalling theory. According to signaling theory, firms make voluntary disclosures to decrease information asymmetry between firm insiders and outsiders(Spence, 1973). CSR activities could serve as an important signal about managerial quality-oriented long-term orientation and sustainable value creation. Those firms that are actively involved in CSR activities could signal less opportunistic behavior and better governance structures that could be reflected in their higher financial stability and less default risk. Those firms with higher CSR activities could better handle adverse shocks because, in those firms, contracting costs are low and financial conditions are less rigid in periods when firms are in their down phase (Lins, Servaes, & Tamayo, 2017). The theory says that CSR could be associated with decreased financial distress even in unfavorable operating and macroeconomic conditions. High CSR expenditures could be negatively treated by stakeholders (Farooq & Noor, 2021). In these phenomena, CSR interventions may potentially stretch financial resources as well as distress risk, as opposed to lowering it. However, the presence of these rival theoretical arguments is a reflection of the need to test their impact empirically because of their additive effects.

The prior literature has been dominated by studies seeking to establish the predictive validity of the predictive accuracy of Z-Score models cross-sectionally by country and industry(Bandyopadhyay, 2006; Pham, Nguyen, & Thanh, 2024; Qiu, Rudkin, & Dłotko, 2020; Singh & Singla, 2023) or studies examining the relationship between corporate social responsibility and risk as measured by market-based or accounting-based risk measures (Khan et al., 2021; Suganda & Kim, 2023). The literature still has an underdeveloped intersection of these

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

two prior literatures. The paper aims to contribute to fill this literature by examining the relationship between corporate social responsibility engagement and financial distress using the Altman Z-score equation and the panel data approach. It aims to contribute to the literature as the literature calls for the need for incorporating sustainability factors into the assessment of financial risk studies such as (Chishti et al., 2024).

The main purposes of this paper are to analyze the Altman Z-Score model's current relevance with CSR in explaining cement sector firm's distress in an emerging market context. The cement industry alone accounts for approximately 7-8% of total industrial emissions of CO2, and it is amongst the largest sector-specific emitters of carbon globally(Andrew, 2018). The present literature focuses on the mitigation of emissions, environmental regulations, and R&D development in the cement industry, whereas the financial impact of engagement with sustainability has received limited attention, particularly in the domain of carbon-emitting industries. The current research attempts to empirically verify the impact of engagement with CSR, whereby default risk can be seen to have decreased, with higher values of the 'Z-Score'. Furthermore, as the research, it will also explore the joint impact of individual firm factors, 'leverage, and 'age,' in conjunction with 'CSR,' in effectuating financial stability. The current research provides the empirical results, which can assist investors, as well as policymakers, within the relevance of 'CSR' disclosures in assessing default risk of any corporate structure.

Literature Review

The recent years have witnessed an important role of the concept Corporate Social Responsibility(Aleknevičienė & Stralkutė, 2023; Mushafiq & Prusak, 2022; Stellner, Klein, & Zwergel, 2015; Vivel-Búa et al., 2024). The role of CSR in the resilience and profit functionality of firms has been analyzed widely. The applicability of CSR to mitigate financial distress in firms has not been explored comprehensively. The financial distress is the state in which firms face difficulties in fulfilling their financial obligations that lead to insolvency(Zouaghi, Garcia-Marco, & Martinez, 2024). The topic of financial distress has been in the focal point of corporate finance for several years because financial distress affects financial valuation and financial stability. The early empirical studies focused on identifying the financial ratios in firms that could identify financial distress. The study focused on Altman's Z-score that provides information about financial distress in firms(Altman, 1968, 2018). Altman's Z-score measures firm-specific financial ratios that identify firms in financial distress. According to the studies, companies that experienced a decline in profitability, have weak liquidity, and high leverage are more prone to enter distress (Campbell, Hilscher, & Szilagyi, 2008; Chava & Jarrow, 2004). The companies' financial distress is not a discrete variable but a continuous indicators that make use of Altman Z-Score, especially as early warning indicators (Altman, 2018).

Conventional financial models have been cited to show limitations where similar balance sheet profiles portray differing default probabilities, implying that conventional variables do not incorporate the full range of potential drivers of default (Garlappi & Yan, 2011). There has been growing literature to suggest that the analysis of financial distress needs to move beyond the existing analysis of accounting ratios to incorporate governance, and non-accounting disclosure (Hasan & Rahman, 2020). For emerging markets, alternative sources of information tend to remain underutilized(Asis, Chari, & Haas, 2021; Beaver, Correia, & McNichols, 2011). There appears to be room to determine the ability of alternative variables like corporate social responsibility to add incremental value to models devised to predict financial distresses.

H1: *The Altman Z-Score is a significant predictor of firm-level financial distress.*

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

The first wave of literature of has been driven by moral philosophy and stakeholder theory. The sustainable corporate finance or CSR literature has developed over decades, but more modern works have embodied its integration in financial economics regarding risk and performance (Cardillo & Chiappini, 2022; Eccles, Ioannou, & Serafeim, 2014). The descriptive section has covered its implications on capital costs, investment effectiveness, and value for capital (Albuquerque, Koskinen, & Zhang, 2019). In empirical work, researchers have found that significant implications of CSR exist in relation to financial market and stock performance of the firm. Firms that practice high-quality CSR experience lower costs of equity and idiosyncratic risk because of their ability to perceive lower vulnerability of the firm to state and reputation risk(Ceylan, Mutlu, & Şimşek, 2024; Saeed & Sroufe, 2021) . Sustainability-focused organizations have been found to enjoy stock price stability in periods of market turbulence (Lins, Servaes, & Tamayo, 2017). However, it is very important that CSR follows mere cosmetics or symbolic disclosure practices, which is negated in the given work that highlights high-quality or substantive involvement in practice in relation to sustainable long-run management practices (Ali et al., 2024; Flammer, 2015; Gillan, Koch, & Starks, 2021). They enjoy reduced likelihood of financial distress. Such firms are more likely to prioritize risk management and operational continuity and reported reduce likelihood of financial distress.

The relationship between CSR and financial distress has reported mixed results. A significant part of literature supports the view that CSR engagement reduces firm risk and mitigates financial distress. According to studies, socially responsible companies demonstrate a relatively low probability of default and less downside risk (Boubaker et al., 2020; Oikonomou, Brooks, & Pavelin, 2012). These conclusions indicate that socially responsible activities could be viewed as a risk insurance mechanism, improving stakeholder relationships, and, as a consequence, shielding against negative shocks. In times of uncertainty, socially responsible activities are even more important from an economic perspective. Based on data from the global financial crisis, (Lins, Servaes, & Tamayo, 2017) find that companies demonstrating high pre-crisis socially responsible performance demonstrated higher stock returns and better operating performance. The same findings are observable in the study conducted in the emerging markets context, where socially responsible activities contributed to an improvement in refinancing risk and increased access to external financing(Khan et al., 2021).

Another line of studies has focused on the analysis of the company's CSR activities against the backdrop of the cost associated with them. Under the framework of the theory of agency, the high level of CSR may be related to the overinvestment made by the management, especially when the governance structure is weak (Barnea & Rubin, 2010). The empirical study from suggests that by engaging in CSR activities, the company may enhance the financial distress, especially when the company spends the scarce resource without generating economic returns (Farooq & Noor, 2021). The findings of the studies, which show opposite conclusions, emphasize the need for further study of the relationship between the CRR and the CDR. Most studies use market-based risk and binary distress measures and leave the question of whether the CRR enhances the accounting-based CDR assessment unanswered.

H2: *Corporate social responsibility engagement is negatively associated with financial distress.*

The relation between CSR and CDR is based on Signalling theory. In markets distinguished by information asymmetry the firms try to involve in observable actions to signal unobservable quality to the external stakeholders. According to Spence, 1973, CSR initiatives can serve as credible signals of financial discipline and managerial commitment. (Connelly et al., 2011) reported that firms using credible nonfinancial disclosures face lower information asymmetry and

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

reduced risk premiums. (Bolton & Kacperczyk, 2021)state that CSR signals may therefore influence lenders' and investors' perceptions of default risk in emerging markets where formal disclosure mechanisms are less developed. According to (Flammer, 2015) firms under financial stress may find it difficult to sustain CSR engagement over time and making CSR a separating signal between financially stable and unstable firms. This approach lends strength to the proposal that the role of CSR can be supplementary to conventional ratios in forecasting financial distress. Old companies tend to be established and hence have better relations with creditors and suppliers, and their distress probability minimizes(Ardian & Sari, 2024) . Evidence from implies that without additional support, firm age cannot ensure financial soundness, as old companies face threats to flexibility and competitiveness (Hasan & Rahman, 2020). The empirical results on firm age and financial distress are ambivalent, and therefore, the second hypothesis of this research is:-

H3: *Firm age is negatively associated with financial distress.*

Leverage refers to the application of debt financing in supporting business operations. A business with high leverage is highly vulnerable to shocks of earnings (Rajan & Zingales, 1995). Business lenders' confirmation shows that business failure risk significantly rises in highly leveraged business entities ((Campbell, 2010) while (Islam et al., 2023) reported leverage has no impact on debt ratio. This effect is exacerbated by inadequate bankruptcy environments in emerging markets.

H4: *Firm leverage is positively associated with financial distress.*

The literature indicates strong relationships between Financial Ratios (FR), Corporate Social Responsibilities (CSR), and firm risk, although the inclusion of CSR into existing models of predictive financial distress analysis remains under-explored. Indeed, existing research either investigates one of these two variables or employs market-based default risk measures. A clear research void seems to be evident in terms of understanding the impact of CSR engagement on existing accounting-based distress models, like the Altman Z-Score, in the EM paradigm. In order to fill this void, the subject FS investigates the inclusion of CSR engagement into the CFD of firm distress prediction. This paper attempts to contribute towards an evolving CFD stream that explores the relationship between Financial distress and sustainability.

Methodology

This study follows a quantitative, explanatory research design to examine the relationship between corporate social responsibility (CSR) and Corporate financial distress (CFD) at the firm level. A panel data approach is employed because it allows the analysis to control for unobserved firm heterogeneity and capture both cross sectional and time-series variations in financial conditions (Baltagi, 2008). Panel data methods are widely used in financial distress and sustainability research due to their ability to produce more efficient and unbiased estimates than purely cross-sectional models (Wooldridge, 2010). The sample consists of all the firm listed in cement sector on the Pakistan Stock Exchange (PSX) observed over the period 2015–2024. Firms were selected based on the availability of complete financial statements and CSR related disclosures over the study period. Financial data were collected from the companied audited annual reports, State Bank of Pakistan publications. CSR information was manually extracted from firms' annual reports sustainability sections and notes to the financial statements by following prior studies that rely on disclosed CSR activities in emerging markets where third party ESG ratings are limited (Dhaliwal et al., 2011; Khan et al., 2021).

FD is measured by using the widely accepted accounting based indicator of default risk i.e. Altman Z-Score (Altman, 1968, 2018). The Z-score provides a continuous measure of financial health and has been extensively validated across developed and emerging markets (Singh & Singla, 2023).

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

The Z-score is calculated as:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$$

Where:

- X_1(Liquidity) = Working Capital / Total Assets
- X_2(Cumulative Profitability) = Retained Earnings / Total Assets
- X_3(Operating Efficiency) = Earnings Before Interest and Taxes / Total Assets
- X_4(Solvency) = Market Value of Equity / Total Liabilities
- X_5(Asset Productivity) = Sales / Total Assets

Firms with higher Z-scores are considered financially stable and lower values indicate elevated default risk. The Z-score is preferred in this study because it captures multiple dimensions of financial performance and allows early identification of distress rather than ex-post bankruptcy outcomes (Altman, 2018).

The CSR is measured by analyzing firms sustainability reports and notes to the CSR related disclosures by using content analysis and by using a binary CSR disclosure indicator. CSR = 1 if the firm reports identifiable CSR or sustainability-related activities in its annual report CSR = 0 otherwise. This approach is consistent with prior empirical research in emerging markets where standardized ESG scores are unavailable and disclosure-based measures are commonly used (Dhaliwal et al., 2011; Farooq & Noor, 2021). CSR disclosures include expenditures or initiatives related to environmental protection, employee welfare, community development, and social programs. Although binary CSR measures do not capture intensity, prior studies show that disclosure itself serves as an informative signal in environments characterized by high information asymmetry (Lins, Servaes, & Tamayo, 2017). To ensure robustness, CSR is interpreted as a proxy for firms' engagement in sustainability-related practices rather than a precise valuation of CSR performance.

Firm age and leverage are control variables of the firms. Firm age is calculated as the number of years since incorporation. Older firms tend to have greater operational experience and stronger stakeholder relationships, which may lower distress risk, although empirical evidence remains mixed (Hasan & Rahman, 2020). Leverage is measured as Total Liabilities / Total Assets (TL/TA). Higher leverage increases fixed financial obligations and amplifies default risk, making it one of the strongest predictors of financial distress (Campbell, Hilscher, & Szilagyi, 2008). The following baseline panel regression model is estimated to examine the relationship between CSR and financial distress :

$$Z_{it} = \alpha + \beta_1 CSR_{it} + \beta_2 Lev_{it} + \beta_3 Age_{it} + \varepsilon_{it}$$

where $i$denotes firms and $t$denotes time.

The analysis results were obtained by using Pooled OLS, fixed-effects and random-effects model. The Hausman test is used to determine the appropriate specification, following standard panel data methodology(Hausman, 1978). Panel unit root tests (Levin–Lin–Chu) are conducted to ensure stationarity and avoid spurious regression results (Levin, Lin, & Chu, 2002). Multicollinearity is assessed using correlation matrices and variance inflation factors. Robust standard errors are applied to account for potential heteroskedasticity. As all data used in this study are obtained from publicly available sources. No confidential or proprietary information is employed, and all firms are treated anonymously in statistical analysis, consistent with ethical research standards.

Results:

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

Table 1 reports the descriptive statistics for the key variables used in the study including financial distress (Z-score), leverage (LVG), firm age and CSR sustainability engagement.

Table 1 Descriptive Statistics

Variable	Mean	Std.Dev.	Min	Max
Z-Score (Z)	5.008	1.129	2.789	8.189
Leverage (LVG)	0.811	0.091	0.577	0.948
Firm Age (Age)	38.50	2.881	34	43
CSR	0.635	0.483	0	1

The mean Z-score of approximately 5.01 indicates the low default risk. On the average firms in the sample lie within the financially safe zone indicating low overall default risk. However, the smallest Z-score of 2.79 is very close to the grey area range, which suggests that there are still financially distressed companies that need to be monitored. This variation of Z-scores indicates that there is meaningful variation of financial conditions of companies. An average leverage of 0.81 suggests that debt is used to a great extent as capital. This is consistent with capital-intensive companies that manufacture products. This uniformity of leverage data points towards debt being systemically used in the sector. An average of firm age of 38.5 years suggests that companies are very mature. This is because very few new companies entered during the time period. There is an average of CSR sustainability engagement of 0.635, which implies that 63.5% of companies are carrying out CSR. This suggests that companies are increasingly adopting greater focus towards sustainability, leaving enough room to test their relationship to financial distress.

Pearson correlation matrix and the significance levels for the variable of the study have been displayed in table 2.

Table 2 Correlation Matrix

Variables	Z	CSR	LVG	Age
Z	1.000			
CSR	0.496*	1.000		
LVG	-0.199*	-0.026	1.000	
Age	-0.044	-0.072	0.000	1.000

The correlation results indicate moderate and statistically significant positive association between CSR and the Z-score ($r = 0.496$, $p < 0.01$), suggesting that firms engaged in CSR tend to exhibit stronger financial health and lower default risk. This preliminary evidence supports Hypothesis H2, which predicts a negative relationship between CSR and financial distress. Leverage is negatively and significantly correlated with the Z-score ($r = -0.199$, $p < 0.01$), indicating that higher debt levels are associated with weaker financial stability. This finding is consistent with traditional capital structure theory and provides initial support for Hypothesis H4. Firm age does not exhibit a statistically significant correlation with either financial distress or CSR engagement, suggesting that maturity alone does not guarantee financial stability or higher CSR involvement. Importantly, the low correlations among independent variables indicate no serious multicollinearity concerns, supporting the validity of the regression analysis.

The stationarity of the variables is assessed by using the Levin–Lin–Chu (LLC) unit root test. The test is performed before estimating panel regression models to assess the suitability of selected models.

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

The results are presented in Table 3.

Table 3 Levin–Lin–Chu (LLC) unit root test

Variable	t-statistic	p-value	Result
CSR	-6.2335	0.000	Stationary
LVG	-7.6575	0.000	Stationary
AGE	-1.6e+02	0.000	Stationary
Z score	-11.5682	0.000	Stationary

The LLC test results reject the null hypothesis of non-stationarity for all variables at the 1% significance level. This confirms that the panel series are stationary, ensuring that regression estimates are not affected by spurious correlations and that conventional panel estimation techniques are appropriate.

Table 4 presents the pooled OLS regression results examining the relationship between CSR, leverage, firm age, and financial distress.

Table 4 Pooled OLS

Variable	Coefficient	Std. Error	t-stat	p-value
LVG	-2.303	0.814	-2.83	0.005
AGE	-0.003	0.026	-0.13	0.896
CSR	1.148	0..154	7.43	0.000
Constant	6.277	1.209	5.19	0.000

The model statistics are $F = 21.60$ ($p < 0.001$), $R^2 = 0.281$, Adj. $R^2 = 0.268$. The CSR sustainability shows a positive and highly significant coefficient indicating that CSR active firms have Z-scores approximately 1.15 points higher than non-CSR firms holding other factors constant. This result strongly supports Hypothesis H2 and suggests that CSR engagement is associated with lower default risk. Leverage exerts a significant negative effect on the Z-score and confirming Hypothesis H4. Firm age is statistically insignificant providing no support for Hypothesis H3 at this stage.

To account for unobserved firm heterogeneity a random effects GLS model is estimated and results are presented in Table 5.

Table 5 Random-effect estimation results

Variable	Coefficient	Std. Error	z-stat	p-value
LVG	−2.303	0.814	−2.83	0.005
AGE	−0.003	0.026	-0.13	0.895
CSR	1.148	0.154	7.43	0.000
Constant	6.277	1.209	5.19	0.000

Table 5 results indicate that the random-effects results mirror the pooled OLS findings and supported robustness. CSR remains positively and strongly associated with financial stability and leverage continues to increase financial distress. The rho value of zero indicates negligible firm-specific variance suggesting that cross-sectional differences are limited after controlling for observed variables. The Wald $\chi^2 = 64.81$ ($p < 0.001$) and Overall $R^2 = 0.281$.

Table 6 fixed-effects estimation results.

Variable	Coefficient	Std. Error	z-stat	p-value
LVG	−2.114	0.872	-2.42	0.017
AGE	−0.003	0.026	-0.11	0.913
CSR	1.193	0.164	7.29	0.000
Constant	6.075	1.250	4.86	0.000

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

The fixed-effects regression results presented in Table6 confirm that CSR engagement consistently improves financial stability. The leverage increases default risk. The F-test for fixed effects (p = 0.785) indicates that firm-specific effects are not statistically significant reinforcing the appropriateness of the random-effects specification.

The Hausman test compares fixed- and random-effects estimators.

Table 7 Hausman Test Results

χ^2 (df = 3)	p-value
0.94	0.815

Table 7 results presents the Hausman test result to choose between the suitable model. The insignificant test statistic indicates no systematic difference between estimators. Therefore, the random-effects model is preferred as it is both consistent and efficient.

Table 8 Summary of Results

Hypothesis	Statement	Result
H1	Z-Score predicts financial distress	Supported
H2	CSR negatively relates to financial distress	Supported
H3	Firm age reduces financial distress	Not Supported
H4	Leverage increases financial distress	Supported

The findings of the study support that the CSR initiatives of firm have an impact of CFD. The study results provide strong evidence that CSR engagement is systematically associated with lower default risk. The magnitude and consistency of the CSR coefficient across all models highlight its relevance in explaining financial stability. Leverage, however, is the most salient risk-contingent factor reminding one of the risk posed by the vulnerability of the company through its indebtedness. Firm age was not found to be a significant determinant in the company's experience with distress. Experience does not translate into greater financial strength.

Discussion:

Results from the study provide evidence that the companies actively participating in the CSR activities result in a lower default risk. The results clearly suggest a strong and positive correlation between default risk and engagement in CSR activities, as evident from Z-scores, suggesting that companies actively participating in CSR activities face a lower risk of default or financial distress. The result was similar across the results obtained from pooled OLS, random effects models, and fixed effects models, thus emphasizing the result and its consistency and replicability across different models and their specifications. This result also confirms an essential aspect regarding the value of the CSR coefficient, as it explicitly indicates that organizations actively involving themselves in CSR activities experience a significantly more superior financial situation compared to those organizations that do not expose their sustainable conduct and activities through their reports and statements. This outcome is well-supported and confirms the existing literature regarding the relationship between superior CSR engagement and the reduced risks and enhanced financial performances of organizations. For instance, Lins et al. (2017) explicitly stated and justified the idea that organizations with superior performance at the level of CSR experience superior performance at the level of operation and stock returns when exposed to the stressed environment of the marketplace, implying superior resistance to the risks of the marketplace. Similarly, (Shahrour, Girerd-Potin, & Taramasco, 2021; Sun & Cui, 2014)find that socially responsible firms face lower downside risk, which reduces notes on distress probability. The

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

present study extends this literature by showing that CSR is not only linked to market-based risk measures but also to accounting-based indicators of financial distress.

The relationship between CSR and CDR is grounded on signaling theory. The result of the study are consistent with signalling theory and posits that firms engage in observable actions to convey unobservable quality to external stakeholders. The engagement in CSR activities can serve as a signal for long-term orientation and prudent management, which in turn can lower perceived default risk. Notably, the findings do not imply that a company engages in symbolic actions for CSR but that its link with better Z-scores suggests that a connection for CSR can be made with underlying economic values and not with reputations. The findings indicate that a negative relationship between leverage and Z-scores exists, and this supports the view that a high level of indebtedness significantly increases the risk of financial distress. This is in line with the traditional capital structure approach proposed in capital structure theory and a considerable body of literature providing evidence that high capital structure risks exacerbates underlying vulnerabilities. Studies consistently report leverage as one of the strongest predictors of default risk (Campbell, Hilscher, & Szilagyi, 2008). That the leverage effect remains significant in all model specifications indicates that the risk of debt dependence has become a structural challenge that may not easily be mitigated by the effect of corporate maturity and size. Even when controlling for the effect of CSR engagement, the leverage effect again tends to influence financial stability negatively. This implies that while financial stability may result from good CSR practices, the practices do not easily substitute for sound financial structure management practices. These findings do not support the association between firm age and CDR. Common expectations of a positive association are also contradicted since older firms are often assumed to be in the privileged position of accumulated experience, reputation, and stable stakeholder relations. The result implies that longevity does not necessarily translate into financial soundness. This finding is in line with evidence reported by (Hasan & Rahman, 2020), who show that mature firms may also suffer from organizational rigidity and declining competitiveness, thus offsetting any possible advantage related to experience. Lack of significance also supports the idea that age may be homogeneous within the sample, as the majority of firms are well-established. In such contexts, given the financial structure and CSR engagement, age would have limited explanatory power.

Conclusion

This research examines the link between CSR and CDR through the application of panel data on the listed PSX firms. The Altman Z-score is employed as a default risk estimate. The results confirm that a clear link exists between engagement in CSR and a reduced risk of financial distress. Leverage was found to have a significant amplifying effect on default risk. The age of a firm does not have a significant effect on its stability. Combining a consideration of CSR with the established distress model is useful in proving that CDR is not incongruous with conventional finance. Rather, CDR is systematically associated with a superior risk profile. These results confirm that CDR is an issue that merits an economic perspective and is not a matter of personal choice.

The results of this research have several contributions to the CFD, CSR literature. Firstly, this research advances the Altman Z-score model by considering the non-financial firm attributes, thereby addressing the needs emphasized in substantive literature. Secondly, this research empirically validates the signalling theory by uncovering that the engagement with CSR is linked to lower default risk. Lastly, this work helps address the conflicting studies in the CSR and risk literature by displaying that accounting distress risk is decreased as a result of CSR, in addition to market distress risk. The result has very significant implications for corporate managers, investors, and regulators. For corporate managers, it highlights that financial stability can be created or

increased by engaging with CSR, given proper financial policies. But it must be supplemented by proper leverage management. For investors and lenders, it highlights that by including information about CSR, they can make more accurate assessments about default probabilities. It highlights that regulators must strengthen disclosure requirements about CSR, as it has some information content for financial risk assessment.

Limitations and Future Research Directions

Besides the aforementioned contributions, the study has few limitations. The CSR variable is estimated by the use of a binary disclosure-driven variable measured from the firms annual reports and sustainability disclosures. Later studies may use the actual indices of the CSR or the use of ESG scores by third-party rating services, where applicable. There is also the issue of the simultaneous relationship between the presence of CSR and the financial distress. It can be assumed that studies may be able to use dynamic panels and/or instruments to deal with this issue. Later studies may also establish the influence of the institutional framework on the relationship between CFD and the effect of CSR or the role of the distinct aspects of the former to achieve the results. Another area of study may be the role of the presence of CFD and the role of the existence of financial resilience in the relationship. Examining crisis versus non-crisis periods might further clarify the conditions under which CSR contributes most strongly to financial resilience.

References

Abdelkader, N. A. M., & Wahba, H. H. (2024). A proposed multidimensional model for predicting financial distress: an empirical study on Egyptian listed firms. *Future Business Journal*, *10*(1), 42.

Albuquerque, R., Koskinen, Y., & Zhang, C. (2019). Corporate social responsibility and firm risk: Theory and empirical evidence. *Management Science*, *65*(10), 4451-4469.

Aleknevičienė, V., & Stralkutė, S. (2023). Impact of corporate social responsibility on cost of debt in Scandinavian public companies. *Oeconomia Copernicana*, *14*(2), 585-608.

Ali, W., Bekiros, S., Hussain, N., Khan, S. A., & Nguyen, D. K. (2024). Determinants and consequences of corporate social responsibility disclosure: A survey of extant literature. *Journal of Economic Surveys*, *38*(3), 793-822.

Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, *23*(4), 589-609.

Altman, E. I. (2018). Applications of distress prediction models: what have we learned after 50 years from the Z-score models? *International Journal of Financial Studies*, *6*(3), 70.

Altman, E. I. (2019). Edward I. Altman, PhD: Fifty Years of Z-Scores to Predict the Probability of Corporate Bankruptcy. *Journal of Investment Consulting*, *19*(1), 15-22.

Altman, E. I., Iwanicz-Drozdowska, M., Laitinen, E. K., & Suvas, A. (2014). Distressed firm and bankruptcy prediction in an international context: A review and empirical analysis of Altman's Z-score model. *Available at SSRN 2536340*.

Andrew, R. M. (2018). Global CO 2 emissions from cement production. *Earth System Science Data*, *10*(1), 195-217.

Ardian, A., & Sari, M. R. (2024). ESG, CSR, and company characteristics in forming investor reactions. *EKUITAS (Jurnal Ekonomi Dan Keuangan)*, *8*(1), 138-163.

Asis, G., Chari, A., & Haas, A. (2021). In search of distress risk in emerging markets. *Journal of International Economics*, *131*, 103463.

Baltagi, B. H. (2008). Forecasting with panel data. *Journal of Forecasting*, *27*(2), 153-173.

Bandyopadhyay, A. (2006). Predicting probability of default of Indian corporate bonds: logistic and Z-score model approaches. *The Journal of Risk Finance*, *7*(3), 255-272.

Barnea, A., & Rubin, A. (2010). Corporate social responsibility as a conflict between shareholders. *Journal of business ethics*, *97*(1), 71-86.

Beaver, W. H., Correia, M., & McNichols, M. F. (2011). Financial statement analysis and the prediction of financial distress. *Foundations and Trends® in Accounting*, *5*(2), 99-173.

Bolton, P., & Kacperczyk, M. T. (2021). Carbon disclosure and the cost of capital. *Available at SSRN 3755613*.

Boubaker, S., Cellier, A., Manita, R., & Saeed, A. (2020). Does corporate social responsibility reduce financial distress risk? *Economic Modelling*, *91*, 835-851.

Campbell, G. (2010). Bubbles and Leverage.

Campbell, J. Y., Hilscher, J., & Szilagyi, J. (2008). In search of distress risk. *The Journal of Finance*, *63*(6), 2899-2939.

Cardillo, G., & Chiappini, H. (2022). The credit risk of sustainable firms during the pandemic. *Global Business Review*, *23*(6), 1462-1480.

Ceylan, E., Mutlu, S., & Şimşek, R. (2024). Corporate Social Responsibility Performance and Financial Risk Dynamics in Turkish Companies Listed on Borsa Istanbul. *JOEEP: Journal of Emerging Economies and Policy*, *9*(Special Issue), 104-119.

Chava, S., & Jarrow, R. A. (2004). Bankruptcy prediction with industry effects. *Review of Finance*, *8*(4), 537-569.

Chishti, M. F., Rao, M., Raffat, M. W., & Rafi, S. (2024). Estimating Corporate Risk and Corporate Value An Application Of Altman's Z-Score On The Kse-30 Index. *International Journal of Contemporary Issues in Social Sciences*, *3*(2), 2833-2841.

Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of management*, *37*(1), 39-67.

Dhaliwal, D. S., Li, O. Z., Tsang, A., & Yang, Y. G. (2011). Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting. *The accounting review*, *86*(1), 59-100.

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, *60*(11), 2835-2857.

Farooq, M., & Noor, A. (2021). The impact of corporate social responsibility on financial distress: Evidence from developing economy. *Pacific Accounting Review*, *33*(3), 376-396.

Farooq, M., & Noor, A. (2025). The impact of corporate social responsibility on financial constraints: the role of insider and institutional ownership. *Journal of Financial Reporting and Accounting*, *23*(4), 1630-1655.

Flammer, C. (2015). Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. *Management Science*, *61*(11), 2549-2568.

Garlappi, L., & Yan, H. (2011). Financial distress and the cross-section of equity returns. *The Journal of Finance*, *66*(3), 789-822.

Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of corporate finance*, *66*, 101889.

Hasan, M. T., & Rahman, A. A. (2020). The role of corporate governance on the relationship between IFRS adoption and earnings management: Evidence from Bangladesh. *International Journal of Financial Research*, *11*(4), 329-345.

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: journal of the Econometric Society*, 1251-1271.

Islam, H., Rahman, J., Tanchangya, T., & Islam, M. A. (2023). Impact of firms' size, leverage, and net profit margin on firms' profitability in the manufacturing sector of Bangladesh: An empirical analysis using GMM estimation. *Journal of Ekonomi*, *5*(1), 1-9.

Khan, N., Malik, Q., Saghir, A., Rasheed, M. H., & Husnain, M. (2021). Does corporate social responsibility reduce financial distress? Evidence from emerging economy. *Management Science Letters*, *8*(11), 2225-2232.

Levin, A., Lin, C.-F., & Chu, C.-S. J. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of econometrics*, *108*(1), 1-24.

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.03 No.04 (2025)

Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *The Journal of Finance*, *72*(4), 1785-1824.

Mehmood, A., & De Luca, F. (2025). Financial distress prediction in private firms: developing a model for troubled debt restructuring. *Journal of Applied Accounting Research*, *26*(6), 205-222.

Mulyaningsih, T., Sarmidi, T., & Cahyadin, M. (2023). Corporate Debt, Institutional Differences and Firms' Financial Distress in Emerging Economies under Uncertainty. *JDM (Jurnal Dinamika Manajemen)*, *14*(2), 300-316.

Mushafiq, M., & Prusak, B. (2022). Does being socially good save firms from bankruptcy? A systematic literature review and bibliometric analysis. *Economics and Environment*, *83*(4), 35-59.

Oikonomou, I., Brooks, C., & Pavelin, S. (2012). The impact of corporate social performance on financial risk and utility: A longitudinal analysis. *Financial management*, *41*(2), 483-515.

Pham, M. T., Nguyen, D. T., & Thanh, P. N. (2024). THE RELATIONSHIP BETWEEN CORPORATE SOCIAL RESPONSIBILITY AND FINANCIAL PERFORMANCE: EMPIRICAL EVIDENCE FROM AN EMERGING COUNTRY.

Qiu, W., Rudkin, S., & Dłotko, P. (2020). Refining understanding of corporate failure through a topological data analysis mapping of Altman's Z-score model. *Expert Systems with Applications*, *156*, 113475.

Saeed, A., & Sroufe, R. (2021). Performance, risk, and cost of capital: Trends and opportunities for future CSR research. *Journal of Risk and Financial Management*, *14*(12), 586.

Shahrour, M. H., Girerd-Potin, I., & Taramasco, O. (2021). Corporate social responsibility and firm default risk in the Eurozone: a market-based approach. *Managerial Finance*, *47*(7), 975-997.

Singh, G., & Singla, R. (2023). Default risk and stock returns: Evidence from Indian corporate sector. *Vision*, *27*(3), 347-359.

Spence, M. (1973). l the MIT press. *The quarterly journal of economics*, *87*(3), 355-374.

Stellner, C., Klein, C., & Zwergel, B. (2015). Corporate social responsibility and Eurozone corporate bonds: The moderating role of country sustainability. *Journal of Banking & finance*, *59*, 538-549.

Suganda, T. R., & Kim, J. (2023). An empirical study on the relationship between corporate social responsibility and default risk: Evidence in Korea. *Sustainability*, *15*(4), 3644.

Sun, W., & Cui, K. (2014). Linking corporate social responsibility to firm default risk. *European Management Journal*, *32*(2), 275-287.

Tron, A. (2021). *Corporate financial distress: Restructuring and turnaround*. Emerald Publishing Limited.

Utami, E. S., & Hasan, M. (2021). The role of corporate social responsibility on the relationship between financial performance and company value. *The Journal of Asian Finance, Economics and Business*, *8*(3), 1249-1256.

Vivel-Búa, M., Lado-Sestayo, R., Martínez-Salgueiro, A., & Díaz-Ballesteros, M. (2024). Environmental, social, and governance perfomance and default risk in the eurozone. *Review of Managerial Science*, *18*(10), 2953-2980.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Zouaghi, F., Garcia-Marco, T., & Martinez, M. G. (2024). Navigating firm financial distress in turbulent times: The impact of the institutional context. *Business Strategy and the Environment*, *33*(8), 8037-8054.