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Does CSR disclosure mitigate financial distress? Evidence from Indonesian manufacturers and the COVID-19 shock

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ABSTRACT

This study examines whether corporate social responsibility disclosure (CSRD) reduces financial distress and whether this effect becomes stronger during a systemic shock. Using panel data from 21 Indonesian manufacturing firms over the period 2017–2020, financial distress is measured by the Altman Z-score. The analysis applies pooled ordinary least squares (OLS), random-effects, fixed-effects, and feasible generalized least squares (GLS) models, including an interaction term between CSRD and the COVID-19 period. The results show that in non-crisis years, higher CSRD is associated with lower Z-scores, suggesting the presence of short-term compliance and implementation costs. However, during the COVID-19 period, the interaction term between CSRD and COVID-19 is positive and statistically significant, indicating that CSRD improves Z-scores and reduces financial distress when shocks occur. This study contributes firm-level evidence from an emerging market and highlights a crisis-dependent effect of CSRD, helping to explain inconsistent findings in previous studies. The results suggest that firms can enhance resilience by investing in credible disclosure systems, while policymakers can support financial stability by encouraging transparent sustainability reporting, particularly during economic downturns.

1. Introduction

First mentioned in 1987, sustainable development has recently garnered significant attention amid ongoing alarm bells over pandemics, environmental pollution, climate change, and resource depletion resulting from rapid economic development. More than ever, a balance between economic growth, social development, and environmental protection is needed to ensure that current development does not harm future generations. As a result, corporate social responsibility disclosure (CSRD) is increasingly vital in the business world. Specifically, research by Bernardi and Stark (2018) indicates that investors require companies to provide not only financial reports but also performance reports regarding their CSR efforts. Therefore, companies seeking greater success must raise awareness of CSR's importance and effectively implement their CSRDs in recent decades (Dhaliwal et al., 2014).

Over 70% of business leaders view the implementation of social responsibility as a vital factor for the survival and growth of their companies. Additionally, Jiraporn et al. (2014) indicated that companies with high CSR ratings can enhance their reputation to secure financing at lower borrowing costs. Furthermore, Lins et al. (2017) showed that the disclosure of social responsibility reports improves financial performance and reduces risk for the company (Mishra and Modi, 2013).

In Indonesia, the largest country in Southeast Asia and a significant contributor to the development of the manufacturing sector, corporate social responsibility (CSR) requirements were established in 2007 when the Indonesian parliament passed Law 40/2007 on Limited Liability Companies. However, debates regarding the role of CSR practices in the operational performance of businesses in Indonesia continue to unfold (Rosser and Edwin, 2010). Specifically, Razafindrambinina and Sabran (2014) asserted that CSR disclosure (CSRD) does not have a significant impact on business performance. In contrast, studies by Laksmi

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and Hasri (2022) and Aula et al. (2022) confirmed the positive impact of CSRD on the return on assets (ROA) and return on equity (ROE) of companies and banks. Furthermore, Nurfadila and Sukmayanti (2020) demonstrate that CSRD enhances the relationship between financial performance and dividends for businesses.

It is evident that numerous previous studies have examined the impact of corporate social responsibility disclosure (CSRD) on business operations in Indonesia; however, none have delved deeply into the relationship between CSRD and financial risk, particularly in the context of the COVID-19 pandemic, which has severely affected the global economy.

Therefore, this paper aims to investigate the impact of social responsibility disclosure on financial risk in Indonesian companies, with a particular focus on the effects of CSRD on financial risk before and during the COVID-19 pandemic. This study utilizes data from 21 publicly listed manufacturing companies on the Indonesian stock exchange from 2017 to 2020. The research findings indicate that CSRD significantly reduces financial risk for companies during the COVID-19 period. Thus, the study emphasizes that manufacturing companies in Indonesia need to clearly recognize the importance of complying with legal regulations and social standards regarding CSRD, as well as take more proactive actions in disclosing their social responsibility practices to ensure safe and sustainable development in the future.

The paper is organized as follows, excluding the introduction: Section 2 provides the theoretical background and empirical evidence. Section 3 outlines the research methods employed. Section 4 presents the results and discussion, while Section 5 concludes the paper.

2. Theoretical background and empirical evidence

2.1. Theoretical background

This study explores the relationship between social responsibility disclosure and financial risk, drawing on theories of social responsibility and corporate activities. Notably, Stakeholder Theory and Legitimacy Theory serve as the foundational frameworks for this research.

Stakeholder Theory, advanced by Freeman (2010), has become a pivotal framework in management theory since its emergence in the 1960s. According to Freeman (2010), stakeholders encompass individuals or groups that can affect or be affected by an organization's activities, including employees, customers, suppliers, local communities, and government entities. This theory posits that organizations have responsibilities not only to shareholders but also to all stakeholders, necessitating a balance of their diverse goals and needs to achieve sustainable success. As a result, Stakeholder Theory serves as a foundational framework for understanding the impact of Corporate Social Responsibility (CSR). Altman et al. (2019) noted that one contributing factor to financial risk is executives' inadequate managerial skills. Companies that prioritize CSR typically enjoy higher credit ratings and foster trust among stakeholders, thereby enhancing stability and growth (Attig et al., 2013). The relationship between companies and their shareholders can be strengthened through effective CSR practices, ensuring that all stakeholders, including those who do not directly impact financial performance, are kept informed about corporate social initiatives.

Moreover, Vagin et al. (2022) argued that implementing social responsibility enables organizations to use internal resources more effectively, aligning social and environmental objectives with operational efficiency and ultimately reducing financial risk. Thus, applying Stakeholder Theory is not only appropriate but essential for understanding the interplay between CSR and financial risk management.

On the other hand, Legitimacy Theory, as developed by Lindblom (1994), is frequently employed in social and financial research to explain the rationale behind companies' voluntary disclosure of social and environmental information. This theory posits that the relationship between businesses and society is dynamic, with societal responsibilities and expectations continually evolving. Consequently, organizations must adapt their operations to align with these changing societal norms.

Lindblom (1994) identified four strategies that companies can use to legitimize their activities: educating stakeholders about actual performance, altering stakeholders' perceptions without changing organizational behavior, diverting attention from problematic issues, and shifting the focus to more favorable topics or changing external expectations. These strategies can be manifested through Corporate Social Responsibility (CSR) activities and reporting practices. For instance, companies often highlight positive CSR initiatives while downplaying negative aspects, indicating a deliberate effort to communicate legitimacy through CSR disclosures (Deegan and Soltys, 2007).

Numerous studies have also used this theory to elucidate CSR activities across different sectors (Deegan and Rankin, 1996; Deegan et al., 2000; 2002; Milne and Patten, 2002). While some empirical studies challenge the validity of Legitimacy Theory (O'Dwyer, 2002), an increasing body of research supports its relevance in explaining CSR disclosures (Deegan et al., 2000; Archel et al., 2009). Legitimacy Theory suggests that companies disclose CSR information to legitimize their operations and enhance their reputations. Furthermore, CSR disclosure plays a critical role in reducing information asymmetry and improving transparency, thereby enhancing financial accessibility and reducing financial risk for organizations. Therefore, employing Legitimacy

Theory to argue that CSR disclosure mitigates financial risk is a compelling approach.

In summary, Stakeholder Theory and Legitimacy Theory are two critical frameworks that elucidate the relationship between corporate social responsibility (CSR) disclosure and financial risk. Stakeholder Theory, as articulated by Freeman (2010), posits that organizations have responsibilities not only to shareholders but also to a diverse array of stakeholders, including employees, customers, suppliers, and the broader community. This theory emphasizes the need for businesses to address the legitimate interests of all stakeholders to achieve sustainable success. By aligning corporate practices with stakeholder expectations, organizations can enhance their credibility and reduce potential financial risks associated with stakeholder discontent.

Conversely, Legitimacy Theory, developed by Lindblom (1994), explained why companies voluntarily disclose social and environmental information. It suggests that businesses must adapt their operations to meet evolving societal expectations, thereby legitimizing their activities. This approach helps mitigate negative perceptions arising from selective disclosure or a lack of transparency, thereby reducing financial risk.

Both theories clearly underscore the importance of transparency in CSR practices. By integrating Stakeholder and Legitimacy Theories, organizations can better understand how to leverage CSR disclosure to ultimately minimize financial risk and foster long-term sustainability.

2.2. Empirical studies

Prior empirical research increasingly examines whether corporate sustainability or CSR disclosure (CSRD) functions as a mechanism for mitigating firm risk and financial distress. From a stakeholder-oriented perspective, firm performance is not assessed solely through conventional financial statements; stakeholders also demand credible information on social and environmental performance. This demand can motivate firms to disclose sustainability initiatives to build trust and reduce information asymmetry, with potential implications for risk management and resilience (Waddock and Graves, 1997).

Nevertheless, evidence on the CSRD-risk linkage remains mixed, in part because CSR/CSRD is measured heterogeneously across firms and settings. Aupperle et al. (1985) showed that variation in how social performance is conceptualized and assessed complicates cross-firm comparisons and can obscure systematic relationships with financial outcomes. Moneva et al. (2007) further highlighted that incomplete reporting histories and differences in disclosure quality constrain inference and make estimates sensitive to index construction. In a related vein, Mittal et al. (2008) argued that CSR initiatives are more likely to translate into observable value creation when investors and stakeholders consider CSR decision-useful and credible; otherwise, market responses may remain weak or ambiguous.

Against this backdrop, recent large-sample studies using explicit distress proxies provide clearer evidence that CSR/CSRD can be risk-relevant under normal conditions. Using 1,201 US-listed firms over 1991-2012, Boubaker et al. (2020) reported that stronger CSR is associated with lower financial distress risk and interpreted the effect through improved creditworthiness and financing access. In emerging markets, Thuy et al. (2021) examined 225 Vietnamese listed firms (2014-2019) and found that CSR disclosure is negatively related to firm risk, suggesting that transparent sustainability reporting can lower perceived risk exposures. Tarighi et al. (2022), studying 200 Iranian listed firms (2013-2018), likewise document a significant relationship between CSRD and financial distressed risk and show that institutional ownership conditions this association, underscoring the role of monitoring and credibility in translating disclosure into risk mitigation.

Beyond effects in normal periods, a growing empirical literature assesses whether the CSRD/CSR-risk relationship changes during systemic shocks, when information needs, legitimacy pressure, and financing constraints intensify. Lins et al. (2017) show that firms with stronger CSR exhibited superior performance during the 2008-2009 financial crisis, consistent with an insurance-like mechanism that becomes more valuable when markets are stressed. However, crisis payoffs are not universal across institutional settings. Particularly, Zhang et al. (2020) replicated crisis evidence and tested it during the 2015 Chinese stock market crisis, finding limited crisis-period valuation benefits of CSR and attributing the difference to institutional environment and signal credibility. COVID-19 evidence also supports state dependence. Huang and Ye (2021) found that the risk-increasing effect of excessive leverage during the pandemic is more pronounced for firms with weaker CSR, implying that CSR can buffer risk when shocks amplify solvency concerns. In Indonesia, Oeyono et al. (2011) document the growing salience of CSR disclosure among leading listed corporations and the use of GRI-based indicators, suggesting that stakeholder demand and reporting practices have been evolving in ways that could heighten the relevance of disclosure in adverse periods.

Taken together, prior studies imply that the CSRD/CSR-risk nexus is sensitive to measurement quality and may be regime-dependent, with crisis periods potentially amplifying the role of credible disclosure. Yet, Indonesia-specific evidence remains limited in two respects. First, firm-year CSRD measures that are systematically comparable and suitable for modelling financial distress are scarce, constraining direct tests of disclosure effects on distress proxies. Second, explicit crisis-moderation tests for Indonesia, particularly for COVID-19, are rare in the distress literature. Addressing these gaps,

this study examines the association between CSRD and financial distress (measured using a Z-score-based proxy) for Indonesian listed manufacturing firms and explicitly tests crisis effects through a COVID-period interaction term (CSRD x COVID).

3. Research methods

3.1. Research model

Based on the two foundational theories for this research—the Stakeholder Theory and the Legitimacy Theory—as well as the findings from previous studies, the research group proposes a model to study the impact of corporate social performance disclosure effectiveness on financial distressed risk (FDR) of listed manufacturing companies on the Indonesian stock market as follows:

$$FDR_{i,t} = \beta_0 + \beta_1 IND_{i,t} + \beta_2 BS_{i,t} + \beta_3 CEOD_{i,t} + \beta_4 CSRD_{i,t} + \beta_5 COCSR_{i,t} + \beta_6 GROW_{i,t} + \beta_7 PROF_{i,t} + \beta_8 FSIZE_{i,t} + u_{it} \quad (1)$$

where,

- i and t represent the firm and year, respectively
- FDR: Financial distressed risk (Z-score)
- IND: Shareholder independence (based on BvD Independence Index)
- BS: Board size (number of Board members)
- CEOD: CEO Duality is a dummy variable, equal to "1" if the CEO is also the Chairman of the Board of Directors and equal to "0" otherwise.
- CSRD: Corporate social responsibility disclosure
- COCSR: Calculated by the variable COVID*CSRD in which the variable COVID takes the value = "1" for 2020; takes the value = "0" for the remaining years
- GROW: Growth opportunity measured by the rate of change in total assets.
- PROF: Profitability is defined as the ratio of pre-tax profit to total assets.
- FSIZE: Enterprise size measured by the natural logarithm of total assets (unit: million USD)

3.2. Data

This study examines the effect of corporate sustainability reporting disclosure (CSRD) on financial distress in Indonesia. During the study period, no single source provided both standardized firm-level financial statements and a comparable firm-year CSRD measure for Indonesian listed companies. Therefore, the dataset was assembled by merging two complementary sources, and the effective sample is determined by the overlap in their coverage. Financial variables were retrieved from Orbis, whereas firm-year CSRD scores were taken from Cahyaningsih and Septyaweni (2022), a limited but systematic source of Indonesian CSRD data grounded in the disclosure requirements of OJK Regulation No. 51/POJK.03/2017. As a result, the analysis uses a balanced panel of 21 Indonesian manufacturing firms listed on the Indonesia Stock Exchange over 2017–2020.

FDR (Finance Distressed Risk) is an explanatory variable, reflecting the risk of default of manufacturing companies. To measure the financial risk of these enterprises, the study uses the Altman Z-score formula, and the research team decided to use the Z-score for manufacturing enterprises as follows:

$$Z = 1.2A + 1.4B + 3.3C + 0.6C + E \quad (2)$$

where,

A = (Current Assets - Current Liabilities) / Total Assets
B = Retained Earnings / Total Assets
C = EBIT / Total Assets
D = Market Value of Equity / Total Liabilities
E = Sales / Total Assets

Many critics have argued that the original Altman model had limited applicability to general business enterprises; therefore, Altman revised the model in 1983 by replacing the book value of equity with the market value of equity and modifying the coefficients as well as the bankruptcy classification criteria (Altman et al., 2019; Karamzadeh, 2013). This model is mainly used in manufacturing companies and has very high accuracy (Karamzadeh, 2013). For example, analysis of the Iranian market shows that the Altman Z-score model has a high ability to predict the probability of bankruptcy for Iranian companies, with a very low error rate. This is an advantage when using Z-scores to evaluate the impact of CSRD on financial risk. In addition, if the calculated Z-Score shows that when a business has an index below 1.81, it is considered dangerous and has serious financial problems. If it is between 1.81 and 2.99, the business is in the risk zone. Finally, a manufacturing business with a Z-Score above 2.99 is considered a financially healthy business and has no risks in the near future.

Following Cahyaningsih and Septyaweni (2022), CSRD is measured using an item-based disclosure index constructed through content analysis of corporate reports. The scoring checklist is aligned with OJK Regulation No. 51/POJK.03/2017 and comprises 67 disclosure items, including 27 items on general information and 40 items on sustainability implementation. The sustainability implementation items cover economic (7 items), social (15 items), and environmental (18 items) aspects.

For each firm-year observation, an item is assigned a value of 1 if the corresponding disclosure is explicitly reported in the annual report and/or sustainability report, and 0 otherwise. The CSRD index is computed as the proportion of disclosed items to the total items, yielding a continuous measure bounded between 0 and 1:

$$CSRD_{it} = \frac{\sum_{j=1}^{67} Disclosure_{ijt}}{67} \quad (3)$$

where, $Disclosure_{ijt} \in \{0,1\}$ indicates whether firm i discloses item j in year t.

Higher CSRD values indicate more extensive sustainability disclosure. This transparent content-analytic scoring procedure directly addresses the measurement requirement and ensures comparability across firms and years within the Indonesian regulatory context.

4. Results and discussion

4.1. Data description

Table 1 displays the summary statistics of the data for the variable (CSRD) and independent and control variables: IND, BS, CEOD, GROW, PROF, and FSIZE.

Table 1: Description statistics of research variables

Variable	Mean	SD	Min	Max
ZSCORE	8.554	7.775	0.906	39.915
CSRD	0.641	0.081	0.478	0.851
COCSR	.0108	0.226	0.000	0.672
IND	3.561	2.538	2.000	10.000
BS	5.205	2.321	2.000	10.000
CEOD	0.780	0.416	0.000	1.000
GROW	0.059	0.130	-0.230	0.625
PROF	0.163	0.167	-0.244	0.708
FSIZE	5.885	1.574	3.526	8.655

The dependent variable, Z-score, has an average value of 8.554429, indicating that companies generally have a low likelihood of experiencing financial risk. However, the standard deviation of 7.775523 suggests that there is significant variation in the level of financial risk among companies over the years. The wide range of variation, from 0.9060833 to 39.91569, shows considerable differences in the companies' risk-taking behavior.

CSRD (Corporate Social Responsibility Disclosure) for the 21 companies during the 2017-2020 period is 0.6413699, with values ranging from 0.478 to 0.851, indicating a large disparity in the level of CSR implementation between companies. The standard deviation of 0.0816106 suggests that the difference between companies in terms of CSR implementation is not too significant.

IND (Shareholder Independence) for the 21 companies from 2017 to 2020 is 3.561644. This index ranges from 2 to 10, showing a large difference in shareholder independence among companies. The standard deviation of 2.538516 indicates uneven levels of shareholder independence across companies.

BS (Board Size) has an average value of 5.205479. The standard deviation is 2.321152, with a range from 2 to 10, indicating significant variation in board sizes around this average value. The standard deviation of 2.321152 and the range from 2 to 10 reflect a high degree of diversity in board sizes among companies.

CEOD (CEO Duality) has an average value of 0.7808219, and the standard deviation is 0.4165525, ranging from 0 to 1, indicating differences in the number of CEOs who also hold the position of chairman of the board among the 21 companies.

GROW (Growth Opportunity) has an average value of 0.059466. The standard deviation is 0.1301006, with a range from -0.23 to 0.6249646, reflecting significant differences in growth opportunities, operational efficiency, and business strategies between companies. The standard deviation of 0.1301006 and the range from -0.23 to 0.6249646 indicate considerable variation in actual growth across companies.

PROF (Profitability) has an average value of 0.1631979. The standard deviation is 0.1677787, with a range from -0.2444444 to 0.7081081, showing that companies have a pre-tax profit-to-total assets ratio of around 16.32%. The standard deviation of 0.1677787 and the range from -0.2444444 to 0.7081081 indicate differences in industries, business strategies, cost management, and investment opportunities among companies.

FSIZE (Firm Size), measured in million USD, has an average value of 5.885467. The standard deviation is 1.574214, with a range from 3.526361 to 8.655389, indicating that the asset size of the 21 companies is relatively large. The standard deviation of 1.574214 and the range from 3.526361 to 8.655389 show significant differences in asset size between companies.

Table 2 presents the correlation matrix of the study variables. The correlation coefficients are all below 0.8, indicating that there is no significant multicollinearity between the variables in the model that would affect the estimation results.

Table 2: Correlation matrix of research variables

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ZSCORE	1.000								
(2) CSRD	0.318	1.000							
(3) COCSR	-0.090	-0.408	1.000						
(4) IND	-0.145	-0.028	-0.083	1.000					
(5) BS	-0.064	-0.042	0.029	0.392	1.000				
(6) CEOD	-0.169	0.029	-0.081	0.328	0.334	1.000			
(7) GROW	-0.203	0.241	-0.165	0.073	0.065	0.017	1.000		
(8) PROF	0.742	0.289	-0.056	-0.250	0.005	-0.502	0.015	1.000	
(9) FSIZE	0.314	-0.068	0.121	0.091	0.602	0.130	0.096	0.311	1.000

4.2. The effect of CSRD on FDR

First, the study estimates the regression model using three common models with panel data: Pooled Ordinary Least Squares (POLS), Fixed Effects Model (FEM), and Random Effects Model (REM). Next, the study employs tests to compare model pairs, including: the POLS and FEM pair (F-test) (Appendix

A), REM and POLS (Breusch-Pagan Lagrange test) (Appendix B), and FEM and REM (Hausman test) (Appendix C). The results indicate that REM is the optimal model suitable for research.

Next, the study conducts tests for the deficiencies of the Random Effects Model (REM). The results of the variance heteroscedasticity test for the REM indicate that the Prob > chi^2 value (0.0455) is less than 0.05 (Appendix D), suggesting the presence of heteroscedasticity in the model. Similarly, the results of the Wooldridge test show that the Prob > F value is 0.0000, which is below the significance level of 0.05 (Appendix E), indicating that the constructed FEM also exhibits autocorrelation. To address the issues of autocorrelation and heteroscedasticity, the Feasible Generalized Least Squares (FGLS) model is employed. The results of the model are presented in Table 3.

Table 3: Model results after correcting for autocorrelation and heteroscedasticity

ZSCORE	Coefficient	SE	z	P>|z|	[95% confidence interval]	
CSRD	-3.771	0.519	-7.26	0.000	-4.790	-2.752
COCSR	1.335	0.259	5.15	0.000	0.827	1.843
IND	-0.288	0.018	-15.79	0.000	-0.324	-0.253
BS	0.086	0.092	0.94	0.345	-0.093	0.267
CEOD	2.216	0.512	4.33	0.000	1.211	3.220
GROW	-1.813	0.407	-4.45	0.000	-2.610	-1.015
PROF	18.949	0.997	18.99	0.000	16.993	20.905
FSIZE	-0.404	0.139	-2.91	0.004	-0.676	-0.131
Constant	5.191	0.862	6.02	0.000	3.500	6.882

The FGLS regression results in Table 3 indicate the following equation:

Z-score = 5.191628 – 3.771CSRD + 1.335COCSR – 0.288IND + 2.216CEOD – 1.813GROW + 18.949PROF – 0.404FSIZE.

4.3. Discussions

The estimation results show that six variables, CSRD, IND, CEOD, GROW, PROF, and FSIZE, had a significant relationship with the financial distress risk (FDR) of listed manufacturing companies in Indonesia. In which, CEOD and PROF have a positive impact on the Z-score, while the other four variables, CSRD, IND, GROW, and FSIZE, have a negative relationship with the dependent variable Z-score. In addition, only the BS variable showed no significant relationship with FDR.

The results indicate that CSRD is negatively associated with the Z-score in normal times, while the interaction term CSRD×COVID is positive, implying that the role of sustainability disclosure becomes more protective during crisis conditions. In this study, a higher Z-score reflects a lower likelihood of financial distress (i.e., greater financial stability), whereas a lower Z-score indicates a higher distress risk. Accordingly, the negative CSRD coefficient in normal periods suggests that higher CSRD is associated with a lower Z-score (higher distress risk), while the positive CSRD×COVID coefficient implies that during the COVID-19 period, CSRD tends to increase the Z-score (reduce distress risk). This pattern is theoretically plausible when stakeholder theory and legitimacy theory are considered jointly.

From a legitimacy-theory perspective, sustainability reporting in an emerging-market setting may initially be driven by compliance and reputational concerns, requiring firms to allocate resources to reporting systems, data collection, assurance, and related social/environmental initiatives. In the short run, these activities can increase operating and administrative costs and divert managerial attention from core cash-generating operations, thereby weakening near-term financial buffers and reducing the Z-score. This "implementation-cost" channel is likely to be more pronounced when CSRD practices are at an early stage, and firms are still building reporting capabilities, as is often the case for Indonesian companies adapting to evolving disclosure expectations. In addition, if part of the disclosure is symbolic or not yet matched by operational improvements, the market and creditors may not immediately reward the disclosure, which can further explain a negative association in non-crisis periods. By contrast, stakeholder theory provides a compelling explanation for why CSRD becomes beneficial during the COVID-19 shock. A systemic crisis intensifies stakeholder scrutiny and amplifies the value of trust, transparency, and relational capital. Firms with stronger sustainability disclosure can signal credibility and responsible conduct to key stakeholders—creditors, suppliers, employees, regulators, and customers—at a time when liquidity constraints and uncertainty are heightened. This can ease access to external financing, stabilize supplier terms, support workforce commitment, and sustain customer loyalty, ultimately strengthening financial resilience and increasing the Z-score. In other words, while CSRD may impose costs in normal times, it can operate as an "insurance-like" mechanism during crises by protecting stakeholder relationships and mitigating downside risk. This interpretation is consistent with evidence that the risk-mitigation value of CSRD is stronger in adverse environments, where disclosure becomes more salient for investors and stakeholders and more consequential for firm survival (Tarighi et al., 2022). Similar patterns have also been documented in financial institutions, where higher CSR disclosure is associated with improved profitability and reduced risk exposure, suggesting that disclosure can enhance stakeholder confidence when conditions are stressed (Platonova et al., 2018).

Overall, the findings suggest that the CSRD–distress relationship is state-dependent: in normal times, legitimacy-driven compliance and implementation costs may dominate, whereas during a crisis, the stakeholder-support channel becomes more influential, turning CSRD into a stabilizing factor for firm financial health.

Independent Shareholders (IND): IND and Z-Score have opposite effects. When the IND ratio is higher, the Z-score is lower. When the ratio of independent shareholders (IND) increases by 1 unit, the Z-score decreases by 0.2889559 units. The company may be more likely to face financial risk as IND increases. In two studies, Tao et al. (2018) and Tsouknidis (2019) came to the same conclusion. The authors found that when the IND ratio increases, the company may face greater financial risk. The author explains that independent board members may lack an in-depth understanding of the enterprise's specific business operations and therefore cannot make appropriate strategic decisions, leading to a decrease in the enterprise's financial performance and contributing to the decline of the Z-score.

CEO Duality (CEOD): CEOD has a positive relationship with the Z-score. When CEOD increases by one unit, the Z-score will increase by 2.216375 units. Miglani et al. (2015) study highlighted that CEO duality can enhance stability and consistency in corporate governance, thereby improving the enterprise's financial health. The combination of senior leadership roles can help optimize decisions and enhance operational performance. Yang and Zhao's (2014) study also gave similar results. The author emphasized the benefits of CEO duality for cost savings and effective decision-making, leading to an improvement in Z-score.

Growth Opportunities (GROW): GROW has an inverse relationship with Z-score. When the growth rate of a firm increases by 1 unit, the Z-score decreases by 1.813094 units. According to Yahya et al. (2023), fast-growing firms may face significant financial pressures, especially in managing cash flow and capital. The study results emphasize that firms with large growth opportunities often struggle to manage finances. Rapid growth can put significant pressure on the balance between debt and equity, especially in difficult times or market downturns, which can increase financial risk.

Profitability (PROF): PROF and Z-Score have a positive relationship; that is, when PROF increases, Z-score increases and vice versa. This finding aligns with Masdupi et al. (2018), who emphasized that higher profit levels are often associated with better financial health, thereby increasing the enterprise's Z-score. They also noted that higher profits enable the enterprise to invest in development projects and repay debts, thereby improving financial stability. Firm Size (FSIZE): FSIZE and Z-Score have an inverse relationship, which means that when FSIZE increases, Z-Score will decrease. Research by Dirman (2020) showed that small firms have better financial capabilities and higher Z-scores than larger firms. The study also argued that financial distress is negatively affected by a company's size, as measured by total assets. This is because a larger company's total assets will increase its ability to pay off its debts in the future, preventing financial difficulties.

5. Conclusion

The findings indicate that the effect of CSRD on financial stability is state-dependent: in normal periods, higher CSRD is associated with a lower Z-score (i.e., higher distress risk), plausibly reflecting implementation and compliance costs; however, during the COVID-19 period, the positive CSRD×COVID effect suggests that CSRD can become stabilizing, improving the Z-score through stronger stakeholder support and legitimacy benefits. Taken together, these results suggest that it may be beneficial for firms to treat CSRD as a resilience capability—built in normal times and leveraged during shocks—rather than as a purely compliance-driven reporting exercise.

(i) Institutionalizing CSRD in advance may strengthen crisis preparedness. Given that CSRD is associated with improved Z-scores during crises, firms may consider developing a clear disclosure strategy, defining responsibilities, and establishing internal processes (data collection, verification, reporting timelines, and governance oversight) in normal times. This approach can help reduce early-stage implementation burdens that may depress Z-scores and enable timely, credible disclosure when uncertainty rises.

(ii) Focusing on decision-useful, material disclosures may increase stakeholder responsiveness. Firms may benefit from prioritizing disclosures that are directly relevant to operational continuity and risk management (e.g., workforce protection, supply-chain stability, health and safety measures, environmental compliance, and community support), which can shift reporting away from symbolic compliance toward information valued by key stakeholders.

(iii) Improving credibility through consistency and recognized standards may enhance the protective channel. Because stakeholder trust is central in crisis periods, it is advisable to ensure that CSRD information is complete, transparent, and comparable over time. Where feasible, aligning disclosures with widely adopted frameworks (e.g., GRI) and obtaining external assurance may further strengthen credibility and reduce the likelihood that sustainability reporting is discounted by creditors and investors.

(iv) Strengthening stakeholder engagement may reinforce the "insurance-like" role of CSRD. Since CSRD appears more beneficial when stakeholder scrutiny intensifies, firms may consider complementing reporting with structured engagement mechanisms (e.g., communication protocols with banks, suppliers, employees, regulators, and customers) and participatory initiatives (e.g., social programs, responsible products, and transparent updates on ethical and

environmental commitments). Partnerships with reputable CSR organizations and programs may also support capability building and improve disclosure quality.

Limitations and future research. This study has several limitations that should be considered when interpreting the findings. The sample size is relatively small and industry-specific, reflecting a data-availability constraint rather than discretionary sampling: during the study period, systematically coded firm-year CSRD scores were only accessible from a limited number of sources, and our sample is determined by the intersection between these CSRD observations and the corresponding financial data. While this setting provides a suitable testbed for the Indonesian context, the results should be interpreted with caution in terms of external validity. Future research can expand the coverage across industries and years as sustainability disclosure databases in Indonesia become more comprehensive and can further assess robustness using alternative distress proxies and disclosure-quality measures.

List of abbreviations

BS	Board size
BvD	Bureau van Dijk (provider of the Orbis database)
CEOD	CEO duality
COCSR	COVID × CSRD interaction variable
CSR	Corporate social responsibility
CSRD	Corporate social responsibility disclosure
EBIT	Earnings before interest and taxes
FDR	Financial distress risk
FEM	Fixed effects model
FGLS	Feasible generalized least squares
FSIZE	Firm size
GLS	Generalized least squares
GRI	Global Reporting Initiative
GROW	Growth opportunity
IND	Shareholder independence
LM	Lagrange multiplier
OJK	Otoritas Jasa Keuangan
OLS	Ordinary least squares
POLS	Pooled ordinary least squares
PROF	Profitability
REM	Random effects model
ROA	Return on assets
ROE	Return on equity
SD	Standard deviation
SE	Standard error
ZSCORE	Altman Z-score

Appendix A. F-test for fixed effects

The F-test was conducted to determine whether the Fixed Effects Model (FEM) is preferable to the pooled Ordinary Least Squares (OLS) model. The test produced an F-statistic of 3.63 with degrees of freedom equal to (20, 46) and a probability value of 0.0002. Since the probability value is less than the 0.05 significance level, the null hypothesis that all individual effects are jointly equal to zero is rejected. Therefore, the results indicate that the Fixed Effects Model is more appropriate than the pooled OLS specification.

Appendix B. Breusch–Pagan Lagrangian multiplier test

The Breusch–Pagan Lagrangian Multiplier (LM) test was performed to examine whether the Random Effects Model (REM) is more suitable than the pooled OLS model. The estimated variance components showed that the variance of the panel-level error term was 7.827 with a corresponding standard deviation of 2.798, while the variance of the idiosyncratic error term was 12.913 with a standard deviation of 3.593. The overall variance of the dependent variable (ZSCORE) was estimated at 60.459 with a standard deviation of 7.776.

The LM test generated a chi-square statistic of 2.86 with a probability value of 0.0455. Because this probability value is below the 0.05 significance threshold, the null hypothesis that the variance of the random effects is equal to zero is rejected. Consequently, the findings support the use of the Random Effects Model instead of the pooled OLS model.

Appendix C. Hausman test

The Hausman specification test was employed to determine whether the Fixed Effects Model (FEM) or the Random Effects Model (REM) is more appropriate for the panel data analysis. The test compares the estimated coefficients obtained from both models and evaluates whether the differences are systematic.

The estimated coefficients for the explanatory variables differed moderately between the FEM and REM estimations. However, the Hausman test produced a chi-square statistic of 6.17 with six degrees of freedom and a probability value of 0.4039. Since the probability value exceeds the 0.05 significance level, the null hypothesis cannot be rejected. This indicates that the differences between the FEM and REM coefficients are not systematic, implying that the Random Effects Model is more efficient and appropriate for the analysis.

Appendix D. Heteroskedasticity test

A heteroskedasticity assessment was conducted using the variance components obtained from the panel regression model. The estimated variance of the random effects component was 7.827 with a standard deviation of 2.798, whereas the variance of the idiosyncratic error term was 12.913 with a standard deviation of 3.593. The overall variance of the dependent variable (ZSCORE) was estimated at 60.459 with a standard deviation of 7.776.

The test yielded a probability value of 0.0455, which is below the 0.05 significance level. Therefore, the null hypothesis of homoskedasticity is rejected, confirming the presence of heteroskedasticity in the panel data model.

Appendix E. Wooldridge test for autocorrelation

The Wooldridge test for autocorrelation in panel data was conducted to examine the presence of first-order serial correlation in the model residuals. The test generated an F-statistic of 44.373 with degrees of freedom equal to (1, 18) and a probability value of 0.0000.

Since the probability value is substantially lower than the 0.05 significance level, the null hypothesis of no first-order autocorrelation is rejected. Accordingly, the results confirm the existence of autocorrelation in the panel data model.

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Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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