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THE EFFECT OF FINANCIAL RATIO IN THE ALTMAN *Z-SCORE* ON *FINANCIAL DISTRESS*

Ayu Suci Pratiwi[1)] Shinta Heru Satoto [2)] Sri Budiwati Wahyu Suprapti[3)]
UPN "Veteran'Yogyakarta[1,2,3]
E-mail: shintaherusatoto@gmail.com

Abstract: The purpose of this study is to determine the effect of financial ratio in Altman Z-Score Model, that is Net Working Capital to Total Assets, Retained Earnings to Total Assets, Earnings Before Interest Tax to Total Assets, and Book Value of Equity to Total Liability on the probability of financial distress in manufacturing companies. This research uses purposive sampling method where 39 samples companies are obtained. The criteria for financial distress in this study were measured using the Altman Z-Score. The result show that Net Working Capital to Total Assets and Book Value of Equity to Total Liability has an effect on the probability of financial distress, but Retained Earnings Total Asset and Earnings Before Interest Tax to Total Assets has no effect on the probability of financial distress

Keywords: *Altman Z-Score, Financial Distress, Financial Ratios*

1. Introduction

Financial distress is a situation where a company experiences a financial decline before bankruptcy or liquidation occurs. An indication that a company is experiencing financial distress is if the company is experiencing difficulties in fulfilling its obligations to debtors and carrying out operational activities due to insufficient funds. If financial distress can be identified properly, the company can evaluate and take actions to prevent the company from entering more difficult situations such as liquidation or bankruptcy (Platt and Platt, 2002).

Financial distress can be classified based on the situation faced by the company, namely in the form of business, economic failure, technical difficulties, bankruptcy, and legal bankruptcy. Economic failure refers to a situation where a company is unable to fund the company's total operating costs, including production costs. Business failure indicates a condition that requires the company to stop its business activities to minimize losses for creditors. Technical difficulties are conditions that arise due to the company's inability to settle obligations even though they are due. Meanwhile, bankruptcy is a condition in which the market value of the company's assets is less than the total book value of liabilities. And lastly, bankruptcy legally refers to the state of a company that has been declared bankrupt by law (Gamayuni, 2011).

Financial distress can be predicted by observing ratios in the company's financial statements. By predicting financial distress, management actions can be taken to prevent insolvency and bankruptcy, such as taking merger actions to increase the company's ability to pay its debts when they fall due. Prediction financial distress is a warning effort that can be made by the company so that interested parties can prepare and take anticipatory steps in dealing with the worst scenario in the company's survival

Altman Z-Score model is one model that is often used in predicting financial distress conditions. In his initial research, Altman used five indicator ratios in finance, namely; Working Capital to Total Assets (WCTA), Earnings Before Interest and Tax to Total Assets (EBITTA), Market Value of Equity to Total Liabilities (MVTL), Retained Earnings to Total Assets (RETA), and Sales to Total Assets. In the analysis using this indicator, companies are grouped based on the high and low probability of bankruptcy. In its development, Altman modified the Z-score to remain relevant to several indicator changes, including Retained Earnings to Total Assets, Net Working Capital, Book Value of Equity to Total Liability, and Earnings Before Interest Tax to Total Assets. Considering the impact of changes in the value of stock prices, Altman also includes the Book Value to Equity as one of the indicators in the modified formulation.

In Indonesia, the phenomenon *of financial distress* appears in several manufacturing companies that are included in the main industrial sector due to declining sales. The results of the ratio analysis in table 1 show that in the basic and chemical industry sectors for the period 2013-2016, the results of the calculation of financial ratios using the Altman Z-Score model show the financial performance of PT. Holcim Indonesia is in a state of bankruptcy (2013 and 2014) and even bankruptcy (2015 and 2016). This is due to the decrease in the value of the ratio due to the decrease in working capital due to the unavailability of collaborating creditors so that the company has difficulty working capital in operational activities. In the textile and garment sub-sector, the most significant phenomenon of financial distress occurred at PT Trisula International Tbk which is affected due to an increase in liabilities that is not accompanied by optimization of assets and working capital in the company. For 4 consecutive years, PT. Trisula International Tbk is in a position prone to bankruptcy or it can be said that the company is about to go bankrupt. Meanwhile, in the cosmetics and household goods sub-sector, the most significant financial distress happens on PT Mustika Ratu Tbk (MRAT). PT. Mustika Ratu, Tbk is in the category of prone to bankruptcy due to the company's inability to increase profits from its overall assets in 2013 and 2016. Although the company can meet the short-term debt, form funds, and increase sales, each year the numbers shown tend to decrease.

Table 1
Results *of Z-Score* to Measure Financial Performance in the three main industrial sectors in Indonesia

PT	Holcim Indonesia Tbk		PT Trisula International Tbk		PT Mustika Ratu Tbk	
	Z-Score	Criteria	Z-Score	Criteria	Z-Score	Criteria
2013	2.34	Prone to bankruptcy	2.98	Prone to bankruptcy	1.98	Prone to bankruptcy
2014	1.85	Prone to bankruptcy	2.98	Prone to bankruptcy	1.93	Prone to bankruptcy
2016	1.54	Bankruptcy	2.71	Prone to bankruptcy	1.87	Prone to bankruptcy
bankruptcy	1.12	Bankruptcy	2.71	Prone to bankruptcy	1.71	Prone to bankruptcy

Research on predicting financial distress using the Altman Z-Score model, has been carried out by Sajjan (2016), Gunawan et.al (2017), Mohammed (2015), and Panigrahi (2019). Sajjan (2016) finds that no company is completely in the safe zone except for a few years. The majority of companies are in the Distress Zone which indicates that these companies have the potential to go bankrupt shortly. The authority of top management in designing effective strategies for controlling and managing resources can be a win-win solution for management and investors. Gunawan's research (2017) shows that the variables in the Altman Z-score-able to explain financial distress by 65%, while the rest are influenced by other variables outside the study. Research by Mohammed (2016) and Panigrahi (2019) concludes that by using the Altman Z-Score model, companies in the cement and pharmaceutical sectors show good financial health conditions and do not show indications of bankruptcy so that the financial health of companies in these sectors does not need to be considered. feared in the years to come. Investors' investment in this sector is also considered safe and management does not need to worry about the financial condition of these companies.

Considering the research that has been done previously, the authors assess that financial distress is an important thing to study. As a warning system, financial distress is a crucial analysis in anticipatory treatment for companies before bankruptcy occurs. The implementation of the use of this analytical model can also be used by creditors in measuring the company's performance in its development so that the company's ability to repay loan funds can be measured properly

2. Research Method

The population in this study are publicly listed manufacturing companies on the Indonesia Stock Exchange from 2018 to 2020. The sample is determined using the purposive sampling technique and 39 companies are obtained as research samples. Sample companies will be categorized into two categories, namely companies experiencing financial distress and not experiencing financial distress.

The assessment of financial distress is carried out using the Altman Z-Score which has been modified in 1995. The Altman Z-Score used is (Altman, 1995):

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

Where:

X1 = Net Working Capital to Total Assets
X2 = Retained Earnings to Total Assets
X3 = Earning Before Interest and Tax to Total Assets
X4 = Book Value of Equity to Total Liability

To get the value of the dependent variable or Z", the four independent variables are calculated using a formula which then always spirits the result is summed. After the "Z" value is obtained from the formula, the "Z" value will be re-categorized to see the condition of the company. The criteria used to see the condition of the company are as follows:

1) The company is included in the class of companies that go bankrupt if the value of the company Z "<1.1.

2) The condition of the company entering the zone cannot be determined if the company value is 1.1 < Z" < 2.6.
3) The company can be classified into a healthy company if the value of the company Z" < 2.6.

Analysis in this study used logistic regression. Logistic regression is used to describe the data and explain the relationship between one dependent binary variable and one or more independent variables, either categorical or continuous.The feasibility test of the regression model was carried out using two types of tests, namely, Overall Model Fit and Hosmer and Lemeshow's Goodness of Fit Test. The Overall Model Fit is carried out to ensure that the data and models are appropriate or fit, the criteria used are to look at the likelihood (-2LogL). The model is said to fit the data if it has a final value of -2LogL lower than the initial value of -2LogL. Meanwhile, Hosmer and Lemeshow's Goodness of Fit Test was used to ensure that the empirical data matched the model so that there were no significant differences. If the value of Hosmer and Lemeshow's Goodness of Fit Test is equal to or less than 0.05, then there is a significant difference between the model and the observed value so that Goodness fit cannot predict the value of the observation, and vice versa (Ghozali, 2018).

Statistical testing in this study used logistic regression analysis. The logistic regression equation model in this study is as follows:

$$Ln\frac{=}{1-\Delta E}\ a\ +\ b1\ X1\ +\ b2\ X2\ +b3X3+b4X4+\mathrm{e}$$

Where:

$Ln\frac{=}{1-\Delta E}$ Dependent variable, which if the value is equal to 1 then experiencing *financial distress*, whereas if the value is equal to 0 then it does not experience *financial distress*.

Hypothesis testing is done using the Wald test**.** The wald test used to compare the results of the beta coefficients from the regression carried out against the estimated values that have been predicted or determined previously (Y-Predicted or Y-hat, both elasticity (in %) and in normal). If Wald statistic < chi-square table and significance level > 5%, then the hypothesis which states that the independent variable affects the dependent variable is rejected, and vice versa.

3. Results and Discussion

3.1. Results

Model Feasibility Test Results

The results of the model feasibility test using the overall model fit in table 2, the initial 76.703 while the final -2LogL value is 24.99 This indicates that the final -2LogL value is lower than the initial 2LogL. So that it can be concluded that the data and **models used are appropriate or fit**.

4. Table 2. Overall Fit Model

Iteration		-2 Log-likelihood	Coefficients Constant	Iteration		-2 Log-likelihood
Step 0	1	76.763	Step 0	Step 1	1	43.979
	2	76.703			2	31.606
	3	76.703			3	26.690

					4	25.225
					5	25.004
					6	24.997
					7	24.997
					8	24.997
a. Constant is included in the model.						
b. Initial -2 Log-Likelihood: 76,703						
Hosmer and Lemeshow Test						
Chi-square : 2.013						
Sig. : 0.959						
Nagelkerke R Square : 0.792						

The results of the model feasibility test using Hosmer and Lemeshow's Test in table 2 obtained a significance value of 0.959 which is greater than 0.05. So it can be concluded that the model can predict the value of observations and this model can be used for further logistic regression analysis.

Hypothesis Testing Results

The results of hypothesis testing in table 3 show that the variables Net Working Capital to Total Assets and Book Value of Equity to Total Liability have a significance value (which is greater than 5%. This means that the Net Working Capital to Total Assets and the Book Value of Equity to Total Liability has a significant effect on the probability of financial distress, while the variable Retained Earnings to Total Assets and Earnings Before Interest Tax to Total Assets have a significant value greater than 5%, which means that the variables Retained Earnings to Total Assets and Earning Before Interest Tax to Total Assets have no significant effect on Financial Distress

Tabel 3. Wald Test Result

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	NWCTA	-1.267	.567	4.999	1	.025	.282
	RETA	-.085	.615	.019	1	.890	.918
	EBITTA	.437	.487	.805	1	.370	1.548
	BVETL	-3.165	.977	10.488	1	.001	.042
	Constant	.875	1.693	.267	1	.605	2.398

3.2 Discussion

Net Working Capital to Total Assets has a significant negative effect on the probability of financial distress, so it can be interpreted that the higher the ratio of Net Working Capital to Total Assets, the more likely the company is experiencing financial distress Getting lower. Net Working Capital to Total Assets indicates the company is not experiencing liquidity problems because the company can meet its short-term debt. This applies vice versa, if networking capital has a low yield, it indicates that the company is experiencing liquidity problems.

Retained Earnings to Total Assets have no significant effect on financial distress. Retained Earnings is an element of shareholder equity so it is not a company asset. Retained profit is a policy carried out by company leaders which will then be used for other purposes for the company, for example for company business expansion which means assets are planted in the form of factories and equipment, not in bank accounts. Retained earnings reported on the balance sheet are not assets but are an element of shareholder equity (Horngren and Harrison, 2007). Companies that have low retained earnings will not necessarily experience possible financial difficulties due to these reasons. This is what causes the Retained Earnings to Total Assets to not affect the occurrence of financial distress. According to Sari and Arif (2020), there is no effect of Retained Earnings to Total Assets on financial distress because retained earnings from total assets increase so that the company avoids financial difficulties. The higher the company's retained earnings, the better the company's ability to manage its assets.

Earnings Before Interest Tax to Total Assets does not affect financial distress. Earning Before Interest and Tax to Total Assets shows how far management can collect sufficient sales on the company's total assets. The ineffectiveness of this variable may be due to the company's ability to generate sales being very low, and even the company's assets are considered unable to generate profitable sales. According to Ramadhan (2021), the effect of Earning Before Interest Tax to Total Assets on financial distress could be due to an increase in profits that make financial conditions better. Because the higher the profit value, the company is very good at managing its assets.

Book Value of Equity to Total Liability has a negative effect on financial distress so it can be interpreted that the higher the value of the Book Value of Equity to Total Liability, the more likely the company will experience financial distress. A Book Value of Equity to Total Liabilities is an indicator of why a company is not included in a company experiencing financial distress because, with its capital or equity, the company can meet its long-term obligations. The higher the Book Value of Equity to Total Liabilities, the lower the amount of debt accumulated against the company's capital. However, if the amount of debt accumulated to capital is greater than the book value of its equity, this indicates that the company will experience difficulties in fulfilling its debt obligations, where the book value of the company's equity which is smaller than the amount of debt is vulnerable to the health condition of the company. Total debt which is greater than its equity indicates the company will experience financial distress. Chabachib et.al (2019) states that if the ratio of Market Value of Equity to Total Liabilities increases, it will reduce the probability of financial distress, on the contrary, if the company has large debt or the ratio of Market Value of Equity to Total Liabilities is low, the company will have the propensity to experience financial difficulties.

4. Conclusion

The results of this study indicate that the variables Net Working Capital to Total Assets, and Book Value of Equity to Total Liability have a significant effect on the probability of financial distress. Meanwhile, Retained Earnings to Total Assets and Earnings Before Interest Tax to Total Assets do not affect the probability of financial distress. From the results of the study, it appears that there are deficiencies where the results obtained indicate that not all financial ratios used in the Altman Z-Score model can be used to predict the occurrence of

financial distress in manufacturing companies listed in Indonesia Stock Exchange for the period 2018 to 2020. This may be due to different conditions in each country. For further researchers, it can provide corrections by considering other variables outside the variables in the Altman Z-Score model as variables that can predict the occurrence of financial distress such as variables in the Ohlson, Fulmer, Springate, and Zmijewski models. In addition, research using objects other than manufacturing companies must also be considered to ensure that the Altman model can predict financial distress conditions more accurately in non-manufacturing companies.

Reference

Afridola, S., & Wisdom. (2019). The Effect of Altman Z-score Financial Ratios on Financial Distress at PT Citra Tubindo Tbk. *Ganesha Journal*. Polytechnic Institute Medan, 2(1), 1– 14.

Alifiah, MN. (2014). Prediction of financial distress companies in the trading and services sector in Malaysia using Macroeconomic Variables. *2nd Conference on Innovation Management and Technology Research*. 90-98

Altman, Edward I. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *Journal of Finance*, 189-209.

Altman, Edward I. (2000). *Predicting Financial, Distress of Companies: Revisiting The Z-Score and Zeta ® Models*, New York University, Stern School of Business.

Baimwera, B., & Muriuki, AM. (2014). Analysis of corporate financial distress determinants: A survey of non-financial firms listed in the NSE. *International Journal of Current Business and Social Sciences*. 1(2). 58–80.

Brigham, Eugene F. and JF Houston. 2010. *Fundamentals of Financial Management.* Edition 11. Jakarta: Salemba Empat.

Chabachib, M., Fitriana, TU. , Hersugondo , Pamungkas, ID., & Udin. (2019). Firm Value Improvement Strategy, Corporate Social Responsibility, and Institutional Ownership. *International Journal of Financial Research*. 10(4). 152-163

Chadegani, Arezoo Aghaei. (2011). The Determinant Factors Of Auditor Switch Among Companies Listed On Tehran Stock Exchange. *International Research Journal of Finance and Economics*. Issue 80

Fitriyah and Oktaviana, UK (2013). Relevance of Financial Performance and Good Corporate Governance Determinant of Sustainability Corporate Social Responsibility Disclosure in Islamic Bank in Indonesia. *International Journal of the Islamic Archipelago.* 1 (2). 22-37

Gamayuni, RR. 2011. Analysis of the Accuracy of the Altman Model as a Tool for Predicting Bankruptcy. *Journal of Accounting and Finance*. 16(2). 176-190.

Ghozali, Imam. 2018. *Application of Multivariate Analysis with IBM SPSS 25* Program. Diponegoro University Publishing Agency: Semarang

Gunawan, B., Pamungkas, R, and Susilawati, D. (2017). Comparison of Financial Distress Predictions with Altman, Grover and Zmijewski Models. *Journal of Accounting and Investment*. 18(1). 119-127

Horngren, Charles T., Srikant M. Datar., George Foster., 2008. *Cost Accounting: Managerial Emphasis*. Eleventh Edition. (Translated by: Desi Adhariani). PT Index. Jakarta.

Khaliq, A., Motawe Altarturi, BH, Mohd Thas Thaker, H., Harun, MY, & Nahar, N. (2014).

Identifying Financial Distress Firms: A Case Study of Malaysia's Government Linked Companies (GLC). *International Journal of Economics, Finance, and Management, 3*(3), 141–150.

Lakshsan, AMI, & W. MHN Wijekoon. (2013). The Use of Financial Ratios in Predicting Corporate Failure in Sri Lanka. *American GSTF International Journal on Business Review*. 2(4). July 2013.

Mohammed, Shariq. (2016). Bankruptcy Prediction by Using the Altman Z-Score Model in Oman: A Case Study of Raysut Cement Company SAOG and Its Subsidiaries. *Australasian Accounting, Business, and Finance Journal*. 10(4). 70-80

Nugroho, M., & Mawardi, W. (2012). Prediction Analysis of Financial Distress Using Altman Z-Score Modified Model 1995. *Journal of Management*. 1–11.

Nurul Mukhlisah. (2011). Bankruptcy Analysis in Property and Real Estate Companies Listed on the Indonesia Stock Exchange. *INTEKNA Journal.* Year XI. No. 2. 191–203

Nustini, Y. (2019). Altman Model For Measuring Financial Distress: Comparative Analysis Between Sharia And Conventional Insurance Companies. *Journal of Contemporary Accounting*. 1(3) . 161-172

Panigrahi, Ashok. 2019. Validity of Altman's "Z" Score Model in Predicting Financial Distress of Pharmaceutical Companies. *NMIMS JOURNAL OF ECONOMIC AND PUBLIC POLICY.* 4(1). 65-73

Pasaribu, RBF. (2008). Use of Binary Logit to Predict Financial Distress of Issuers on the Jakarta Stock Exchange (Case Study of Trading Industry Issuers). *Journal of Economics, Business, and Accounting VENTURA* .11(2). 153-172.

Pittaya, DHA. (2015). Application of Financial Distress Prediction Using the Altman Method: A Study on Manufacturing Companies Listed on the Indonesia Stock Exchange 2010-2013 Period. *Doctoral dissertation, Gadjah Mada University*.

Platt, HD, and MB Platt. (2002). Predicting Corporate Financial Distress: Reflections on Choice-Based sample Bias. Journal of Economics and Finance. 26(2). 60-72

Rahmawati, AIE, & Hadiprajitno, PB. (2015). Analysis Of Financial Ratios On Financial Distress Conditions In Manufacturing Companies Listed On The Indonesia Stock Exchange in 2008-2013. *Diponegoro Journal of Accounting*. 4(2), 737–747

Ramadhan, Y. & Laksono, SS (2021). Bankruptcy Analysis On Coal Mining Companies. *Journal of Accounting and Financial Research*. 9(2). 209-222

Sari, NR, & Arif, MF. (2020). Detecting Financial Distress with Altman Z-Score Model. *Scientific Journal of Accounting and Humana*. 10(1), 93–102

Ross, SA, Westerfield, RW, & Jaffe, J. (2013). *Corporate Finance* (tenth). New York: McGraw-Hill.

Ray. S. (2011). Assessing Corporate Financial Distress in Automobile Industry of India: An Application of Altman's Model. *Research Journal of Finance and Accounting*. 2(3). 155-16

Sajjan, R. (2016). Predicting Bankruptcy Of Selected Firms By Applying Altman's Z-Score Model. *International Journal of Research-GRANTHAALAYAH.* 4(4). 152-158

Yurika, Yeni. 2015. Effect of Liquidity, Leverage, Profitability, Operating Capacity, and Managerial Agency Costs on Financial Distress. *FEKON Journal.* 2(2). 1-15