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Financial Distress Prediction Using Financial Measurement with a Grover Model Approach to Basic and Chemical Industries in Indonesia

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ABSTRACT: *Financial distress is a condition where the company's finances are experiencing difficulties and fail in business. Knowing the condition of the company's financial distress from an early age, it is expected that actions can be taken to anticipate those that lead to bankruptcy. This study aims to predict financial distress using financial measures. financial distress is measured using the Grover model. The Pecking Order theory explains the priority order of managers in determining their funding sources. The population in this study are companies in the basic and chemical industry sectors listed on the Indonesia Stock Exchange (IDX) for the 2019-2021 period. The sampling technique is using purposive sampling method and a sample of 153 companies is obtained. The data analysis method used is logistic regression analysis. The results showed that the variable profitability proxied by return on assets, solvency proxied by debt to assets and the measure of liquidity proxied by current ratio have effect on financial distress. while the measure of accounts receivable turnover proxied by receivable turnover, and the measure of growth proxied by total assets growth and the measure of capital intensity proxied by capital intensity ratio have no affect on financial distress.*

Keywords: *Financial Distress, Grover Model, Pecking Order Theory*

I. INTRODUCTION

The formation of a company must have goals to be achieved such as expecting to create optimum profits with efficient costs. Still, in practice to achieve this goal is not easy. Companies need a good corporate financial management system, but good financial management system does not necessarily reflect good performance and guarantee the continuity of company, even things that are not wanted by every company owner can occur, namely bankruptcy. The bankruptcy of a company is caused by company's inability to carry out obligations that are due, besides that there are also factors of competition between other companies (Dewi, Endiana & Arizona, 2019).

Chemical industry is one of the sectors that gets development priorities because it is able to make a significant contribution to the Indonesian economy. Because it can absorb large capital, create jobs and generate added value. Indonesia's basic industry and chemistry are the largest base in ASEAN with a contribution of 20.27%. This is because chemicals are strategic commodities to be used as raw materials in various other industrial sectors. Chemical industry is ranked as the third largest contributor to the

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performance of the non-oil and gas processing industry sector that it becomes a sector that plays an important role in the growth of the national manufacturing industry in Indonesia.

For three consecutive years there has been a decrease in the Indonesia Composite Index (IHSG) which occurred in 2016 (-0.1%), 2019 (-0.5%), and 2020 (-0.9%). Looking at each sector, basic and chemical industries are the sectoral index with the deepest decline, namely 43.53% year to date (www.investor.co.id). With this statement a phenomenon is found that it has the potential to cause delisting. Delisting is an act of delisting a company's shares from the Indonesia Stock Exchange, that shares cannot be traded on the exchange because the company concerned is deemed unable to meet the specified criteria. According to Asfali (2019) the factors that cause bankruptcy are divided into two factors, namely external factors and internal factors.

Financial distress is defined as a late stage of corporate decline that precedes more cataclysmic events such as bankruptcy or liquidation (Platt & Platt, 2002). Financial distress is a stage of declining financial conditions experienced by a company, which occur before bankruptcy or liquidation. The existence of the threat of financial distress makes companies need to have the right strategy to anticipate conditions that can cause problems to the company's finances. This study aims to provide information, motivation and education related to the prediction of financial distress by using financial measures in companies in the basic and chemical industry sectors in Indonesia.

II. MATERIAL AND METHODS

2.1. Financial Distress

Financial distress is a condition where company's finances are experiencing difficulties and fail in business. From knowing the condition of company's financial distress from an early age, it is expected that actions can be taken to anticipate those that lead to bankruptcy. The Pecking Order theory explains the priority order of managers in determining their funding sources. The manager's preference states that the sequence of funding sources starts from internal funding as the main source then the next priority is debt and the last is the issuance of shares. (Brigham & Houston, 2019). This is supported by agency theory as in Tekin & Polat (2020) which states, that agents are responsible to the principal. In other words, the Manager as an agent is responsible for running the company as well in order to carry out operating activities and increase the company's profits using the order of the company's funding preferences. If operational management is carried out properly, the company will avoid financial distress.

Financial Distress in this study is measured by the Grover Model approach. The Grover model are created by restoration or redesign of the Altman Z-score model. It takes X1 and X3 from the Altman model and then adds a profitability ratio in the form of ROA. (Heryanto, 2020).

2.2. Profitability

Profitability is a measure a company's ability to earn profits or gains. Positive profitability indicates that the overall assets used for company's operations are able to provide profits for the company and vice versa if it is negative, it indicates that the assets used for company's operations are not able to provide benefits for the company. Profitability is related to company's ability to manage its sources in generating company profits. Therefore, an increase in assets will also occur and keep company away from the threat of financial distress.

Profitability is proxied by return on assets (ROA), that it will provide an overview of company's ability to earn profits. The results of this study are in accordance with Situomorang (2018) which states that profitability affects and influences the occurrence of financial distress.

H_1: Profitability affects financial distress.

2.3. Solvability

The solvency is used to measure the extent to which a company's assets are financed with debt, meaning how much debt the company bears compared to other assets. As for this study, solvency is measured using the total debt to asset ratio (DAR). DAR compares total debt with total assets to find out how much company's assets are financed with total debt. If the company in carrying out its business activities uses more debt, there will be a risk of payment difficulties in the future. Conditions like this will create conditions where the debt owned is bigger than the total assets and capital, if it is not immediately corrected it will cause financial

distress and lead to bankruptcy. This is in line with Antoniawati and Purwohandoko (2022) which states that the smaller the DAR value, the less likely it is that financial distress in the company will decrease.

H_2: Solvency affects financial distress.

2.4. Liquidity

Liquidity is the company's ability to pay short-term financial obligations. In this study it is proxied by the current ratio (CR). Calculation of the current ratio is by comparing the total current assets with total current liabilities. A company that is more liquid or has a high ratio value, the farther it is from the threat of financial distress. The results of this study are in accordance with Situomorang's (2018) which states that liquidity affects financial distress.

H_3: Liquidity affects financial distress.

2.5. Receivable turnover

A company is said to have a high account receivable turnover ratio (RTO) when they are efficient in collecting payments that are due. Otherwise, a low value indicates payment is difficult to realize. You could also say that the company is facing stagnant or even bad credit and thus has the potential to cause financial distress. Receivables turnover is proxied by credit sales divided by the average receivables. Accounts receivable turnover is used to measure the efficiency or effectiveness of a company in using its assets. The results of this study are in accordance with Ridhoansyah (2021), which states that the receivable turnover ratio has an effect on financial distress.

H_4: Receivable turnover affects financial distress.

2.6. Growth

According to Gupta (1968) in Audina (2018), financial managers believe that total asset growth (TAG) can increase company size and activity in the long term. This happens because the more the TAG of a company, the higher company's ability to manage investment assets effectively and efficiently. As a result, the probability of financial distress occurring in the company will decrease.

In this study, the amount of growth or growth in total assets is proxied by comparing total assets in a given year reduced by total assets in the previous year's period and then divided by total assets in a certain year minus in the previous year's period. The results are from Audina's (2018) that total asset growth has no significant effect on financial distress.

H_5: Growth affects financial distress.

2.7. Capital intensity

Capital intensity is a variable that can measure the possibility of financial distress. Companies that have a low level of capital intensity will reduce the risk of financial distress and some say that a high capital intensity can reduce the cost of operating activities by utilizing costs for fixed assets, in other words, companies can contribute the company's operational costs to long-term assets. length at no additional cost. This means that company can increase its assets by buying a building which is then renting or leasing the building, that company gets additional profit from the building. Capital intensity is proxied by calculating total assets divided by sales of capital. Conducted by Bachtiar & Handayani (2022) that capital intensity has a negative effect on financial distress.

H_6 : Capital intensity affects financial distress.

III. RESEARCH METHODS

Based on the data used in this study, this type of research is quantitative research by testing the hypothesis. This research is conducted to determine the effect of profitability, solvency, liquidity, accounts receivable turnover, growth and capital intensity on financial distress. The population in this study are all companies in the basic and chemical industry sectors in Indonesia from 2019 to 2021 that are listed on the IDX. Sampling using purposive sampling method, namely determining the sample from the population based on certain criteria.Thus stillin this study obtained a sample of 153 samples. The analytical method used to test the hypothesis in this study is logistic regression, because the dependent variable using binary/dummy variables (Finishtya, 2019). In this study, the dependent variable is measured using dummy variable, code 1 for

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companies experiencing financial distress and code 0 for companies not experiencing financial distress. The logistic regression model used to test is as follows:

Operating Variable and Measurement

Variable Dependent	Indicator	References
Financial Distress (FD)	Grover (G-Score) = 1.650X1 + 3.404X3 + 0.016ROA + 0.057 1. The state is bankrupt if the score obtained or the cut off point is ≤ -0.02. Financial distress ≈ 1. 2. The situation does not go bankrupt if the score obtained or the cut off point is ≥ 0,02. No financial distress ≈ 0.	Heryanto, 2020
Variable Independent		
Profitability (ROA)	$\frac{\text{Net Profit}}{\text{Total Assets}}$	Marfungatun, 2017
Solvability (DAR)	$\frac{\text{Total Debt}}{\text{Total Assets}}$	Asfali, 2019
Liquidity (CR)	$\frac{\text{Current Assets}}{\text{Current Debt}}$	Dewi, Endiana & Arizona, 2019
Receivable Turnover (RTO)	$\frac{\text{Credit Sales}}{\text{Average Receivable}}$	Maulida, 2018
Growth (TAG)	$\frac{\text{Assets}_{t} - \text{Assets}_{t-1}}{\text{Assets}_{t-1}}$	Audina, 2018
Capital Intensity (CIR)	$\frac{\text{Total Assets}}{\text{Sales}}$	Bernardin & Tifani, 2019

$$\text{Ln}\left(\frac{p}{p-1}\right) = -1.696 - 69.954 + 11.082 - 14.998 + 0.323 + 7.719 + 0.000 + e$$

Formula $\text{Ln}\left(\frac{p}{p-1}\right)$ shows the probability of companies experiencing financial difficulties using independent variable measure described on the table. Such as return on assets, debt to assets, current ratio, receivable turnover, growth and capital intensity.

IV. RESULT AND DISCUSSION

Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
FD (G-Score)	153	0.00	1.00	0.0980	0.29834
ROA	153	-0.45	0.69	0.0334	0.10563
DAR	153	0.00	4.14	0.4882	0.38166
CR	153	0.06	374.68	6.9042	35.05367
RTO	153	0.00	21.28	7.1319	5.01859
TAG	153	-0.88	0.63	0.0384	0.15529
CIR	153	0.14	2258.64	18.2817	183.74185
Valid N (listwise)	153				

The table above shows the descriptive statistics for each variable. The profitability variable (ROA) has a minimum value of 0.00 and a maximum value of 1.00 with an average of 0.0980 and a standard deviation of 0.29834. Solvency variable (DAR) has a minimum value of -0.45 and a maximum value of 0.69 with an average of 0.0334 and a standard deviation of 0.10563. Liquidity variable (CR) has a minimum value of 0.06 and a

maximum value of 374.68 with an average of 6.9042 and a standard deviation of 35.05367. Receivables turnover variable (RTO) has a minimum value of 0.00 and a maximum value of 21.28 with an average of 7.1319 and a standard deviation of 5.01859. Growth variable (TAG) has a minimum value of -0.88 and a maximum value of 0.63 with an average of 0.0384 and a standard deviation of 0.15529. Variable capital intensity (CIR) has a minimum value of 0.14 and a maximum value of 2258.64 with an average of 18.2817 and a standard deviation of 183.74185.

Goodness Test

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	0.995	8	0.998
Chi Square Test			
-2 Log Likelihood		Value	
Start (*Block Number* = 0)		98.150	
End (*Block Number = 1)*		9.940	
Nagelkereke Test			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkereke R Square
1	9.940[a]	0.459	0.925

Based on the table above, Hosmer and Lemeshow's sig value is 0.998. This shows that the regression model in this study is feasible and there is no significant difference between the variables because it has a significance value greater than 0.05. -2 log likelihood value (block number = 0) is 98.150 while the final -2 log likelihood value (block number = 1) is 9.940. These results indicate that the model used is a good regression model and fits the data because the initial -2 log likelihood value (block number = 0) is greater than the final -2 log likelihood value (block number = 1). Nagelkereke's R Square value of 0.925 indicates that 92.5% that the independent variables affect the dependent variable together (simultaneous) at 92.5%.

Hypothesis Test

	B	Wald	Sig.
ROA	-69.954	3.461	0.063*
DAR	11.082	3.333	0.068*
CR	-14.998	4.718	0.054*
RTO	0.323	1.881	0.170
TAG	7.719	0.938	0.333
CIR	0.000	0.000	0.983

Source : Data SPSS 26

***Significance at 0,100**

This study uses a significance level of 10%. If the significance value is < 0.100 or < 10%, it means that this variable affects financial distress and vice versa. Profitability variable proxied by return on assets has a significance value of 0.063 < 0.100. This shows that return on assets has an influence on financial distress. Thus it shows that hypothesis one (H_1), which states return on assets has affect on financial distress, is accepted. The results of this study are in accordance with the results of Situomorang's research (2018) which states that profitability partially affects the occurrence of financial distress.

Solvency variable proxied by debt to total assets has a significance value of 0.068 < 0.100. This shows that debt to total assets has an influence on financial distress. Thus it shows that the second hypothesis (H_2), which states debt to assets has affect on financial distress, is accepted. This is in line with Antoniawati and Purwohandoko (2022) which states that solvency proxied by debt to assets has an effect on financial distress.

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Liquidity variable proxied by the current ratio has a significance value of 0.054 < 0.100. This shows that the current ratio has an influence on financial distress. Thus it shows that the third hypothesis (H_3), which states that the current ratio has an effect on financial distress, is accepted. The results of this study are in accordance with the results of Situomorang's (2018) which states that liquidity has a simultaneous and significant effect on financial distress.

Variable receivable turnover which is proxied as receivable turnover has a significance value of 0.170 > 0.100. This shows that receivable turnover has no effect on financial distress Thus it shows that the fourth hypothesis (H_4), which states that receivable turnover has affect on financial distress, is rejected. The results of this study are not in accordance with Ridhoansyah (2021) which stated that the receivable turnover ratio has an effect on financial distress.

Growth variable proxied by total assets growth has a significance value of 0.333 > 0.100. This shows that total asset growth has no effect on financial distress. Thus it shows that the fifth hypothesis (H_5), which states that total assets growth has affect on financial distress, is rejected. The results of this study are in line with Audina (2018) which states that total asset growth has no effect on financial distress.

Capital intensity variable proxied by the capital intensity ratio has a significance value of 0.983 > 0.100. This shows that the capital intensity ratio has no effect on financial distress. Thus it shows that the sixth hypothesis (H_6) which states that the capital intensity ratio has affect on financial distress, is rejected. This is in line with Bachtiar and Handayani (2022) that capital intensity has no effect on financial distress.

V. CONCLUSION

Based on the results of this study indicate that in calculating financial distress using the Grover method it can be proven that profitability, solvability and liquidity have a significant effect on financial distress in basic industrial and chemical manufacturing companies listed on the stock exchange in IDX 2019-2021. Meanwhile, receivable turnover, growth and capital intensity did not show any effect on financial distress in manufacturing companies in the basic and chemical industrial sectors which were listed on the stock exchange in IDX 2019-2021.

Using the Grover method in this study, it is suitable for measuring normal and abnormal economic conditions such as during the Covid-19 pandemic, because this study uses financial measures to predict financial distress in companies in the basic and chemical industry sectors in Indonesia. Grover model it is suitable for assessing the short-term and long-term finances of a company. For further research can use different variable measurements as well as other open sector companies that are different from this research.

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