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FINANCIAL DISTRESS PREDICTION ON AGRICULTURAL SECTOR COMPANIES IN INDONESIA STOCK EXCHANGE

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Abstract
This study aims to prediction of financial distress in the agricultural sector companies in Indonesia used logistic regression analysis. The data used secondary data from resume financial report of companies at Indonesia Stock Exchange period of 2009-2018. The independent variable in this study are financial ratios and macroeconomic indicators. The independent variables in this study are financial ratios and macroeconomic indicators. Financial ratios consist of DER, CR, CLTA, ROA, ROE, NPM, TATO and WCTA, while the macroeconomic indicators used interest rate and exchange rate sensitivity. Financial distress status is used as the dependent variable. Independent variable such as ROA and WCTA significantly can be used in prediction model with accuration rate of 89,91%. The model also can be used as early warning signal of financial distress in the agricultural sector companies in Indonesia.

Keywords: Financial Distress, Financial Ratios, Macroeconomic Variables, Logisitic Regression.

Introduction
Predicting the financial failure of companies is one of the main topics that many international institutions have dealt with, due to its negative impact on companies, investors and the economy as a whole especially agricultural sector companies in Indonesia. The agricultural sector is one of the important sectors because of its role in long-term economic development and in the nation's economic recovery so that the importance of financial forecasting also lies in helping decisions makers to take the appropriate decisions as far as financing is concerned.

The condition of the agricultural sector in Indonesia is alarming, one of them is agricultural land which has begun to convert into industrial land to housing. According to data from the Ministry of Agrarian Affairs and Spatial Planning or the National Land Agency, in 2018 there were 7.75 million hectares of rice fields, but each year there will be a decline of 150,000 to 200,000 hectares due to the change of function. Government policy are also less focused on the agricultural sector [1]. Besides that, the contribution of the growth rate of the agricultural sector to Indonesia's GDP in 2013 to 2018 was the lowest compared to other sectors. The average growth rate of GDP in the agricultural sector is 3,8%.These conditions will certainly have an impact on agricultural sector companies especially conditions of financial distress.

Agricultural sector companies is important to detect early the company's financial condition so that it will greatly enable companies to prevent financial distress. Financial distress of company if not improved performance will lead to bankruptcy. companies were experience a decline in financial conditions that occur before bankruptcy or liquidation are companies that are experiencing financial difficulties [2]. Financial distress was condition where the company's operating cash flow is not sufficient to meet its current obligations such as trade payables or interest costs [3]. Financial reports can be used as a basis for measuring the financial condition of a company through the analysis of financial statements using financial ratios. In predicting business bankruptcy for a period of one to five years before the business is truly bankrupt, it can use financial ratios [4]. Financial ratio analysis is one of the popular techniques to be applied to assessing company performance [5]. The evaluation of a company's financial performance also needs to attention to the company's macroeconomic variables because they come from outside the company and cannot be controlled.

Empirical research that discusses financial distress using financial ratios and macroeconomic variables has been carried out. one of the studies conducted by Noviandri that predicts the condition of financial distress in trading

sector companies using the current ratio, deb to equity ratio, operating profit margin ratio, and total asset turnover ratio. Research analysis techniques used logical regression analysis. The conclusion of the study is the ability of the model (Nagelkerke R Square test results) can explain 59% of the conditions of financial distress. The financial ratios used in the research are proxied by CR, DER, OPM, and TATO which affect the financial distress of trading sector companies listed on the Indonesia Stock Exchange [6].

Empirical research conducted by Yuniarti about the effect financial ratios to financial distress predictions on basic and chemical industry companies listed in the Indonesian stock exchange. The study uses financial ratios as independent variables. The condition of companies that experience and do not experience financial distress using the Altman model. The analysis technique used is multiple linear regression analysis. Simultaneous test results were Quick Ratio, Debt to Equity Ratio, Time Interest Earned Ratio, Receivable Turnover Ratio, Inventory Turnover Ratio, Net Profit Margin and Return On Assets have a significant effect on financial distress, with contribution of 40.8% . While partial testing shows that only Return On Assets has a significant effect on financial distress at the 95% confidence level or $\alpha = 5\%$, while other ratios not significant effect on financial distress [7].

The empirical studies about discussing financial distress using macroeconomic variables have also been carried out. Darmawan found that inflation, interest rates, exchange rates haven't effect on financial distress and only corporate governance has a negative effect on financial distress [8]. Consistent with study of Kurniasanti and Musdholifah, the result were that inflation and interest rates haven't effect on financial distress [9]. Moleong's research also results that real interest rate not affecting financial distress [10]. Differences research of Purbayati, resulting that the sensitivity of banks to interest rates affect the prediction of bankruptcy probability [11]. Nurhidayah and Rizqiyah, the result of them research that the exchange rate is not significant in predicting financial distress [12].

The results of previous empirical studies there are inconsistent results in predicting of financial distress in the company so that this condition becomes interesting to study with the latest data. Predicting financial distress in agricultural sector companies used financial ratios and macroeconomic variables is very important. This study was conducted to analyze financial ratios and macroeconomic variables in predicting financial distress in companies and the resulting level of accuracy from the model.

Sample, Data, and Methodology

This research was conducted to analyze the ability of financial ratios and macroeconomic indicators to be predictors of financial distress in agricultural sector companies. This research was quantitative and the type of hypothesis test research. The population which the object of this study is agricultural sector companies listed on the Indonesia Stock Exchange with the period 2009 to 2018. This study divides the research sample into 2 parts were subsample design to create a model and a holdout / validation subsample for a regression model test. Design sample in this study uses data from the company's financial statements in 2009-2013 and validation sample in this study was company's financial statement data period 2013-2018.

Dependent variable (Y) in this study was the company's financial status with a measurement scale using a nominal scale. The category of companies that experiencing financial distress was the company having an interest coverage ratio (ICR) <1, while the company that is not experiencing financial distress was the company has an interest coverage ratio (ICR) > 1. The independent variables used in the study were debt to equity ratio, curent ratio, current liabilities to total asset ratio, return on total assets ratio, return on equity ratio, net profit margin ratio, total asset turnover ratio, working capital to total asset ratio, exchange rate sensitivity and interest rate sensitivity.

The analytical tool used in this study was logistic regression analysis because to test the probability of occurrence the dependent variable can be predicted with the independent variable. The following of logistic regression equation used in this study:

$$P_i = E(Y = 1|X_{i,t-1}) = \frac{1}{1+e^{-z_i}}$$

So $$Z_i = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} \quad (1)$$

Description :

Pi	= Probability of financial distress
e	= natural logo; e = 2.71828
Zi	= Dependent variable
β0	= constant
β1, ..., β10	= Regression coefficient
X1	= DER period (t-1)
X2	= CR period (t-1)
X3	= CLTA period (t-1)
X4	= period ROTA (t-1)
X5	= ROE period (t-1)
X6	= NPM period (t-1)
X7	= TATO period (t-1)
X8	= WCTA period (t-1)
X9	= Period Interest Rate (SBI) (t-1)
X10	= Exchange Rate period (KURS) (t-1)

Results and discussion

The following in table 1 was amount of companies that experienced and didn't experience financial distress which were used as Variable Y.

Table 1. Number of Companies Experiencing and didn't Experiencing Financial Distress

Object	Period										Total of Companies
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	
Financial distress	4	4	3	3	7	6	9	8	9	10	63
Not financial distress	8	9	10	13	10	15	13	14	13	12	117
Total	12	13	13	16	17	21	22	22	22	22	180

Source: Data Processed, 2019

Logistic Regression Analysis Results

The data has been obtained was processed using the SPSS program and analyzed by the logistic regression method. Table 2 presents the equation functions generated from CLTA, ROA, ROE, NPM, TATO, WCTA, interest rate sensitivity and exchange rate sensitivity using logical regression analysis.

Table 2. Logistic Regression Analysis Results

Variabel	**β**	***Standar Eror***	**Wald**	**Signifikansi**
DER	0.060	0.249	0.058	0.809
CR	0.006	0.038	0.024	0.878
CLTA	-12.328	9.257	1.774	0.183
ROA	-40.050	17.541	5.213	0.022
ROE	-0.031	1.428	0.000	0.983
NPM	0.120	1.909	0.004	0.950
TATO	1.299	2.764	0.221	0.638
WCTA	-16.170	8.083	4.002	0.045
SBI	0.026	0.030	0.764	0.382
KURS	0.046	0.048	0.911	0.340
Constant	2.783	1.505	3.418	0.064

Source: Data Processed, 2019

On table 2 there are coefficients that have significance value or p value of the Wald test more than α = 5% or not significant. The coefficient consists of DER, CR, CLTA, ROE, NPM, TATO, SBI and KURS variables. Variables which has insignificant coefficients were not included in the calculation. Variables which has significant regression coefficients were ROA and WCTA and so included in the calculation and are recalculated with the following results.

Table 3. Logistic Regression Analysis Results for Model (2)

Variabel	β	*Standar Eror*	Wald	Signifikansi
ROA	-34.901	9.414	13.744	0.0002
WCTA	-7.786	3.949	3.888	0.049
Constant	0.872	0.564	2.386	0.122

Source: Data Processed, 2019

The logistic regression analysis results in table 3 are used to arrange the new model equations as follows :

$P(Y_{2009, 2010, 2011, 2012, 2013}=1|X_{2008, 2009, 2010, 2011, 2012}) = \frac{1}{1+e^{-z_i}}$ (2)

so Z = 0,872 -34,901ROA -7,786WCTA

Description:
P = Probability of financial distress
Z = Status of the company's financial distress
ROA = Return on Assets Ratio
WCTA = Working Capital to Total Assets Ratio

Table 4 shows that second model was able to classify 46 companies which not experiencing financial distress and 4 other companies were classified to condition of financial distress with truth level of 92%. Besides that, the model can classify 16 companies to financial distress and 5 companies to not financial distress with an accuracy level of 76.2%. In terms of overall, second model has accuracy on classifying design sample data with an accuracy level of 87.3%.

Table 4. Classification Table Model (2)

Observasi		Predction		
		Y		Percentage Correct
		Not financial distress	Financial distress	
Y	Not financial distress	46	4	92.0
	Financial distress	5	16	76.2
Overall Percentage				87.3

Source: Data Processed, 2019

The next step was find cut-off point to test the accuracy of the prediction in second model using validation data. The cut-off point obtained was 0.6147 and criteria if the probability value > 0.6147 so the company was included in category of companies experiencing financial distress but if the probability value < 0.6147 so the company was included in category of companies not experiencing financial distress

Based on recapitulation calculation on prediction accuracy of model 2 using validation sample to classifying companies that are experiencing and not experiencing financial distress as follows:

$$\textit{Sum correct rate} = \frac{60+38}{109}\ x\ 100\%$$
$$= 89.91\%$$

Based on prevalence level used by Wilopo research which was prevalence rate of 50% to determine whether model considered capable or unable as means to predicting financial distress [13]. Results of the calculation prediction accuracy level of the model 2 using validation sample show that accuracy rate was 89.91%, which means that model 2 accurate and feasible to use in predicting occurrence of financial distress agricultural sector companies in Indonesia. Independent variable which can test the probability of dependent variable occurrence were only financial ratios that consist ROA and WCTA ratios.

Conclusion

The prediction model in this study which can be used in predicting the agricultural sector companies financial condition was model 2. The model produces accuracy using data sample validation with results above 50% so it can be concluded that the prediction model was able to predict financial condition of agricultural sector companies in Indonesia. Not all financial ratios and macroeconomic indicators can predict financial condition of agricultural sector companies in Indonesia. The independent variable which significant to predicting the financial distress of agricultural sector companies in Indonesia was ROA and WCTA ratios.

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