

# Financial Health Assessment Model for Listed Companies in Indonesia

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**Abstract:** It is important to conduct financial health assessment to measure company's health so that corrective action can be taken and it serves as a guide in investment decision. Managers will accordingly be able to detect the factors that may improve company's financial health. This study, therefore, aims to produce a financial health probability assessment model. The population involved companies listed on the Indonesia Stock Exchange. The target population is all companies experiencing bankruptcy and insolvency in 2018 totalling 23 companies and a total of 23 healthy companies as the comparison. The sample consist of all companies in the target population. The analysis was conducted using logistic regression. The findings further discovered that the profitability ratio was potentially likely to improve the financial health of the company, while the financial leverage ratio was potentially likely to worsen the financial health of the company. The classification accuracy two years prior to the observation year was 93.5%, and the previous year was 95.7%.

## 1 INTRODUCTION

The financial health of a company is the ability to maintain a balance against changing conditions in the environment and relates to everyone who participates in business (Csikosova et al., 2019). A financial health reflects company's health in financial aspects, such as health in terms of profitability, financing, liquidity, asset utilization, and market value. Financial statements are a prime source of information about financial health (Ross et al., 2013).

The prediction model of financial distress can also be adopted to predict company's financial health (Arasu et al., 2013 and Sriram, 2008). Its application has been implemented in research to determine the soundness of manufacturing companies in Indonesia using the Altman, Springate, and Zmijewski models (Sinarti and Sembiring, 2015), research in India used Altman's model to measures companies' financial health (Kumari, 2013), and research on banking industry in Bangladesh adopted Altman's model to predict financial health (Parvin, 2013). These models were carried out at different places and times, thus leaving the possibility that they are not suited to current condition in Indonesia. Tuckman urged that financial unhealthy is used to describe companies that eventually became liquidated (Tuckman and Chang,

1991). In 2018, there were 23 publicly listed companies in Indonesia receiving special notations on their ticker shares from the Indonesia Stock Exchange due to negative business capital or equity, for example the APEX stock code was miswritten as APEX.E. The financial distress condition with this type of insolvency in bankruptcy needs to be minded as it shows signs of economic failure that potentially lead to business liquidation (Fachrudin, 2007).

As of now, there has been no financial health assessment model suited to current conditions in Indonesia. This research therefore attempted to create a model that can estimate the probability of company's health condition and its level. This model will largely benefit company's management, investors and potential investors, creditors, and academia.

### Theoretical Linkages between Financial Health and Financial Distress

Business failure causes losses to creditors and investors who use accounting disclosures to assess financial health, so financial health assessment can be done through a financial distress model that also uses accounting data (Sriram, 2008; Yakymova and Kuz, 2019). Performance measures reflected in the financial ratios surrogate for important attributes of

the firm's financial conditions such as profitability, solvency, liquidity, and asset management. Financial ratios also provided reliable signals of financial health (Sriram, 2008).

Financial health prediction is one of the most discussing topics in financial literatures (Javaid and Javid, 2018). Financial performance is determined by the financial ratios to be compared between financially healthy and financially unhealthy companies to produce prediction models in order to determine the financial health of a firm (Javaid and Javid, 2018).

The theory of financial distress is described as a condition that is influenced by balance sheet influence and earnings effect. Balance sheet influence includes liquidity ratios, activity, and financial leverage. While the earning effect includes profitability, and retained earnings to working capital ratio (Nketiah, 2017). The financial ratios used to predict financial distress will also be used to assess financial health.

### Financial Health Prediction Model

Sriram (2008) created a model for assessing financial health using fundamental financial variables and intangible assets with predictive accuracy that was comparable to prediction rates in the Altman's model. Altman (1977) conducted a multiple discriminant analysis test on manufacturing and retail companies included in the list of bankruptcy requests (distressed) and companies that face bankruptcy (non-distressed) to get a bankruptcy prediction model. The model obtained is the previous revised model currently named as Revised Z-Score. The model produced by Altman was also used to assess financial health (Sriram, 2008).

The model is :

$$Z'' = 0.717(X_1) + 0.847(X_2) + 3.107(X_3) + 0.420(X_4) + 0.998(X_5) \quad (1)$$

Where :

$X_1$  = working capital/total assets

$X_2$  = retained earnings/total assets

$X_3$  = earnings before interest and taxes/total assets

$X_4$  = book value equity/book value of total liabilities

$X_5$  = sales/total assets

If the score obtained is <1.23, the company has the potential to go bankrupt, a score of 1.23 to 2.9 is

classified as a gray area, and a score of > 2.9 is classified as not having the potential to go bankrupt.

Yakymova (2019) created a model to assess financial health for municipal companies by developing a five-factor discriminant model using data from 50 Ukrainian companies during 2014-2017. The most distinguishing factors between healthy and unhealthy companies are equity-assets ratio, the current ratio, and the average accounts receivable turnover.

The assessment of financial health can also be carried out using Bonitu B Index (Javaid and Javid, 2018). The formula is as follows:

$$B = 1.5X_1 + 0.08X_2 + 10X_3 + 5X_4 + 0.3X_5 + 0.1X_6 \quad (2)$$

Where:

$X_1$  = cash flow / debts

$X_2$  = total capital / debts

$X_3$  = earnings before taxes / total capital

$X_4$  = earnings before taxes / total revenues

$X_5$  = stocks price / total assets

$X_6$  = total revenues /total capital.

If B produces positive value, it means that the company is positive and healthy, if it generated negative values, it means that the company has a negative and unhealthy situation, thus the lower the value of B, the worse the situation of the company would be.

Jordan (1998) used the ratio analysis and identified financial health of water utility. The function of financial health he made consisted of size of liquid assets, cash flow, debt, and expenditures (Jordan, 1998). The variables used in the model consisted of return on assets, current ratio, debt to equity ratio, operating ratio, and cash flow coverage.

Other financial distress prediction models used for financial health assessment include Springate and Zmijewski models. Springate uses multiple discriminant analysis - step wise by using 19 popular financial ratios to distinguish between healthy and bankrupt companies (Springate, 1978; Arasu et al., 2013). The Springate model is as follows:

$$S\text{-Score} = 1.03 X_1 + 3.07 X_2 + 0.66 X_3 + 0.4 X_4 \quad (3)$$

Where :

$X_1$  = working capital / total assets

$X_2$  = earning before interest and taxes (EBIT) / total assets

$X_3$  = net income before taxes (EBIT) / current liabilities

$$X_4 = \text{sales} / \text{total assets}$$

If the Springate Z-score is smaller than 0.862, then the company is predicted to go bankrupt, whereas if the score is greater than 0.862, then the company is predicted to be healthy (Huo, 2006).

Zmijewski (1984) involved a sample of bankrupt and non-bankrupt companies listed on the American and New York Stock Exchange during 1972-1978 under probit analysis. The formula is as follows:

$$b^* = -4.3 - 4.5 X_1 + 5.7 X_2 - 0.004X_3 \tag{4}$$

$$X_1 = \text{net income} / \text{total assets}$$

$$X_2 = \text{total debt} / \text{total assets}$$

$$X_3 = \text{current assets} / \text{current liabilities}$$

If  $b^* > 0$ , then the company is predicted to potentially experience bankruptcy, whereas if  $b^* < 0$  then the company is predicted to be free from bankruptcy.

Predictions of financial distress using predictors in the form of financial ratios, be it profitability ratio, capital structure, liquidity, and asset management. However, Bal (2013) discovered that a good ratio used to distinguish between failed companies and successful companies is the ratio of return on assets, return on capital, and earnings per share, all of these three ratios are profitability ratios. In the meantime, Javaid (2018) and Altman et al. (2017) stated that the financial ratios that have the most impact on prediction models in identifying the status of failed and non-failed companies are profitability and liquidity ratios. The ranking of the popularity of financial ratios in prediction of financial distress is dominated by the ratio of net income to total assets, current assets to current liabilities, total liabilities to total assets, working capital to total assets, and earnings prior to interest and taxes to total assets (Fachrudin, 2007). For the prediction of financial distress probability in Indonesia due to the 1997-1998 economic crisis, a significant predictor is the ratio of net income to total assets and the ratio of total liabilities to total assets (Fachrudin, 2007).

## 2 HYPOTHESIS DEVELOPMENT

In 2018, 46 companies with unhealthy financial condition was found. This preliminary study involved the variable of financial ratios in the form of net income to total assets, working capital to total assets, retained earnings to total assets, earnings before interest

and taxes to total assets, book value of equity to book value of total liabilities, sales to total assets, and total liabilities to total assets (Altman, 1977; Springate, 1978; and Fachrudin, 2007) in order to estimate the probability of financial health by using logistic regression in one year and two years prior to the observation year, that is 2018. Some trials was conducted by involving all the variables as well as in stepwise, yet the obtained model was not feasible and a number of financial ratios were found insignificant. To this end, this study selected variables of the ratio of net income to total assets and the ratio of total liabilities to total assets in order to estimate the probability of financial health in line with Fachrudin's research previously conducted in Indonesia (Fachrudin, 2007).

The hypothesis are :

1. Ratio of net income to total assets has positive and significant influences to probability of financial health
2. Ratio of total liabilities to total assets has positive and significant influences to probability of financial health

### Research Model

This study used profitability ratio and financial leverage ratio as the variables to estimate the probability of financial health. The model is as follows:

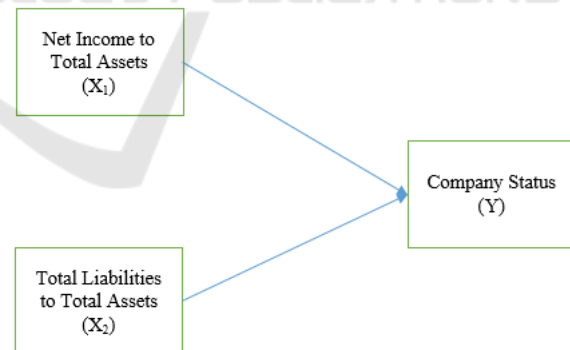


Figure 1: Research Model

## 3 RESEARCH METHODS

### 3.1 Sample Design

The population in this study involved all 600 companies listed on the Indonesia Stock Exchange. The target population is 23 unhealthy companies that received a special notation on its stock ticker from the

Indonesia Stock Exchange as of December 31, 2018 as they have negative equity. These companies with negative equity theoretically belong to companies that experience financial distress with insolvency in bankruptcy type. They are compared with 23 healthy companies. Each unhealthy company is compared to a healthy company that has the highest positive equity in the same sector and has almost the same total assets. Saturated sampling was done for 46 companies in the target population.

### 3.2 Variable

The variables of this study include:

Dependent variabel (covariates) :

$X_1$  = net income / total assets (NITA)

$X_2$  = total liabilities / total assets (TLTA)

The dependent variable (Y) is company's health status which is a categorical variable. The values are:

1 = The company that has the best level of financial health

0 = The company that has the worst level of financial health (experiencing financial distress - insolvency in bankruptcy type).

### 3.3 Statistical Analysis

Data analysis was performed by logistic regression Binary regression model :

$$y_1 = a + b_1x_1 + b_2x_2 + \mu \quad (5)$$

Descended into Logistics distribution function :

$$P_i = 1 / [1 + \exp(a + b_1x_1 + b_2x_2)] \quad (6)$$

$P_i$  = financial health probability whose value is between 0 and 1

## 4 RESULTS AND DISCUSSION

### 4.1 Results

The results of the study are presented in descriptive statistics and inference statistics in the form of logistic regression

#### 4.1.1 Descriptive Statistics

Descriptive statistics are presented in Table 1

Table 1. Descriptive Statistics - Mean and Standard Deviation of the Net Income to Total Assets Ratio and the Total Liabilities to Total Assets Ratio

		NITA	TLTA
<b>2016</b>			
Healthy Companies	Mean	0.037	0.371
	Stdev	0.145	0.263
Unhealthy Companies	Mean	-0.618	3.165
	Stdev	2.605	4.051
<b>2017</b>			
Healthy Companies	Mean	0.004	0.373
	Stdev	0.132	0.203
Unhealthy Companies	Mean	-0.227	3.527
	Stdev	0.332	5.266

#### 4.1.2 Logistic Regression

Logistic regression results are presented in Table 2

Table 2. Logistic Regression Results for Financial Health Assessment

Independent Variable	2017		2016	
	B	Exp (B)	B	Exp (B)
Constant	2.473 (0.003)	0.084	3.996 (0.002)	0.018
NITA	5.955 (0.041)	385.505	6.993 (0.060)	1089.212
TLTA	-2.382 (0.007)	0.092	-5.225(0.002)	0.005
n	46		46	
Hosmer and Lemeshow	0.503		0.267	
-2LL	34.125		25.001	
Negelkarke R Square	0.633		0.759	
Predicted Percentage Correct	95.70%		93.50%	

Numbers in brackets indicate significance

The value of Hosmer and Lemeshow goodness of fit shows a significance probability of 0.503 one year prior to the observation year (2017) and 0.267 in the previous two years (2016). This value indicates that these models are feasible for further analysis because as there is no *distinct distinguishment* between the predicted classification and the observed classification.

Negelkarke R square, respectively, are 0.633 and 0.759, which means that the variability of the dependent variable can explain the dependent variable by 63.3% in one year prior to the observation year and 75.9% in the previous two years. This value indicates a fit model.

The -2 Log-Likelihood indicates a decrease of 34,125 in one year prior to the observation year and 25,001 in the previous two years. These values are greater than the critical values of chi square table at alpha 5%, which indicates a better fit model.

The model for two years prior to the observation year has a significance level of 5%, but for one year prior this model is not significant at alpha 5% because the phi value of NITA is 0.060. The statistical results show that the hypotheses 1 are supported by empirical data at alpha 5% and hypotheses 2 are not supported by empirical data at alpha 5%.

The classification accuracy in one year prior to the observation year is 95.7% and 93.5% in the previous two years. Both variables are significant with the odds ratio shown by the Exp (B) value as presented in Table 2, describing as follows:

1. One year prior to the observation year, the increase in net income to total assets ratio would potentially increase company's financial health by 385.505 times,
2. One year prior to the observation year, the increase in the ratio of total liabilities to total assets would potentially reduce company's financial health by 0.092 times,
3. Two years prior to the observation year, the increase in the ratio of net income to total assets would potentially increase company's financial health by 1089.212 times,
4. Two years prior to the observation year, the increase in the ratio of total liabilities to total assets would potentially reduce company's financial health by 0.005 times.

The models obtained are as follows:

Two years prior

$$P_i = 1 / [1 + \exp (3.966 + 6.993 X_{1i} - 5.225 X_{2i})] \quad (7)$$

The logistic distribution function can be simplified to:

$$P_i = 1 / 1 + 2.718^{-(3.996 + 6.993 X_{1i} - 5.225 X_{2i})} \quad (8)$$

One year prior

$$P_i = 1 / [1 + \exp (2.473 + 5.955 X_{1i} - 2.382 X_{2i})] \quad (9)$$

The logistic distribution function can be simplified to:

$$P_i = 1 / 1 + 2.718^{-(2.473 + 5.955 X_{1i} - 2.382 X_{2i})} \quad (10)$$

P value range between a 0 and 1.

## 4.2 Discussion

The ratio of financial health prediction reflected by the balance sheet influence and earnings effect [19] can be applied to estimate company's financial health. The ratios that have a significant effect on this study are among others the ratio of net income to total assets and the ratio of total liabilities to total assets. This finding is in line with previous financial distress prediction model (Fachrudin, 2007) and previous financial health assessment model (Csikosova et al., 2019).

This model did not involve the variable of current ratio such as Yakymova and Kuz (2019) and Jordan

(1998) models. This is due to the fact that the preliminary study discovered that this ratio is not significant since liquidity problem can be handled by taking debt. Thus, total liabilities serve as an important predictor.

## 5 CONCLUSION

Profitability and financial leverage ratios can be used to estimate the financial health of a company. The probability value obtained ranged between 0 and 1. A value of 0 indicates that the condition of the company is unhealthy. While a value of 1 indicates that the condition of the company is healthy. The values indicate the level of company's health, for example a value of 0.1 can be categorized as healthy, a value of 0.5 can be categorized as moderate, and a value of 0.9 can be categorized as unhealthy.

## 6 SUGGESTION

This financial health assessment model can be applied to companies for assessing their company's financial health in the next year or in the next two years. Company's managers should make efforts in increasing company's profitability by increasing sales and other sources of income as well as carrying out activities that might add value to the company so as expenses can be reduced. A negative net income will cause negative retained earnings, thus leaving company's equity negative.

Company managers should be aware of any increase in liabilities as it can potentially reduce company's financial health. Companies have to consider taking debt, especially debt in foreign currencies whose value might go up when Indonesian Rupiah is weakening.

Prospective creditors and potential investors can use this model to make funding decisions and funds investment. In so doing, investors who have invested in company shares can assess the company's health to review their investment portfolio.

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