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Z-Score Bankruptcy Prediction Model and Stock Prices of The Cigarette Companies in Indonesia

Carlos Alberto Marcus Wiyarni
STIE Malangkucecwara Malang, Malang, East Java, Indonesia

Abstract: This research aims to explore the usefulness of the Altman model for predicting bankruptcy of the cigarette companies that listed in Indonesia Stock Exchange.This study also attempts to measurethe effects of the Altman's scores on the stock prices of the companies. The sample of this study is all cigarette companies that publish their financial report for the periods 2013 until 2016. There are four companies that published their financial report in those periods. They are PT. GudangGaramTbk, PT. Handjaya Mandala Sampoerna Tbk, PT. Bentoel International InvestamaTbk, and PT. WismilakInti Makmur Tbk. This study found that only one company that has bankruptcy potential and the other three companies are healthy based on the Z-score analysis. The result of T-test, simple regression analysis and value of determinant coefficients showed that the value of Z-score positively influenced the stock price.
Key word: Bankruptcy Prediction, Altman's Z-Score, Cigarette Companies, Stock Price

I. Introduction

The cigarette industry is one of the most dynamic industries in Indonesia. Alongwith the economic development, various types of cigarette products have emerged in Indonesia. Although smoking is one of the products, which can be said to have almost no benefit for those who consume it, but the reality of life that exists, cannot be denied that cigarette products just like incarnate from the product, which is consumed on the basis of "Pleasure" into a "Need". We can find such things from the many behaviors of people who always want to enjoy or consume products that are clearly categorized as containing harmful substances for health.

The study conducted by The Institute for Health Metrics and Evaluation (2014) shows that Indonesia is one of 12 countries that contribute as much as 40% of the total number of world smokers. About 61.4 million of Indonesia's population was active smokers in 2012, about 60% were male smokers and 3.5% female smokers and this number increased in 2013 to 62.3 million people and continued to increase. Given the importance of health for the community and the magnitude of the dangers arising from smoking, the government since 2014 has made a lot of regulations in order to safeguard products containing these active substances, ranging from raising cigarette excise tariffs, limiting production, limiting tobacco plantation area as raw materials, restrictions on product promotion, restrictions on smoking-free areas, as well as the obligation to put up pictures of the dangers of smoking in every package of cigarette products.

By the limitation of advertisementand the production of cigarette and also the increasing public awareness of the harmful for consuming the cigarettes, it makes cigarette producers worried about the reduction of cigarette consumers. These conditions can harm tobacco companies and may make the companies experience financial difficulties. Financial difficulties are very essential problems that companies must watch out for because it can make the business failure. For this reason, the company must carry out a variety of analysis as early as possible, especially analysis concerning the level of financial safety of the company. This analysis is very useful for companies to anticipate what is needed.

There are several analysis models that can be used for predicting the financial health of the company.These models are put forward byBeaver (1966), Altman (1968),Springate (1978), Ohlson (1980), and Zmijewski (1983).This study uses the Altman model because according to Adnan &Kurniasih (2000), the Altmanapproach can empirically prove that financial ratios can be used as a tool to predict the level of financial health of banking and non-banking companies with sufficiently accurate.

Generally, the company that is predicted to experience financial difficulties, it will impact on itsstock price (Syamni et al., 2018). The stock price will move down or unchanged. To anticipate the worst possible predictions of the company's financial health on stock price movements, this study would like to examine how much the impact of Altman's financial bankruptcy analysis on particular stock price movements in the cigarette industry. This study is expectedto be very useful for investors to make decision whether to continue to invest or not.

Altman's Z-Score

Financial difficulties are situations where the company experiences a deficit or difficulty in funds to run or continue its business. In analyzing the financial health of a company, ratio analysis is needed through financial statements. Investors and owners usually use financial ratio analysis tolearn more the detailed of company's financial health as well as its potential. Financial ratio analysis can also be used in two different ways, but same usefulness. First, financial ratio analysiscan be used to examine the performance of a company in comparison to past periods of time. Thiscan help to identify problems that need fixing. Itcan also direct your attention to potential problems that can be avoided. Second, the investors or owners can usethe ratio analysis to compare the performance of a company against that of its competitors or othermembers of the industry.There are several models that can be used to analyze the financial health of a company by using the financial ratios. The models are Beaver's model (1967), Altman (1968), Springate (1978), Ohlson (1980), and Zmijewski (1983). Altman's Z-Score model is a prediction model formulated by Altman in 1968, this model is used to predict the possible financial difficulties of a company. Altman's Z-score model uses the Multiple Discriminant Analysis (MDA) method which in its calculations uses financial ratios (Altman, 2000).Al-Rawi et al. (2014) used the Altman Z-Score analysis to predict insolvency of a firm. They found that if the firm has increased its debt, it will be facing bankruptcy in the nearfuture. Azizand Humayon (2006) conducted research about predicting corporate bankruptcy through an extensive literature review.Their study provides acomprehensive analysis.They found that financial ratios have been dominant in most research; it may be worthwhile by increasing the variety of explanatory variables,such as to include corporate governance andmanagement practices while developing the research model.

Altman Z-score formula has been developed 3 times, first is the formula used for manufacturing companies that have been listed in stock exchange.The formula is:

Z-score = 1,2 X1 + 1,4 X2 + 3,3 X3 + 0,6 X4 + 0,999 X5.

The second development is addressed for private companies. In this formula, the value of X4 is changed. X4 = book value of equity / book value of total liabilities. Based on this change, the formula of Z-score becomes:

Z-score = 0,717 X1 + 0,847 X2 + 3,107 X3 + 0,420 X4 + 0,998 X5.

The next or third development is for non-manufacture and emerging market companies. For this reason, the formula of Z-score has been modified as follows:

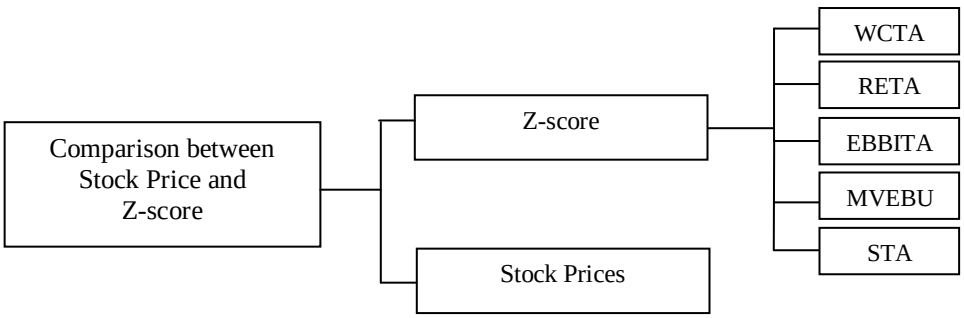
Z-score = 3,25 + 6,56 X1 + 3,26 X2 + 6,72 X3 + 1,05 X4.

This study wants to investigate the financial health of the manufacturing companies that listed in Indonesia Stock Exchange. Therefore, this research used Z-Score for manufacturing company, that is:

Z-score = 1,2 X1 + 1,4 X2 + 3,3 X3 + 0,6 X4 + 0,999 X5.

The Relationship Between Company's Financial Health with Stock Prices

The high and low stock prices on the Stock Exchange are more influenced by the consideration of buyers and sellers who make transactions. Theseconsiderations include the condition of the company's performance, industry prospects, political situation, government policies and the conditions of the exchange itself. From these factors, buyers and sellers will develop their respective perceptions, because for investors to buy shares means buying company prospects. Share prices will increase if the company's performance is good and does not experience financial distress or insolvency. With the increasing share price, it will increase the prosperity of its shareholders.Pranowo (2009) examined the effect on the financial performance to the volume of trading. Research conducted by Tomas& Daniel (2017) showed that there is a positive impact of financial leverage ratio on stock prices and a negative effect of liquidity ratio on stock prices. Based on the theory above, this conceptual framework of this study is as follows:



Hypothesis Development

In the stock market, the stock prices are determined by several factors such as earnings per share, the ratio of earnings to share price or price earnings ratio, the risk free interest rate as measured by the government

deposit interest rate and the level of certainty of the company's operations. Sharif et al. (2015) examined eight variables that impacted the stock price. These variables areROE (return on equity), book value per share, earnings per share (EPS),dividend per share, dividend yield, price earnings, debt to assets and firm size. The results of their study indicate that the ROE, book value per share, dividend per share, dividend yield, price earnings, and firm size are significantly influence of stock prices. Based on this understanding, it can be concluded that the stock price will be formed from the transactions that occur in the capital market which is determined by the demand and supply of shares. Besides, the high and low stock prices formed on the Stock Exchange (secondary market) is more influenced by the consideration of buyers and sellers who make transactions. Thisconsideration consists of the condition of the company's performance (bankrupt or healthy), industry prospects, political situation, government policies and the conditions of the stock exchange itself.

Researches in Indonesia regarding factors related to stock prices have been widely carried out. The results of research conducted by Effendi et al (2016) state that stock prices will increase if the company's performance is good and does not experience financial distressed or insolvency. With the increasing share price, it will increase the prosperity of its shareholders. In line with theseresearches, Syamni et al. (2018)in his study found that the Altman Z-Score influence on stock prices. From this explanation it can be stated that there is an influence of the level of financial health (Altman) of the company on stock prices.Based on the researches above, the first hypothesis of this study is:

H1: There is a significant influence of financial health using Altman's Z- Score on Stock Prices

II. Research Method

This study used secondary data. The data was obtained from the IDX library,Idx.co.id site, magazines, books, journals, newspapers, and other scientific literature related to research topics.The population of this study is a cigarette companies that listed on the Indonesia Stock Exchange at the end of 2016, amounting to 4 companies. The sampling method is done by saturated sampling. In this case the sample taken is the entire population of the cigarette companies. These four companies are:

Table 1
The Sample of the Research

Company Name	Stock Code	Date of IPO
PT. GudangGaramTbk	GGRM	27 Agustus 1990
PT. H.M. SampoernaTbk	HMSP	15 Agustus 1990
PT. Bentoel International InvestamaTbk	RMBA	5 Maret 1990
PT. WismilakIntiMakmurTbk	WIIM	18 Desember 2012

Source: Idx.com

The variables used in this study are the dependent variable and the independent variable. The dependent variable in this study is the stock price while the independent variable is the value of the Altman Z-Score financial ratio.The stock price referred to the average stock price during the observation period. This observation period is determined based on event study. Accordingto Jogiyanto (2013), event study is a study that studies market reaction to an event during the observation period. The events referred to financial report of the companies listed on the Stock Exchange at the end of each year. At the same date, the Z-Score analysis will be conducted.

The observation period (event window) used in this study is 10 days. Determination of the observation period for 10 days is to avoid the influence of other information that can affect changes in the stock price concerned. Ifthe period of the event is taken too long, there are other significant events affecting the outcome (Jogiyanto, 2013). Ten (10) days of observation of this stock price are divided into 2, namely t1 = -5 (5 days before the publication of financial statements) and t2 = 5 (5 days after the publication of the financial statement), based on the explanation above, the average stock price during the observation periods were formulated as follows:

$$Y = \frac{\sum Stock\ Pricet_1 + \sum Stock\ Pricet_2}{Observation\ Period\ \ (10\ \ days)}$$

There are five indicators for independent variable (Altman's Z-Score). These five indicators are:

1. $(X_1) = \frac{WorkingCapital}{TotalAssets}$
2. $(X_2) = \frac{Returning}{TotalAssets}$

3. $(X_3) = \frac{EarningBeforeInterestandTax}{TotalAssets}$
4. $(X_4) = \frac{MarketValueEquity}{BookValueofDebt}$
5. $(X_5) = \frac{Sales}{TotalAssets}$

For analyzing data, this study used Altman's Z-Score analysis and simple regression analysis. The formula of Altman's Z-Score is:

Z –Score = 1,2 WCTA + 1,4 RETA + 3,3 EBITTA + 0,6 MVEBUL + 1 STA

The result of the Altman's Z-Score divided by three categories (Altman, 1968). These three categories are:

1) If the value of Z-Score higher than 2,99 (Z-Score > 2,99), it will be classified as healthy company.
2) If the value of Z-Score between 1,8and 2,99 (1,8 <Z-Score< 2,99), it will be classified as company that will have financial problems.
3) If the value of Z-Score below 1,88 (Z-Score< 1,88), it will be classified as unhealthy company.

Regression can be used to measure the strength of the relationship between two variables; it can also be used to indicate the direction of the relationship between the dependent variable and independent variables. Simple regression is used to analyze the influence of the Z-Score value on stock prices. The formula is:

Y = a + bX

Y = Stock Price

a = constant, the value of Y if X equal 0

b = Independent Variable Coefficient is the direction of regression coefficient, which states the change in the value of Y if there is a change in the value of X. If (+) the direction of the line will rise, and if (-) the line value will decrease

III. Result and Discussion

The results of Altman's Z-Score analysis of this study can be shown in the tables below:

Table 2
Z-Score Recapitulation

Company Name	2013	2014	2015	2016
GudangGaramTbk	4.87	5.41	5.21	9,61
H.M. SampoernaTbk	17.93	17.48	48.51	36,83
BentoelInternasionalInvestamaTbk	1.31	0.73	0.95	3,56
WismilakIntiMakmurTbk	4.52	4.12	4.19	4,22

Table 3
Z-Score Analysis for 2013

Company Name	Z-Score	Cut Off	Interpretation
GudangGaramTbk	4.87	Z>2.99	*Health*
H.M. SampoernaTbk	17.93	Z>2.99	*Health*
BentoelInternasionalInvestamaTbk	1.31	Z<1.80	*Distress*
WismilakIntiMakmurTbk	4.52	Z>2.99	*Health*

Table 4
Z-Score Analysis for 2014

Company Name	Z-Score	Cut Off	Interpretation
GudangGaramTbk	5.41	Z>2.99	*Health*
H.M. SampoernaTbk	17.48	Z>2.99	*Health*
BentoelInternasionalInvestamaTbk	0.73	Z<1.80	*Distress*
WismilakIntiMakmurTbk	4.12	Z>2.99	*Health*

Table 5
Z-Score Analysis for 2015

Company Name	Z-Score	Cut Off	Interpretation
GudangGaramTbk	5.21	Z>2.99	*Health*
H.M. SampoernaTbk	48.51	Z>2.99	*Health*
BentoelInternasionalInvestamaTbk	0.95	Z<1.80	*Distress*
WismilakIntiMakmurTbk	4.19	Z>2.99	*Health*

Table 6
Z-Score Analysis for 2016

Company Name	Z-Score	Cut Off	Interpretation
GudangGaramTbk	9,61	>2.99	*Health*
H.M. SampoernaTbk	36,83	>2.99	*Health*
BentoelInternasionalInvestamaTbk	3,56	>2.99	*Health*
WismilakIntiMakmurTbk	4,22	>2.99	*Health*

Table 7
Prediction of Financial Conditions using Altman's Z-Score
2013 – 2016

Company Name	Conditions			
	2013	2014	2015	2016
GudangGaramTbk	*Health*	*Health*	*Health*	*Health*
H.M. SampoernaTbk	*Health*	*Health*	*Health*	*Health*
BentoelInternasionalInvestamaTbk	*Distress*	*Distress*	*Distress*	*Health*
WismilakIntiMakmurTbk	*Health*	*Health*	*Health*	*Health*

The result based on the table above, in 2013 there was 1 company namely BentoelInternasionalInvestamaTbk which was in the distress zone (unhealthy) while the other 3 companies were in the healthy zone. In 2014 and 2015 it is still the same, BentoelInternational InvestamaTbk still has not managed to get out of the distress zone, it is only in the last year of research that all cigarette companies listed on the Indonesian securities market are in healthy condition or zone.

Based on the Altman's Z-Score above, this study examined the relationship between Altman's Z-Score with Stock Price. The result of this analysis can be seen in the table below:

Table 8
Statistical Analysis

Statistics	N	Minimum	Maximum	Mean	Std. Deviation
Z-Score	16	.73	48.51	10.5906	13.67040
Stock Price	16	408.00	94363.00	31414.625	33462.00505
Valid N (listwise)	16				

According to the statistical analysis above, it can be said that:

1) The mean value of Z-Score is 10.59 with minimum value is 0.73 and maximum value is 48.51. This result means that on average, the cigarette industry is in the health condition, because the value of Z-Score above 2.99 averagely.

2) The mean of stock price is 31,414.62 with minimum value is 408 and maximum value is 94,363.

This study also used the classic assumption tests. The results show that the data is good, because the data is normally distributed and also free from heteroskedasticityand autocorrelation problems. This shows that the data used as an independent variable meets the requirements to predict the dependent variable (Ghozali 2012).

Table 9
T-Test

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12648.838	7650.934		1.653	.121
	z_score	1771.924	451.336	.724	3.926	.002

Source : Data Processed bySPSS 16

Based on result of T-test above, it can be seen that the Z-Score variable has a t-count value of 3.926 with a significance value of 0.002, while the t-table value in the confidence t table of 95% or a = 5% is equal to and with df (degree of freedom) = n - k or 16-2 = 14 so that t-table 2.14479 is obtained. This means that the value of t-count (3.926)> t-table (2.145) then H1 is accepted. Therefore, the Altman's financial health potential affects the stock price movements of cigarette companies in the Indonesia Stock Exchange.

This study also used simple linear regression analysis. The result of statistical analysis for simple regression is shown in the table below:

Table 10
Simple Linear Regression

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant	12648.838	7650.934		1.653	.121
	z_score	1771.924	451.336	.724	3.926	.002

Source: data from SPSS 16

Based on the statistical analysis, it can be shown that the simple linear regression equation in this study is Y = 12648.838 + 1771.924X

The results of the simple linear regression equation above show the magnitude and direction of the influence of the independent variable on the dependent variable. Regression coefficients that have positive values mean that they have a direct influence on stock prices, whereas if the regression coefficients have negative values, they have opposite effects on stock prices. The constant value is 12648.838 if the independent variable (Z-Score Value) is considered constant (value 0), then the stock price is 12648.838. The coefficient of Z-Score (X) is 1771.924, because the coefficient value is positive, the Z-Score has an effect in the direction of the stock price or there is a positive influence between the Z-Score (X) variable on the stock price (Y). This means that if the independent variable Z-Score (X) rises by 1 unit then the stock price variable (Y) will increase by 1771.924 units.

In order to determine the proportion or percentage of total variation in the dependent variable explained by the independent variable, this study also used determinant test. In the coefficient of determinant (R^2) if the value of R^2 is close to 1, it can be said that the ability of the independent variable to explain the variation of the dependent variable is strong. The coefficient determinant (R^2) of this study can be seen in the table below:

Table 11
Coefficient Determinant (R^2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.724[a]	.524	.490	23896.114

Source : Data processed by SPSS 16

Coefficientdeterminant value (R^2) is 0.524 or 52.4%, it means that the ability of the independent variable in explaining variations that occur in the dependent variable, namely the stock price is relatively large or high, while 47.6% is influenced by other factors were not examined in this study.

IV. Conclusion

The purpose of this study is to analyze the relationship between the Z-Score Bankruptcy Prediction Model and Stock Prices of the Cigarette Companies in Indonesia. The results of the study revealed that in 2013 to 2015, only one company (25%) was predicted to experience financial difficulties according to Altman, namely BentoelInternasionalInvestamaTbk., while the other 3 companies (GudangGaramTbk, H.M. SampoernaTbk, WismilakIntiMakmurTbk)are in a healthy position. In the year of 2016, all companies experienced an increase, even PT. BentoelInternasionalInvestamaTbk, which since 2013 was in a state of financial difficulties, also managed to get out of the zone of distress zone, while the other three companies continued to maintain good financial performance.Theresults of T-test showed that with a significance value of 5% and with the degree of freedom 14, indicate that the value of t-count (3.926)> t-table (2.145) then hypothesis is accepted. Therefore, the Altman's financial health potential influences the price movements of cigarette companies on the Indonesia Stock Exchange.The direct effect of Altman's Z-Score on the stock price is a positive.It means that if the independent variable Z-Score (X) rises by 1 unit then the stock price variable (Y) will increase by 1771,924 units. Finally, the coefficientdeterminantvalue (R^2) is 0.524 or 52.4% of Altman's Z-Score explainsthe variations that occur in the stock price.

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