Financial Distress Prediction With Altman Z-Score And Effect On Stock Price: Empirical Study On Companies Subsectors Chemical Listed In Indonesia Stock Exchange Period 2009-2014

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ABSTRACT: *This study aimed to obtain empirical evidence about the state of financial distress prediction using the Altman Z-score and ratio-ratio test Z-score in influencing the price of shares in the chemical subsectors listed in Indonesia Stock Exchange 2009-2014 period. The samples were determined by purposive sampling, while data processing using Microsoft Excel, and SPSS. Financial distress only occurs in ETWA company in 2014 in the category of bankruptcy. Effect of a Z-score to the stock price is significantly 0.004 and ratio-ratio of the Altman Z score is working capital to total assets have no significant effect amounted to 0,085, retained earnings to total assets have no significant effect amounted to 0,478, EBIT to total assets have a significant influence amounted to 0,016, and the book value of equity to book value of total debt had no significant effect of 0.078. Contribution ratio-ratio Altman Z-score of 48.6% to the stock price. In conclusion, the financial distress that are in reasonably good condition. Z-score can be used to predict stock prices, and ratios of Z-score only ebit to total assets can significantly affect stock prices partially.*
Keywords: *Altman Z-Score, Financial Distress, Stock Price*

I. INTRODUCTION

Research Background

Indonesia as a developing country has been progressing in some sectors of industry, particularly the chemical sector. Chemical sector companies have become the object of research by the consideration that the existence of this sector is more and necessary for both individual and corporate. The continued development of technological advances and the human mind at this time, has also increased the demand for chemicals to be processed into such a manner and then can be used to be the base material. So with this case investors interested to invest in this sector.

The share price is a factor that is very important and must be considered by an investor in making an investment because the stock price showed the achievements of issuers, the stock price movement in line with the performance of listed companies. The phenomenon that occurs in the chemical subsector company's share price in 2014 was half of the sample decreased, while the other half experienced a modest increase not significantly (source finance.yahoo.com).
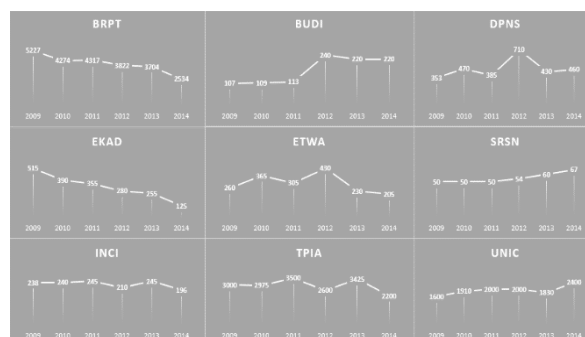

Image 1. Phenomenon of stock price

Currently the company go public that includes chemical subsectors advantage of the existence of capital markets as a means to obtain alternative sources of funding or financing. Economic conditions in Indonesia which is still uncertain results in a high risk for a company experiencing financial difficulties or even bankruptcy. The prediction error on the continuity operations of an enterprise in the future can be fatal loss of earnings or

investments.

Financial distress can occur, especially in companies experiencing economic difficulties have a direct impact on the chain of production to distribution. The economic difficulties experienced by the company, for example trouble paying debts in the past, the amount of costs incurred to finance the production of which exceeds the level of income, the amount of uncollected receivables difficult, and the difficulty of getting loans from other parties. So, gradually economic difficulties will result in bankruptcy.

Research Purposes
1. To determine the condition of financial distress companies chemical sub sectors listed in the Indonesia Stock Exchange using the Altman Z-Score.
2. To determine how much influence the value of Z-score in predicting financial distress to the stock price.
3. To find out how much influence the prediction of financial distress with the ratio of working capital to total assets to the stock price.
4. To find out how much influence the prediction of financial distress with the ratio of retained earnings to total assets to the stock price.
5. To find out how much influence the prediction of financial distress with ebit to total assets ratio of the stock price.
6. To determine how much influence the prediction of financial distress on the ratio of book value of equity to book value of debt to the stock price.

II. REVIEW OF THEORY AND DEVELOPMENT HYPOTHESIS
Review of Theory
1. Stock
Kamaludin and Indriani (2012:235) shares can be defined as a sign of ownership or possession of a person or entity in a company. The form of the stock is a piece of paper stating that the owner of the paper is the owner of the company that publishes the paper. Meanwhile, Fahmi (2012:270) shares is proof of the ownership participation capital/funds in a company.

Samson (2006: 337) price of a type of stock is affected by one or more variables in which each independent variable has a different effect on stocks. Therefore, the required initial identification of the types of variables that allegedly contribute to a kind of stock which theoretically have the quality of the relationship between stock prices and the macro and micro economic variables with the economic conditions prevailing in somewhere.

2. Financial Report
Harmono (2009:104), an analysis of the financial statements for the financial management company that is comprehensive, it can be used to detect the level of health of the company, through a cash flow analysis of the condition or performance of the organization as a whole. Brigham and Houston (2010:84), Financial Statements are a few sheets of paper with numbers written on it, but it is also important to think about real assets behind these figures.

The financial statements, provides an overview of a company's financial circumstances. To gain an overview of the company's financial development, required the interpretation or analysis of financial data from the companies concerned.

3. Financial Ratio
Jumingan (2011:118) the ratio in financial statement analysis is a number that shows the relationship between an element with the other elements of the financial statements. Concluded that the financial ratios financial ratio is a number that shows the relevant and significant relationship between some elements with other elements of the financial statements.

4. Bankruptcy
Prihadi (2011:332) bankruptcy, a condition where the company no longer able to repay their obligations. This condition usually does not just show up on the company. Preliminary indications from the company that usually can be recognized early that the financial statements are carefully analyzed in a particular way. Financial ratios can be used as an indication of the bankruptcy of the company.

5. Altman Z-score
Prihadi (2011:335), Z-Score is a multivariable equation used by Altman in order to predict the rate of bankruptcy. Altman uses a statistical model called discriminant analysis, exactly is multiple discriminant analysis (MDA). MDA began to be used in biological research in the 1930s. At MDA samples were divided into two groups, in this case the company is bankrupt and the company is not bankrupt. This is in contrast to the

regression that mixing the two samples. MDA is a simple step to be taken is:
a. Classification of companies into the company go bankrupt and not bankrupt.
b. Correction data.
c. Assign Score.

Table 1. CutoffpointZ-ScoreAltman

<1,81	The Company declared Bankrupt
1,81<*Z-Score* <2,99	Gray area or zone of ignorance (between bankrupt and not bankrupt)
>2,99	The Company shall be declared bankrupt (safe zone)

Source: Prihadi(2011:336)

5.1 Pure Z-score
When discussing the Z-Score, the other authors tend to discuss the Z-Score The first, in this case called the original Z-Score. Though Altman issued several variations of the Z-Score. The original Z-Score Altman was first formulated by the background conditions, among others:
a. Samples are taken from several manufacturing companies public
b. The company located in the United States
c. Formulated in 1968
d. The number of samples used were 66 companies, of which 33 companies went bankrupt and 33 companies do not go bankrupt.

Total ratio selected to do the test is 22 pieces. Of this amount then only have 5 ratio of the most powerful collectively correlated with bankruptcy. The first version can be seen below:
Z-Score = 1,2 X_1 + 1,4X_2 + 3,3X_3 + 0,6X_4 +1,0X_5
Source : Prihadi(2011:336)

5.2 Z'-score
Due to the limitations of the use of the Z-Score which can only be used on public companies and manufacturing, then develop the two variants of the Altman Z-Score is Z'-Score and Z"-Score. Z'- score is intended for non-public company (private) by way of reformulating ratio used, namely eliminating the Market Value of Equity and replace it with the Book Value of Equity. The formulation has changed and a different sample to make the final result Z'-score formula to be different:
Z'-Score = 0,717X_1 + 0,847X_2 + 3,107X_3 + 0,420X_4 +0,998X_5
Source : Prihadi(2011:338)

5.3 Z"-score
The final variant is Z "-Score. In this last model Sales to Total Assets ratio is eliminated in the hope the industry in terms of size effects associated with the company or the sale of assets can be eliminated. The sample used was later replaced by companies from developing countries, namely Mexico. Z " - Score Altman is the formula of the most versatile because it can be used for public and non-public company which would then be used to calculate Z "-Score 12 food and beverage companies listed on the Indonesia Stock Exchange. Formula:
Z"-Score = 6,56X_1 + 3,26X_2 + 6,72X_3 +1,05X_4
Source : Prihadi(2011:339)
Where the financial ratios used are:
X_1=WorkingCapital/TotalAssets
X_2=RetainedEarnings/TotalAssets
X_3=EarningsBeforeInterestandTaxes/TotalAsset
X_4=BookValueofEquity/BookValueofDebt

Review of Literature
Previous research as the basis for discussion of the results of research associated with consistency in the current study. Here are some of the results of previous research in developing and determining the study.

Table 2. research literature

Name	Result
Marcelina & Yuliandhari(2014)	Prediction bankruptcy with Z-Score method does not have a significant influence on stock prices
Sukmawati et al. (2014)	(1) WC / TA, RE / TA, and S / N no significant effect on the stock price, (2) EBIT / TA and MVE / BTL significant effect on stock prices, (3)

|	simultaneously significant effect on stock prices.
Issabella (2013)	Economic value added and bankruptcy prediction model Altman Z-Score positive significant effect on stock returns, but the systematic risk has no significant effect on stock returns.
Nugroho & Mawardi (2012)	Variable ratio Net Working Capital to Total Assets, Retained Earnings to Total Assets, Earnings before interest and tax to Total Assets and Book Value of Equity to Total Liabilities positive effect on financial distress.
Marcelinda et al.(2014)	Altman Z-Score have low accuracy.
Bashir et al.(2015)	Altman Z-Score is a valid instrument to assess the soundness of financial companies listed on the Karachi Stock Exchange.
Jan & Marimuthu (2015)	Bank Syariah Malaysia was found to be insolvent because it is at the bottom four positions z-score on the list of bankruptcy.
Celli (2015)	Z-score work effectively and performing well in predicting the failure of the Italian company, albeit with a slightly lower level of reliability when applied to Anglo-Saxon.
Wang & Campbell (2010)	Model Z-score revisions have a higher prediction accuracy compared to both the estimation model and the original model Altman. This study shows that the model of Z-score is a useful tool in predicting the failure.

Framework Research Model
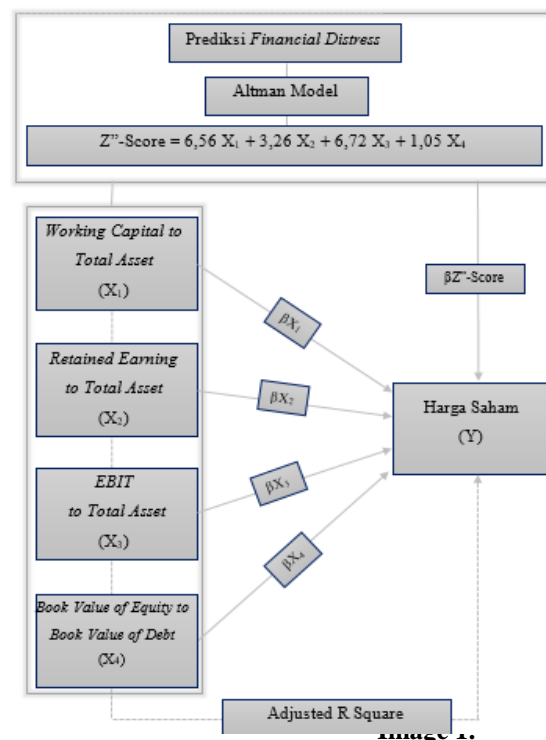
Image 2. Framework Research Model

Based on the framework, the authors formulate hypotheses to be used in the following research.

H1: Values Z "-Score supposed to influence the company's stock price chemical subsectors listed in BEI period 2009-2014.

H2: Working Capital to Total Asstes supposed to influence the company's stock price chemical subsectors listed in BEI period 2009-2014.

H3: Retained Earnings to Total Asstets supposed to influence the company's stock price chemical subsectors listed in BEI period 2009-2014.

H4: EBIT to Total Assets supposed to influence the company's stock price chemical subsectors listed in BEI period 2009-2014.

H5: Book Value of Equity to Book Value of Debt supposed to influence the company's stock price chemical subsectors listed in BEI period 2009-2014.

III. RESEARCH METHODS

Reseacrh Methods

This study is the prediction of financial distress companies and the causal relationship of the variables were observed and studied. Research carried intends to prove the hypothesis, tested with Altman Z-score method and regression analysis using SPSS software V.21.

Variable Operational

Operational measure is the explanation of theoretical understanding of variables that can be observed and measured in analyzing the data collected by the author.

Table 3. Variable Operasional

No	Variable	Indicator	Scale	Reference
1	Harga Saham(Y)(M.Samsul,2006)	Price Closing Stock	Ratio	Financial Report
2	Altman Z-Score(Prihadi,2011)	Z-Score= $6,56X1 + 3,26X2 + 6,72X3 + 1,05X4$	Ratio	Financial Report
3	Working Capital to Total Asset (X_1)	$WC\ to\ TA = \dfrac{Working\ Capital}{Total\ Asset}$	Ratio	Financial Report
4	Retained Earning to Total Asset (X_2)	$RE\ to\ TA = \dfrac{Retained\ Earning}{Total\ Asset}$	Ratio	Financial Report
5	EBIT to Total Asset (X_3)	$EBIT\ to\ TA = \dfrac{EBIT}{Total\ Asset}$	Ratio	Financial Report
6	Book Value of Equity to Book Value of Total Debt (X_4)	$BVE\ to\ BVD = \dfrac{Book\ Value\ of\ Equity}{Book\ Value\ of\ Total\ Debt}$	Ratio	Financial Report

Population

In this study, the population is a sub company of the chemical sector listed in Indonesia Stock Exchange. So assuming this research focuses on the chemical subsector Integration can provide interesting results to further develop deeper and decisions and actions can be taken in anticipation of dealing with financial distress prediction that may occur.

Samples and Sampling Techniques

The method used is purposive sampling method, the research that has the purpose or specific targets in selecting a random sample based on the criteria. The sampling criteria used by researchers are as follows.
1. Company chemical subsectors listed in the Indonesia Stock Exchange.
2. Companies that have a complete financial statement data and published research that is active during the period of 2009 until 2014.
3. Companies that have information for variables used in this study.

Here's a list of companies subsector chemical used as a sample and meet the criteria in this study.

Table 4. Research Sample

Code	Company Name	Code	Company Name	Code	Company Name
BRPT	Barito Pacific[1]	EKAD	Ekhadarma Nusantara[4]	INCI	IntanWijaya Internasional[7]
BUDI	Budi Acid Jaya[2]	ETWA	Eterindo Wahanatama[5]	TPIA	Chandra Asri Petrochemical[8]
DPNS	Duta Pertiwi Nusantara[3]	SRSN	Indo Acidatama[6]	UNIC	Unggul Indah Cahaya[9]

Source : Indonesia Stock Exchange

IV. RESULTS

Prediction of Financial Distress

To obtain the value Z "-score on Altman models namely by adding the coefficient of 6.56 multiplied by the working capital to total assets (X1) coupled with a coefficient of 3.26 times the retained earnings to total assets (X2) coupled with a coefficient of 6.72 times the EBIT to total assets (X3) coupled with a coefficient of 1.05 times the book value of equity to book value of debt (X4). Table calculation of Altman Z "-Score as follows.
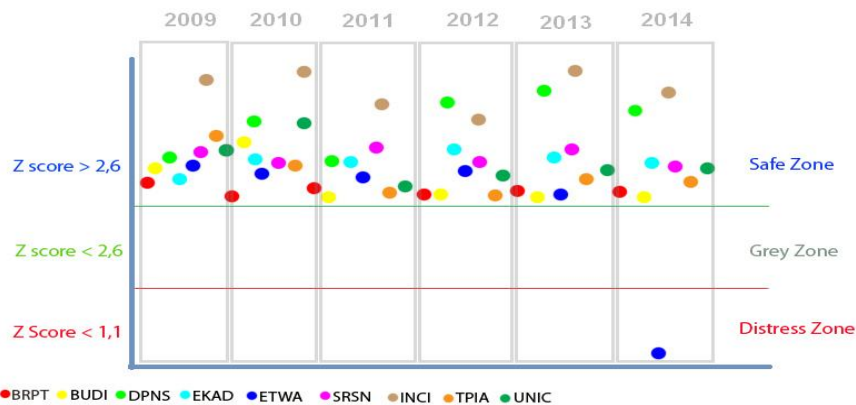
Image 3.   Result Classification Area Z-Score

Classification area Altman Z-score has three categories: safe zone, gray zone and distress zone. Based on the picture above, there is a company in 2014 that are in bankruptcy or distress zone zone while the remaining chemical subsectors almost all companies are in the safe zone or safe zone.

Classic Assumption test
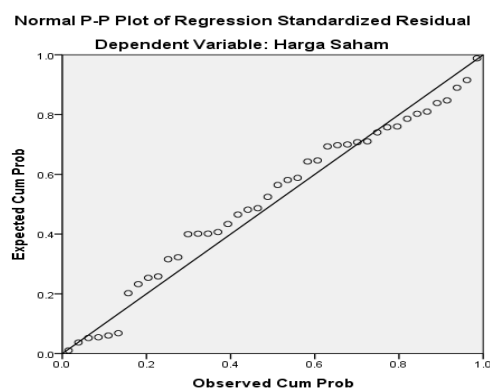 1.   **Normalitas Test**

Image 4.   Normalitas P-Plot Test

From the graph of normality, dots spread around the diagonal line, and its distribution follows the direction of the diagonal line. Therefore the multiple regression model proper to be used to predict the effect of the ratio of independent variables (Working Capital to Total Assets, Retained Earnings to Total Assets, Earnings Before Interest and Taxes to Total Assets and Book Value of Equity to Book Value of Total Debt) to the dependent variable (stock price).

  2.   **Multikolinieritas Test**

Table 5. Multikolinearitas Test

Coefficients[a]			
Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	WCTA	.471	2.123
	RETA	.286	3.499
	EBITTA	.258	3.876
	BVEBVD	.482	2.074
a. Dependent Variable: HargaSaham			

Table coefficients resulted in the Tolerance value of each variable is greater than 0.10 and VIF value of each variable is less than 10. And among the independent variables may be related or unrelated to one another, this kind of research. Due to good research it is each independent variable does not have a relationship with the other

independent variables affect each other or not.

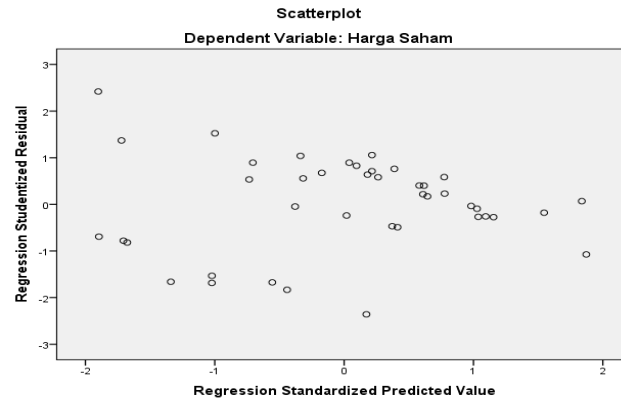### 3. Heteroskidastity Test

Image 5.   Heteroskidastity Test

From the graph in Figure heteroskedastisitas test, it appears that the dots spread randomly, does not form a specific pattern is clear, and spread both above and below the numbers 0 and between 2 and -2. This shows that there is no heteroskedastisity the multiple regression model.

4. Autocorrelation Test

Table 6.   Durbin Watson Test

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.732[a]	.536	.486	2.53381	.759
a. Predictors: (Constant), BVEBVD, RETA, WCTA, EBITTA					
b. Dependent Variable: HargaSaham					

In the table above, it appears that the rate of 0.759 Durbin-Watson, it can be seen from the applicable criteria value 1,285 <DW <2.715 or a value of 1.285 <0.759 <2.715. This shows that multiple regression model is used to predict the effects worthy of the independent variable on the dependent variable.

Correlations Test

Table 7.   Correlations Test

Correlations		HargaSaham	WCTA	RETA	EBITTA	BVEBVD
HargaSaham	Pearson Correlation	1.000	.101	.629	.691	.289
	Sig. (1-tailed)	.	.261	.000	.000	.032
	N	42	42	42	42	42
WCTA	Pearson Correlation	.101	1.000	.087	.302	.710
	Sig. (1-tailed)	.261	.	.291	.026	.000
	N	42	42	42	42	42
RETA	Pearson Correlation	.629	.087	1.000	.827	.140
	Sig. (1-tailed)	.000	.291	.	.000	.189
	N	42	42	42	42	42
EBITTA	Pearson Correlation	.691	.302	.827	1.000	.323
	Sig. (1-tailed)	.000	.026	.000	.	.019
	N	42	42	42	42	42
BVEBVD	Pearson Correlation	.289	.710	.140	.323	1.000

Sig. (1-tailed)	.032	.000	.189	.019	.
N	42	42	42	42	42

The conclusion that can be drawn from the table above as follows.
1. The relationship between Working Capital to Total Assets (X1) on stock prices (Y) is positive and the level of correlation of 0.101 which is the correlation is very weak.
2. The relationship between Retained Earnings to Total Assets (X2) on stock prices (Y) is positive and the level of correlation of 0.629 is a strong correlation.
3. Relationship between Earning Before Interest and Taxes to Total Assets (X3) on stock prices (Y) is positive and the level of correlation of 0.691 is a strong correlation.
4. The relationship between Book Value of Equity to Book Value of Total Debt (X4) on stock prices (Y) is positive and the level of correlation of 0.289 which is the correlation is weak.

Coefficient of Determination Test

Table 8.   Coefficient of Determination

Model Summary[c]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732[a]	.536	.486	2.53381
a. Predictors: (Constant), BVEBVD, RETA, WCTA, EBITTA				
b. Dependent Variable: HargaSaham				

Summary table models produce the coefficient of determination or Adjusted R square = 0.486 which shows the goodness of fit test or feasibility regression model. From the table it can be seen Coefficient of Determination that of all the independent variables are Working Capital to Total Assets (X1), Retained Earnings to Total Assets (X2), Earnings Before Interest and Taxes to Total Assets (X3), and Book Value of Equity to Book Value of Total Debt (X4) has the ability to explain the variation of the dependent variable is the share price (Y) of 0.486 or 48.6% while the remaining 0.514 or 51.4% is explained by other variables not examined in this study.

Simultant Test
The feasibility of the model and the percentage contribution shown by the coefficient of determination were tested using ANOVA calculation results in the form of a table, as follows.
1. If Sig> 0.05 = Reject H0 so H1 accepted (Significant)
2. If Sig> 0.05 = Accept H0 so H1 rejected (Not Significant)

Table 9.   Simultan test

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	105.353	1	105.353	9.488	.004[b]
	Residual	488.573	44	11.104		
	Total	593.925	45			
a. Dependent Variable: Ln HargaSaham						

From the table above, can be summarized as follows.
1. F value (9.488)> F table (5.716)
2. Value Sig. (0.004) <0.05

Then the table above obtained that H0 rejected and H1 accepted which means that the value Z "-Score significantly affect the company's stock price chemical subsectors listed in BEI period 2009-2014.

Partial Test
Alternatively, you can use the Value Significance:
1. If Sig <0.05 β Reject H0 so Ha (1,2,3,4) is Accepted (Significant)
2. If Sig> 0.05 β Accept H0 so Ha is rejected (Not Significant)

Table 10. Partial Test

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.509	1.830		3.557	.001
	WCTA	-3.328	1.884	-.288	-1.767	.085
	RETA	.694	.969	.150	.717	.478
	EBITTA	1.867	.736	.559	2.538	.016
	BVEBVD	.979	.540	.292	1.814	.078
a. Dependent Variable: HargaSaham						

Explanation:
1. The regression coefficient Working Capital to Total Assets (X1) of $\beta1$ = -3.328 probability (sig.) = 0.085. the effect of variable Working Capital to Total Assets (X1) on stock prices (Y) is not significant and T value (-1.767) <T table (2.021) then H0 is accepted.
2. The regression coefficient Retained Earnings to Total Assets (X2) is $\beta2$ = -0.694 probability (sig.) = 0,478. the effect of variable Retained Earnings to Total Assets (X2) on stock prices (Y) is not significant and T value(0.717) <T table (2.021) then H0 is accepted.
3. The regression coefficient Earnings Before Interest and Taxes to Total Assets (X3) of $\beta3$ = 1.867 probability (sig.) = 0.016. the effect of variable Earning Before Interest and Taxes to Total Assets (X3) on stock prices (Y) is significant and T value(2,538)> T table (2.021) then H0 is rejected.
4. The regression coefficient of Equity Book Value to Book Value of Total Debt (X4) of $\beta4$ = 0.979 probability (sig.) = 0.078. then the variable effect of Equity Book Value to Book Value of Total Debt (X4) on stock prices (Y) is not significant and T value(1.814) <T table (2.021) then H0 is accepted.

Regression Model
The results of further calculations used to determine the magnitude of the effect of independent variables, Working Capital to Total Assets (X1), Retained Earnings to Total Assets (X2), Earnings Before Interest and Taxes to Total Assets (X3), and Book Value of Equity to Book Value of total Debt (X4) on stock prices (Y). Multiple regression equation derived from the analysis are:

$$\acute{Y} = 6,509 - 3,328 \ x_1 + 0,694 \ x_2 + 1,867 \ x_3 + 0,979 \ x_4 + e$$

V. CONCLUSIONS AND RECOMMENDATIONS
Conclusions
Through the Altman Z "-Score financial distress can be seen in the sample companies whose results showed almost every company is in conditions not bankrupt or are in the safe zone during the study period. From this research it is known only one company namely Eterindo Wahanatama in 2014 experienced a bankruptcy or financial distress. This is due to the significant reduction of the ratio of retained earnings to total assets and EBIT to total assets, so that resulted in the company in 2014 Eterindo Wahanatama bankrupt or experiencing financial distress.
Effect of a Z-score on stock prices is a significant and ratio-ratio of the Altman Z-score is Working Capital to Total Assets have no significant effect, Retained Earnings to Total Assets have no significant effect, Earnings Before Interest and Taxes to Total Assets have a significant influence, and Book Value of Equity to Book Value of Total Debt to have no significant effect on stock prices.

Recommendations
Based on the research results and conclusions the researchers gave some suggestions as follows:
1. For potential investors who will invest in the capital market, the results
2. This study is expected to be useful as a material consideration in making investment decisions.
3. It is important for investors to know the financial condition and health of the issuer company before investing, because a company is expected to bankrupt bankruptcy would not be direct but starting with financial difficulties first.
4. For further research is expected to use a different type of company and put the scope of a broad sample. It's also expected to add other variables that may affect the stock price.

REFERENCES

[1].   Bashir, Adnan, Ayesha Javed, Samra Iqbal, 2015. "Business Failures Prediction in Karachi Stock Exchange". Indian Journal of Management Scinece Vol. V, Issues 1, EISSN 2231-279X ISSN 2249-0280, www.scholarshub.net. University of Gujrat: Pakistan.
[2].   Celli, Massimiliano, 2015. "Can Z-score Model Predict Listed Companies Failures in Italy An Empirical Test". International Journal Of Business and Management – Vol. 10, No. 3, ISSN 1833-3850 E-ISSN 1833-8119, Published by Canadian Center of Science and Education. Roma TRE University: Italy.
[3].   Darmadji, Tjiptono dan Hendy M. Fakhruddin. 2006. Pasar Modal diIndonesiaPendekatanTanyaJawab.EdisiKedua. Jakarta:SalembaEmpat.
[4].   Fahmi, Irfan. 2012. Pengantar Manajemen Keuangan. Bandung: Alfabeta.
[5].   Ikatan Akuntan Indonesia. 2012. Standar Akutansi Keuangan. Jakarta: IkatanAkuntanIndonesia.
[6].   Issabella, Melissa, 2013. "Pengaruh Economic Value Added, Risiko Sistematis, Dan Prediksi Kebangkrutan Dengan Model Altman Z-score Terhadap Return Saham". Jurnal Akuntansi Fakultas Ekonomi, Universitas Negeri Padang: Padang.
[7].   Jan, Amin, Maran Marimuthu, 2015. "Altman Model and Bankruptcy Profile of Islamic Banking Industry: A Comparative Analysis on Financial Performance".International Journal Of Business and Management – Vol. 10, No. 7, ISSN 1833-3850 E-ISSN 1833-8119, Published by Canadian Center of Science and Education. Teknologi Petronas University: Malaysia.
[8].   Kasmir.2010.PengantarManajemenKeuangan.Jakarta:Kencana.
[9].   Marcelina, Tri Ayu, Willy Sri Yuliandhari, 2014. "Prediksi Kebangkrutan Menggunakan Metode Z-score dan Pengaruhnya terhadap harga saham pada perusahaan transportasi yang terdaftar di Bursa Efek Indonesia Tahun 2008-2012". Jurnal Ekonomi, Universitas Telkom: Bandung.
[10]. Marcelinda, Sheilly Olivia, Hadi Pramu dan Novi Puspitasari, 2014. "Analisis Akurasi Prediksi Kebangkrutan Model Altman Z-Score pada Perusahaan Manufaktur yang terdaftar di Bursa Efek Indonesia". E-Journal Ekonomi dan Akuntansi Volume 1 (1), Universitas Jember : Jember.
[11]. Mamduh, MHanafidan Abdul Halim.2009.AnalisisLaporanKeuangan.EdisiEmpat. Yogyakarta : Sekolah Tinggi Ilmu Manajemen YKPN.
[12]. Nugroho, Mokhamad Iqbal Dwi, Wisnu Mawardi, 2012. "Analisis Prediksi Financial Distress Dengan Menggunakan Model Altman Z-score Modifikasi 1995". Jurnal Manajemen Fakultas Ekonomika dan Bisnis, Universitas Diponegoro: Semarang.
[13]. Prihadi,Toto.2011.AnalisisLaporanKeuanganTeoridanAplikasi.Jakarta:PPM.
[14]. Sarjono,HarjadidanWindaJulianita.2011.SPSSvsLISREL:SebuahPengantar,AplikasiuntukRiset.Jakarta:SalembaEmpat.
[15]. Sjahrial,Darmawan.2007.ManajemenKeuangan.Jakarta:MitraWacanaMedia.
[16]. Sudarmanto, R. Gunawan, 2013. Statistik Terapan Berbasis Komputer Dengan Program IBM SPSS Statistics 19. Bandarlampung: Mitra Wancana Media
[17]. Sugiyono.2010.MetodePenelitianBisnis.Cetakanke-15.Bandung:Alfabeta.
[18]. Sukmawati, Ni Made Dewi, I made Pradana Adiputra, Nyoman Ari Surya Darmawan, 2014. "Pengaruh Rasio-Rasio Dalam Model Altman Z-score Terhadap Harga Saham". E-Journal Akuntansti, Universitas Ganesha: Bali.
[19]. Suliyanto. 2011. Ekonometrika Terapan, Teori dan Aplikasi dengan SPSS.Yogyakarta:ANDI.
[20]. Supranto, J dan Limakrisna. 2013. Petunjuk Praktis Penelitian Ilmiah untuk Menyusun Skripsi, Tesis dan Disertasi. Jakarta: Mitra Wacana Media.
[21]. Wang, Ying, Michael Campbell, 2010. "Business Failure Prediction for Publicly Listed Companies in China". Journal of Business and Management – Vol. 16, No. 1, Montana State University: China.
[22]. Zimmerer, Thomas W., Norman M. Scarborough dan Doug Wilson, 2008.Kewirausahaandanmanajemenusahakecilterjemahan DenyArnosKwary.Edisi5.Buku2.Jakarta:SalembaEmpat.