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Analysis of financial and non-financial factors affecting bond ratings

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Abstract. The decision to invest in the bond market is in high demand by investors because of their fixed income. Investment in the bond market is slower than investment in stocks. One obstacle to this slow development is that the existing bond market conditions have not been optimized by market participants and the general public's understanding of the instruments in bonds is still limited. This research was conducted to analyze the financial factors as measured by financial ratios (profitability ratios, growth ratios, leverage ratios, and liquidity ratios) and non-financial factors were measured by the age of bonds and bond guarantees that Affect the rating of the bonds of manufacturing companies in the period 2013-2017. The uniqueness of this research is the use of a balanced variable between internal variables and external variables. Another uniqueness is that this study uses a quick ratio to measure liquidity while many other variables use the current ratio. Selection and population used in this study using all manufacturing companies see that manufacturing companies are dominant companies in Indonesia and manufacturing companies need alternative Reviews their funds for operational activities so that the issuance of bonds is quite large. The research approach used is quantitative. The population in this study was 156 companies and was taken by 13 companies to be used as samples with purposive sampling method. The method of data analysis used in this study is logistic regression. This logistic regression analysis is used to analyze the relationship between Several independent variables with the dependent variable is categorical variables roomates type. The results of this study state that profitability and liquidity variables variables have a positive effect on the bond ratings of manufacturing companies listed on the Indonesia Stock Exchange for the period 2013-2017. While in the growth variables, the variables of leverage, the Age of bonds and bond guarantees have no effect on the bond ratings of manufacturing companies listed on the Indonesia Stock Exchange for the period 2013-2017.

1. Introduction

Bonds are long-term contracts in which the borrower agrees to make payments of principal and interest on a particular date to bondholders [1]. The Company may use bond issuance as a way to finance his company, without having to make a loan at a bank or issuing new shares. The benefits to be obtained by investors on bond holdings compared to stocks is a positive rate of return on bonds with earned income fixed (fixed income), and the volatility of the stock is higher than the bond that investors will reduce the attractiveness of stocks [2].

Investors in the bond market will face the risk of the issuing company not being able to return the bond principal and pay the coupon in accordance with the agreed agreement. This risk is called default risk . The risk of default on the bonds can be avoided by their bond ratings. Bond ratings a company can illustrate the scale of the risk and the level of security in the issuance of a bond. Bond ratings are divided into two, namely investment grade (AAA, AA, A, and BBB) and non investment grade (BB, B, CCC, and D). Bonds should have to go through the rating process undertaken by the rating agencies or agency bonds (Rating Agency). Bond ranking is based on information that has been provided by the bond issuing company. Bond ratings reflect investors the credibility and prospects of the bonds [3].

One of the phenomena regarding bond ratings in Indonesia is experienced by PT. Tiga Pilar Sejahtera Food. This company has been qualified and regulations of the Indonesia Stock Exchange that is included in the investment grade issuers, but instead the company is unable to pay the principal and interest thereon (failure to pay). In 2013, he issued the first bonds in 2013 resulting decline in bond ratings of idBB + to idCCC, because the company's ability to repay the debt constrained by its weak liquidity and thus susceptible of default.



Sunarjanto and Daniel [4] revealed that the factors which may be taken into consideration in the rating agencies provide bond ratings are from various financial ratios and quality management. Financial factors which are proxied by financial ratio analysis are chosen as consideration material used by rating agencies to rank bonds. Financial ratios used include profitability ratios, growth ratios, leverage ratios, and liquidity ratios that can change the bond rating of a company. Financial ratios are based on the company's financial statements are on the assumption that the report can describe the real state of the company.

The objectives of this research are (a) to analyze the positive influence profitability ratios, growth ratios, liquidity ratios and surety bond against bond rating manufacturing companies in BEI period 2013-2017 (B) to analyze the negative effects of the leverage ratio and the age of the bond to the bond rating manufacturing companies in BEI period 2013-2017.

The hypothesis in this study include:

- H₁ : Profitability have a positive effect on bond ratings
- H₂ : Growth have a positive effect on bond ratings
- H₃ : Leverage have a negative effect on bond ratings
- H₄ : Liquidity have a positive effect on bond ratings
- H₅ : Age bonds have a negative effect the bond ratings
- H₆ : Guarantee bond have a positive effect on bond ratings

2. Method

2.1 Research Design

The research design used in this study was explanatory research. This study uses secondary data obtained from the company's annual financial statements on the Indonesia Stock Exchange. Bond rating data obtained from PT Pefindo's report.

2.1 Samplig

The population used in this study are all manufacturing companies listed in Indonesia Stock Exchange and registered bonds at PT PEFINDO during the period 2013-2017. The sampling technique used in this research is purposive sampling method.

The criteria given for the sample is as follows:

1. Companies that publishes financial statements and annual report in full by manufacturing companies listed in Indonesia Stock Exchange during the period 2013-2017
2. Bonds issued manufacturing companies listed in Indonesia Stock Exchange and registered in the bond rating of PT PEFINDO period 2013-2017.

Logistic regression is a statistical model used to analyze the relationship between several independent variables and the dependent variable. The type of dependent variable is categorical variable. Logistic regression analysis process begins with the first step of testing the feasibility of the model by looking at the test results of Hosmer Lemeshow Goodness of Fit Test. The second step is to test the coefficient of determination by looking at the value Nagelkerke R Square to find out how much variance relationship independent variable on the dependent variable. Further possible logistic regression analysis.

The model used for testing this hypothesis is as follows:

$$Rating_{it} = \text{Log} \left(\frac{P}{1-P} \right) = \beta_0 + \beta^1 ROA_{it} + \beta^2 SG_{it} + \beta^3 DTA_{it} + \beta^4 QR_{it} + EAge + FGuarantee + e$$

Information :

- Rating_i* : Bond rating firm *i* in period *t*
 : probability on bond ratings, notation 1 if including investment grade and
 0 if noinvestment grade
 : constants
 $\alpha, \beta, \gamma, \delta, \epsilon, \zeta, \eta, \theta, \iota, \kappa, \lambda, \mu, \nu, \xi, \omicron, \pi, \rho, \sigma, \tau, \upsilon, \phi, \chi, \psi, \omega, \delta, \epsilon, \zeta, \eta, \theta, \iota, \kappa, \lambda, \mu, \nu, \xi, \omicron, \pi, \rho, \sigma, \tau, \upsilon, \phi, \chi, \psi, \omega$: regression coefficient
 ROA : Level of profitability measured by Return on Assets (ROA)
 SG : The rate of growth is measured by Sales Growth (SG)
 DTA : Degree of leverage measured by Debt to Total Assets (DTA)
 QR : Liquidity levels measured by the quick ratio (QR)
 AGE : The life of the bonds is a dummy variable, 1 if the age of five-year bonds, 0 if the
 age of five-year bonds
 Guarantee : Surety bond is a dummy variable, 1 if the bonds issued have a guarantee of wealth in
 general publisher, 0 if the bonds issued do not have a guarantee on capital
 publishers.
 : error

Hypothesis test used in this study is Wald test. In logistic regression, Wald test is used to analyze the influence of independent variables on the dependent variable partially.

3. Results and Discussion

3.1 An Overview of Research Object

This research process the data by SPSS 18.0. The first step taken is to determine the selected object by purposive sampling method. The object of this research focuses on the manufacturing sector listed in Indonesia Stock Exchange (BEI) in the period 2013 to 2017. Until 2017 there were 156 companies listed on the Stock Exchange.

Samples were selected as many as 13 companies that met the criteria and were used as research samples. The 13 companies consist of 7 companies from the basic and chemical industry sector, 1 company from various industry sectors, and 5 companies from the consumer goods industry sector. The data pooling method was used in this study, 13 companies multiplied by 5 years of observation so that 65 observations were obtained.

3.2 Descriptive Statistics

Descriptive statistical analysis aims to explain the value of the average (mean), standard deviation, median, mode, minimum value and a maximum value in order to get an overview of the variables used in the study. Descriptive statistical test results are presented in Table 1 below.

Table 1. Descriptive Statistics

	N	Minimum	maximum	Modus	Mean	Std. deviation
ROA	65	-0.0970584	0.2403322	-	0.072915012	0.0636440098
SG	65	-0.4400226	0.4764526	-	0.091707894	0.1424949871
DTA	65	0.2517688	0.6947556	-	0.515612983	0.1119689043
QR	65	0.5293040	28,039,386	-	1,272,746,046	0.4878773778
AGE	65	0	1	1	0.77	0,425
GUARAN TE ES	65	0	1	0	0.08	0.269

RATINGS	65	0	1	1	0.85	0.364
Valid N (listwise)	65					

Source: SPSS output

Table 1 shows the results of descriptive statistic. The variable is ROA (profitability), SG (growth), DTA (leverage), QR (liquidity), AGE (age bonds), WARRANTY (bail bond), and RANK (bond rating). The minimum value indicates the lowest value of the data collected. The maximum value indicates the highest value of the data collected. Values represent average mean of the data collected. Standard deviation is a measure of the spread of the data obtained from the data that has been collected.

Profitability shown in Table 1 has a minimum value of -0.097 occurs in PT Tiga Pilar Sejahtera Food Tbk in 2017 which showed that companies are less able to manage their resources derived from income. The maximum value of the profitability variable owned by PT Selamat Sempurna Tbk in 2014 was 0.240, which means that the company was able to optimize assets and generate 24% profit. The average value of the profitability variable in the period 2013 - 2017 is 0.073 and the standard deviation is 0.064, which means that the data on the profitability variable has a small distribution because the standard deviation is less than the average.

The growth variable shown in Table 1 has a minimum value of -0.440 which occurred at PT Chandra Asri Petrochemical Tbk in 2015. The maximum value of the growth variable is PT Tiga Pilar Sejahtera Food Tbk in 2013 amounted to 0.476. Growth variables for the period of 2013 - 2017 show an average value of 0.092 and a standard deviation of 0.142, which means that the growth variable has a large distribution because the standard deviation is greater than the average value.

The leverage variable has a minimum value of 0.252 which occurs at PT Selamat Sempurna Tbk at 2017. The maximum value of leverage variable owned by PT Malindo Feedmill Tbk in 2014 was 0.695. Leverage variable for the period of 2013 - 2017 shows an average value of 0.516 and a standard deviation of 0.112, which means that the leverage variable has a small distribution because standard deviation is smaller than average.

The age of the bond has a minimum value of 0, which means that the age has age more than 5 years so that a higher risk is obtained. The maximum value of the bond age variable is 1, meaning that the bond has an age of less than five years. The variable age of the bond period 2013 - 2017 shows an average value of 0.77 and standard deviation 0, 425. Means the level of the variable age of the bond has a small distribution because the value of the standard deviation is smaller than the average value.

Variable bonds guaranteed, which are shown in Table 1 has a minimum value of 0, which means that the bonds are not guaranteed by the use of specific assets or unsecured so it is very risky for investors. The maximum value of the variable bail bonds is 1, which means the bonds are secured by using a specific asset or bail. Obtained from the variable mode surety bond is a notation of 0, which indicates that our bonds become more samples premises are not guaranteed specific assets or unsecured. Variable surety bond in the observation period 2013 - 2017 shows an average value of 0.08 with a standard deviation of 0.269, which means that the data on the variable has a distribution guarantees high bond because standard deviation is greater than the average value.

Bond rating shown in Table 1 has a minimum value of 0, which means the bonds included in the category are noninvestment grade companies considered to be less able to pay off both the principal and interest thereon. The maximum value of the variable bond rating is 1, which means the bonds included in the investment grade category, a company is considered able to repay principal and interest of bonds issued by the issuer. Variable bond ratings on the observation period 2013 - 2017 shows an average value of 0.85 with a standard deviation of 0.364, which means that the data in the variable bond ratings have a small distribution because the standard deviation value is smaller than the average value. This shows that the level of surety bonds on each of these companies are relatively similar.

3.3 Feasibility Model

Test performed to assess the feasibility of this model matches the empirical data used in the study with the model, the absence of differences between the data and the model, it can be said to be the model fit. Testing the feasibility of the model is done by Hosmer and Lemeshow's Goodness of Fit Test with the decision-making criteria if the statistical value greater than 0.05, the null hypothesis is accepted which means that the model is acceptable because it is able to predict the value of observations and data match observations. The results of the feasibility test model is presented in Table 2 below.

Table 2. Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	1,651	2	0,880

Source: SPSS output

Table 2 shows the results of Hosmer and Lemeshow test of 1,651 to 0,880 which means the significance of the result of the acquisition of greater than 0.05 then H0 is accepted and Ha rejected meaning regesi logistic equation models that form suitable for use in further analysis and should be interpreted.

3.4 Test Coefficient of Determination

Determination test is done to determine the relationship variant independent variable on the dependent variable. Keofisien test of determination using the Cox and Snell R Square and Nagelkerke R Square. Keofisien test results are processed using SPSS determination are presented in Table 3. Here.

Table 3. Test Results Coefficient of Determination

Step	-2 log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	9.263	0.576	0.801

Source: SPSS output

Table 3 show that value *Cox and Snell R Square* of 0.576 which means that the model has predictive power of the model is formed by 57.6% explained by variables in this study, while the remaining 42.4% is explained by variables outside the research model. While the value Nagelkerke R Square of 0.801 which means that the variable bond ratings in this study could be explained by the independent variable of 80.1%. While the balance of 19.9% is explained by other variables that exist outside the research model. This shows the model used is good.

3.5 Logistic Regression Analysis

Data obtained from profitability, growth, leverage, liquidity, the life of the bond, bail bonds and bonds rating. Data analyzed using logistic regression analysis proram SPSS. Based on the partial SPSS output prediction six independent variables are ROA, SG, DTA, QR, AGE, JAM against RAT formulated in the following model.

$$\text{RAT} = \text{Log} () = 492.606 + 310,204\text{ROA} + 91,732\text{SG} - 81,790\text{DTA} + 244,334\text{QR} - 148,198\text{UMUR} + 446,417\text{JAMINAN} + e$$

Variables or factors that affect the ranking of the bonds at a rate of 5% is a profitability and liquidity. Variable growth, leverage, the life of the bonds, and bonds, not significant at the 5% level α . However, the four fixed variables included in the model, because when variables excluded from the model will affect eligibility (goodness of fit test) of the overall model.

3.6 Hypothesis Testing

Test the hypothesis in this study using a test wald the criteria for decision-making if the significance value less than 0.05, the null hypothesis is rejected, which means variable partial effect on bond ratings predictions. Summary of wald test results are presented in Table 4 below.

Table 4. Summary of Test Results Wald

Variables	B	Sig.	Information
ROA	310.204	0,027	H0 ₁ rejected
SG	91.732	.820	H0 ₂ accepted
DTA	- 81.790	0.895	H0 ₃ accepted
QR	244.334	0,022	H0 ₄ rejected
AGE	-148.198	0.185	H0 ₅ accepted
GUARANTEES	446.417	0.911	H0 ₆ accepted

Source: SPSS output

Based on Table 4, the hypothesis obtained will be explained as follows.

The results in Table 4 shows the logistic regression test between variable profitability (ROA) to the bond rating is equal to 0.027. This value is greater than a predetermined significance level of 0.05, the decision result of hypothesis test is H0 rejected and accepted H2. This shows that the profitability of significant positive effect on bond ratings.

The results in Table 4 shows the logistic regression test between variables Growth (SG) to the bond rating is equal to 0.820. This value is greater than the specified significance level is 0.05 then the decision of the hypothesis test is H0 and H2 is rejected, this shows that growth is not significant positive effect on bond ratings.

Results of Table 4 shows the logistic regression test between variable Leverage (DTA) to the bond rating is equal to 0.895. This value is greater than the specified significance level is 0.05 then the decision of the hypothesis test is H0 and H3 rejected. This shows that leverage significant negative effect on bond ratings.

The results in Table 4 shows the logistic regression test between variables Liquidity (QR) on the ratings of the bonds is 0.022. This value is smaller than the specified significance level is 0.05 then H0 hypothesis testing decision is rejected and H4 accepted. This shows that the liquidity significant positive effect on bond ratings.

The results in Table 4 shows the logistic regression test between the variables Age Bonds (AGE) on the bond rating is equal to 0.185. This value is greater than the specified significance level of 0.05, the decision result of hypothesis test is H0 and H5 rejected. This shows that the life of the bond significant negative effect on bond ratings.

The results in Table 5 shows the logistic regression test between variables Bond Guarantee (SECURITY) to the bond rating is equal to 0.911. This value is greater than the specified significance level is 0.05 then the decision of the hypothesis test is H0 and H6 rejected. This suggests that the bail bond not significant positive effect on bond ratings.

Results of research on factors influencing oligasi ranked by the independent variable is profitability, growth, leverage, liquidity, term of the bonds, and bonds, providing evidence that the only variable profitability and liquidity variables that can affect the bond ratings. The discussion can be explained as follows.

3.7 Discussion

Results of research on financial and non-financial factors that affect bond ratings by the independent variable is profitability, growth, leverage, liquidity, term of the bonds, and bonds, providing evidence that the only variable course of profitability and liquidity in the model which could affect bond ratings. Wald discussion of test results of each independent variable on the dependent variable will be explained as follows.

3.7.1 Profitability Influence Of Bond Ratings

Wald test results (partial) shows that profitability and significant positive effect on bond ratings is shown at a significance level of 0.027 which is smaller than the specified significance level is 0.05 so it shows that H0 rejected and H1 accepted. Gains indicates that the issuer's financial condition is good. High levels of profitability which can describe the company's ability to going concern and good settlement of obligations bonds and coupon bonds that default risk can be minimized. Issuer that has a high profitability will be rated good because the income generated can be used to settle obligations of the company. The

results are consistent with the theory that can be used to analyze the profitability of securities because this ratio gives an overview of the company running efficiency. The results of this study support research Al-Khawaldeh done [5], [6] and [7] states that the positive effect on the profitability ratios bond rating. The high profitability of companies indicate that the loans granted by the creditor used by the company so well that the company is able to generate high profits.

3.7.2 Effect of Growth (Growth) Against Bond Ratings

Wald test results (partial) shows that growth does not affect bond ratings is shown at a significance level of 0.820 which is greater than the specified significance level is 0.05 so it shows that H0 and H2 rejected. Hypothesis test results showed positive regression coefficient is not significant to the bond rating means the size of the company's growth will not affect the bond ratings. This indicates that the high growth of the company can not guarantee that the company is free from the risk of default. The results of this study are not consistent with the theory that growth is one of the means which facilitate the perangkuman various aspects of policies in the financial and investment companies. The results of this study support [9] and [8] suggests that growth does not affect the bond ratings. The results of this study do not support research do True showed that the growth of the company (growth) has a positive effect in predicting bond ratings. Influence the growth of companies that are not significant to the bond rating indicated by factors that are used PT PEFINDO in assessing the bond company one competition industri, prospects and industry market share and did not assess the company's growth is based on the ability of investment related companies asset management [10].

3.7.3 Effect of Leverage Against Bond Ratings

Wald test results (partial) shows that the leverage does not affect bond ratings is shown at a significance level of 0.895 which is greater than the specified significance level is 0.05 so it shows that H0 and H3 rejected. Hypothesis test results showed negative regression coefficient is not significant to the bond rating, which means that the size of the company's leverage does not affect the bond rating company. The results of this study support [10], [11] that leverage does not negatively affect bond ratings. The results of this study do not support research do [12] states that leverage negatively affect bond ratings. The amount of debt companies that are smaller than the company's assets means companies are able to pay off its debts, on the other hand effective debt can provide opportunities for companies to make higher profits so that the size of leverage by proxy debt to total assets does not affect bond ratings. Investors will not think about how much the company owners of the bonds using the debt, but the level of ability to pay its debts into consideration for investors to leverage it can not predict the bond rating company.

3.7.4 Effect of Liquidity Against Bond Ratings

Wald test results (partial) shows that liquidity affects bond ratings is shown at a significance level of 0.022 which is smaller than the specified significance level is 0.05 so it shows that H0 is rejected and H4 accepted. The high liquidity ratio owned by a company make the company more able to pay its short-term liabilities and to repay long-term liabilities, the better. These results are consistent with the theory that the company as the issuer will use the most liquid assets to be used as a primary source to meet the payment and interest on securities yang in the asset financed. So, if a company has a lot of liquid assets it will affect the settlement of liabilities or repayment of bonds was good and the risk of default or default risk can be minimized so that a good bond ratings a company can have. The results of this study support research do [9], [13] states that the partial liquidity variables (individual) significant positive effect on the company's bond ratings predictions. Good liquidity of the company can give a good rank well for bond ratings.

3.7.5 Effect of Age Against Bonds Bond Ratings

Wald test results (partial) showed that age does not affect the bond rating of the bonds is shown with a significance level of 0.185 which is greater than the specified significance level is 0.05 so it shows that H5 H0 is accepted and rejected. Hypothesis test results showed negative regression coefficient is not significant to the bond rating. That is maturing bonds over the age of five years or less than five years does not affect the bond ratings were given to the company. These results are not in accordance with the statement [14] found that there is a relationship between the structure of the existing nonmonotonik at the age of bonds and credit quality of companies listed in bond ratings. Bonds maturing age does not affect the probability of an increase or decrease in bond ratings because in this case PT declaring them bond rating companies in terms of the company's performance in paying debts not of the age of the bonds issued by the company. Age of bonds is the time required for the bond holders get a principal payment of the bond nominal value. The results support the research conducted [17] and [8] states that the term of the bonds is

not proven to affect the bond ratings. The results of this study do not support research do [14] states that the bond maturity or age less than 5 years will be in the investment grade bond rating and certainly will affect bond ratings.

3.7.6 Against Bond Collateral Effect of Bond Ratings

Wald test results (partial) indicates that the bond guarantee does not affect the bond ratings is shown at a significance level of 0.911 which is greater than the specified significance level is 0.05 so it shows that H0 and H6 rejected. Hypothesis test results showed positive regression coefficient is not significant to the bond rating. This means that a high bail bonds or bonds issued without the guarantee did not have an impact on bond ratings. According [15] improvement bonds, which are not supported by the value of the collateral used by the company to guarantee bonds issued, the value of collateral used also must be greater than the value of the bonds issued. The increase in the guarantee does not affect the probability of bond rating companies including investment grade category or non- investment grade, this indicates that the bonds were secured by specific assets and bonds are not secured by specific assets underestimated in determining bond ratings. The results are consistent with [12] and [6] states that the bond guarantee does not affect the bond ratings. The results of this study do not support research The results are consistent with [12] and [6] states that the bond guarantee does not affect the bond ratings. The results of this study do not support research The results are consistent with [12] and [6] states that the bond guarantee does not affect the bond ratings. The results of this study do not support research Results of research conducted by [16] states that a secure bond or guarantee a significant effect and positively related to the company's bond ratings.

4. Conclusion

This study analyzed the financial factors which consist of profitability, growth, leverage and liquidity as well as non-financial factors that include age bonds and surety bonds that allegedly affect bond ratings in the Indonesia Stock Exchange in 2013 - 2017. Based on the results of hypothesis testing and analysis showed that ; (A) Profitability significant positive effect on the bond rating companies listed in Indonesia Stock Exchange 2013-2017 period; (B) Growth is not significant positive effect on the bond rating companies listed in Indonesia Stock Exchange 2013-2017 period; (C) Leverage significant negative effect on the bond rating companies listed in Indonesia Stock Exchange 2013-2017 period; (D) Liquidity significant positive effect on the bond rating companies listed in Indonesia Stock Exchange 2013-2017 period; (E) Age significant negative effect on the bond rating companies listed in Indonesia Stock Exchange 2013-2017 period; (F) Guarantees no significant positive effect on the bond rating companies listed in Indonesia Stock Exchange 2013-2017 period.

Based on the results of research and discussion that has been presented, then as for the advice given as follows; (A) Further research may add to financial factors such as solvency ratio, firm size and the ratio of activity. Non-financial factors also added to the auditor's reputation in research to analyze the effect of bond rating. Future studies are expected to expand the observations in the study sample were used; (B) The company's management needs to consider the financial ratios as measured by profitability and liquidity that proved significant to affect the bond ratings manufacturing company so that the company can avoid the risk of default. However, other ratios should not be overlooked because of the financial ratios have relevance to one another;

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