FACTOR ANALYSIS – GROWTH, SIZE, PROFITABILITY, LIQUIDITY FACTORS ON BOND RATING

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Abstract *This study analyzes the factors that can influence the prediction of bond ratings on companies listed on the Indonesia Stock Exchange using accounting factors, namely company growth (Growth) as measured by the book to market ratio, company size (Size) as measured using total assets, profitability as measured using return on investment (ROA) and liquidity as measured using current assets (Current Ratio). In taking or determining the sample, taken in a targeted manner, as many as 36 series of bonds can be obtained from companies listed on the Indonesia Stock Exchange which are rated by PT Pefindo in 2017 to 2019. The data used are secondary data, data obtained and collected from documents- documents owned by the company. In this study, the variables that have a significant effect on the rating are Growth, Size, while the profitability and liquidity variables do not have a significant effect on bond ratings.*

Keywords Growth, Size, Profitability, Liquidity, Bond Rating

I. INTRODUCTION

Bond investment is a type of investment that is in great demand by capital owners (investors) because bonds have a fixed income. The fixed income is derived from the principal of the bonds and interest which will be received periodically at maturity. The advantage obtained from bond investment is that bondholders have the first right to the company's assets if the company in question experiences liquidity because the company has signed a contract to be able to pay off the bonds that have been purchased by bondholders. Companies that need additional funds like bonds because they are easier to obtain.

Capital owners who are interested in buying bonds should pay attention to bond ratings because bond ratings provide information about the probability of a company's debt failure. Bond rating is a scale of risk of all bonds traded. To invest in bonds, sufficient funds are needed and the owners of capital also need sufficient knowledge about bonds and followed by good business sense to be able to analyze or estimate the factors that can affect investment in bonds.

Bonds must be rated by a bond rating agency or agency. Bond rating agency is an independent institution that provides information on rating the risk scale, one of which is bond securities as an indication of the security of a bond for investors. This rating process is carried out to assess the company's performance, so that the rating agency can state whether or not the bonds are worth investing in. Bond ratings or so-called debt ratings serve to help public policy to limit speculative investment by institutional investors such as banks, insurance companies and pension funds.

Since 1995, debt securities, especially those issued through public offerings, are required to be rated by rating agencies registered with BAPEPAM. In Indonesia there are 2 debt securities rating agencies, namely PT. PEFINDO (Indonesian Securities Rating Agency) and PT. Kasnic Credit Rating Indonesia. In the current study, it refers more to PEFINDO. Research on bonds is still rarely carried out in Indonesia, especially regarding the combination of accounting and non-accounting factors that influence the prediction of bond levels in Indonesia. In this study, the sample used is the most dominant company in Indonesia which is most widely listed on the Indonesia Stock Exchange.

The following is a model framework that can describe the overall hypothesis based on the research objectives.

Bond ratings of private companies that rank debt securities (bonds) by taking into account accounting factors. Thus, the researcher uses four variables which include company growth (growth), company size (size), profitability, liquidity to predict bond ratings on companies listed on the Indonesia Stock Exchange.

First, by looking at the company's growth, it is calculated using the market to book value of common equity in order to see the market value of the company. This variable is the first variable that must be considered by the rating agency, because the higher the growth of a company, the company will have an investment grade bond rating.

Second, by looking at how big the level of a company's size is proxied by total assets. Where in general, large companies are less risky than small companies because the larger the company, the greater the potential for diversifying non-systematic risk, thus reducing the risk of the company's bonds. This variable is the second accounting factor that must be considered by the rating agency. The larger the size of a company, it is expected

that the bond rating will increase. With the increase in bond ratings, it will have an impact on the desire of investors to buy bonds so that it will affect the company's financial condition.

Third, see how big the profitability variable is measured using ROA. This variable is calculated by dividing net income by total assets. A high ROA shows the company is able to generate profits at a certain asset level. If the company's profit is high, it is expected that the company's bond rating will also increase so that it has an impact on the confidence of investors to get their loan principal back on time.

Fourth, look at the liquidity variable which is measured by using the current ratio. The current ratio is a liquidity indicator that is widely used because it provides information about the ability of current assets to cover all current liabilities. The higher current assets to cover current liabilities is an indication that the current debt can be paid so that the company's bond rating will also increase.

II. METHOD

The data collection method used in this research is the study of documentation, namely financial reports and articles.

Discriminant analysis also aims to categorize something in certain groups. In essence, discriminant analysis is relatively the same as logistic regression, the difference is: discriminant analysis requires normality of independent variable data and all independent variables are metric. If the independent variable is non-metric (nominal), then logistic regression is used.

The conditions that must be met to use discriminant analysis techniques:

The dependent variable is only one and is non-metric, meaning that the data must be categorical and on a nominal scale. The independent variable consists of two variables and has an interval scale. All predictor variables should have a normal distribution. Multivariate, and variance metrics – covariance within groups must be the same for all groups.

Group membership is assumed to be exclusive, meaning that none of the cases are included in more than one group and collectively exhaustive, meaning that all cases are members of one group. There is no correlation between independent variables. If two independent variables have a strong correlation, it is said that multicollinearity occurs. Multivariate normality or independent variables should be normally distributed. If they are not normally distributed, this will cause problems in the determination of the discriminant function (model) of logistic regression, or logistic regression can be used as an alternative method if the data is not normally distributed. Box'm and the level of significance entered.

The basic process of discriminant analysis includes:
1. Separating the variables into dependent and independent variables.
2. Determine the method for creating the discriminant function.
3. Testing the significance of the discriminant function that has been formed, using wilk'slambda, pilai, f-test and others.
4. Testing the classification determination of the discriminant function, including knowing the classification determination individually with casewise diagnostics
5. Perform interpretation of the discriminant function.
6. Perform discriminant function validation test.
7. The number of samples in discriminant analysis for sure there is no ideal number of samples in the analysis.

Model of Discriminant Analysis

Discriminant analysis is included in the multivariate dependence method with the following model:

Y1 = X1 + X2 + X3 +X4

Description: independent variables (X1, X2, X3, X4) are metric data whose data is of the interval or ratio type. such as company growth, company size, profitability and liquidity. The dependent variable (Y1) is categorical or nominal data such as bond ratings. So this model is called the Two Group Discriminant Analysis.

III. RESULT AND DISCUSSION

In this study, the data analysis carried out consisted of discriminant analysis and Box's M. Discriminant analysis that will be discussed in this section is the average, standard deviation and variables to be studied,

1. Dependent variable

The dependent variable in this study is the bond rating. Variables are seen based on the ratings issued by PEFINDO which

generally divided into two, namely investment grade and non-investment grade. Bonds that are considered investment grade are bonds rated AAA, A3, AA/AA+ and A. are denoted by the number "1". Meanwhile, bonds that have ratings of A-, Baa3, Baa1, BBB, BBB-, BB, B, CCC, SD, D and are denoted by the number "0". Data on the category of bond ratings for manufacturing companies on the Indonesia Stock Exchange in 2017 to 2019.

Overall, there are 36 bond ratings for companies on the IDX, with 9 bonds for each company. During the 2017 to 2019 period, there were 5 series of bonds that were included in the investment grade category, multiplied over four years to 20 bond series. This is because bonds that are included in the investment grade category are bonds that have low risk and are supported by the obligor's ability to meet long-term obligations in accordance with the agreement. Meanwhile, in the non-investment grade category, there are 4 series of bonds multiplied by four years to 16 series of bonds.

This is because bonds that are included in the non-investment grade category are bonds that have a fairly high risk and indicate a rather weak ability of the obligor to meet its long-term obligations.

2. Independent Variable

This study uses 4 independent variables which aims to determine the factors that influence the prediction of bond ratings on manufacturing companies on the IDX that issue bonds. The four variables consist of company growth (Growth), company size (Size), profitability as measured using ROA, and liquidity measured using current ratio (Current Ratio).

DISKRIMINAN STATISTIC

Peringkat		N	Mean	Std. Deviasi
Non investment grade	Growth	36	0.53850	0.496689
	Size	36	12.45144	0.419179
	Profitabilitas	36	0.04725	0.150563
	Likuiditas	36	3.02606	5.588205
Investment grade	Growth	36	1.45725	1.546170
	Size	36	13.13040	0.721503
	Profitabilitas	36	0.07635	0.064139
	Likuiditas	36	1.35580	0.318847
Total	Growth	36	1.04892	1.271959
	Size	36	12.82864	0.689184
	Profitabilitas	36	0.06342	0.110289
	Likuiditas	36	2.09814	3.761270

1. Company Growth (growth)

In this study, growth is seen based on the company's growth opportunities, namely using the market to book value of common equity. Its use is intended to be able to capture the real phenomenon of the company's market value.

In the attachment above, it can be seen that the yield of corporate bonds that have a sample (N) of 36 bond series, the average investment grade rating from 2017 to 2019 is 1,45725. on the non-investment grade rating the average is 0.53850. while the sum of the average overall ratings on growth is 1.04892. the standard deviation of investment grade is 1.546170. on non-investment grade 0.496689. while in total 1.271959.

2. Company Size (size)

Firm size is one of the accounting variables that predict bond ratings. This variable is measured using the natural log of total assets.

From the discriminant results presented in the table above, it shows that the size of the company has a sample (N) of 36 bond series with an average investment grade rating of 13.13040, a non-investment grade rating of 12.45144 while the total of all ratings on size is 12.82864. the standard deviation for investment grade is 0.721503, for non-investment grade it is 0.419179 , while the total rating for the overall rating is 0.689184.

3. Profitability

This ratio measures the company's ability to generate profits (profitability) at a certain level of sales, assets and share capital (Mamduh and Halim, 2000:83). This variable is measured using Return On Assets (ROA). Appendix 6 shows that profitability has a sample (N) of 36 bond series. With an average investment grade rating of 0.07635 and a non-investment grade rating of 0.04725, the overall rating is 0.06342. the standard deviation of the investment grade rating is 0.064139 on the non-investment rating is 0.150563 and the total is 0.110289.

4. Liquidity

This ratio measures the company's short-term liquidity ability by looking at the company's current assets relative to its current liabilities (Mamduh and Halim, 2000). One of the tools used to measure liquidity is to use the current ratio (Current Ratio).

From the discriminant results presented in the table above, it shows that liquidity has an average investment grade rating of 1.35580, non-investment grade of 3.02606, and a total of 2.09814. while the standard deviation of the investment grade rating is 0.318847, the non-investment grade is 5.588205, and the total is 3.761270

In this study, discriminant analysis was carried out using Box'M and Wilks Lambda which showed that of the four variables, namely company growth (growth), company size (size), profitability, and liquidity.
Discriminant Analysis Output
Tests of Equality of Group Means

Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
GROWTH	.867	5.193	1	34	.029
SIZE	.754	11.122	1	34	.002
PROFITABILITAS	.982	.612	1	34	.439
LIKUIDITAS	.950	1.793	1	34	.189

In the table above, the sign value of growth is 0.029, size is 0.002, profitability is 0.439 and liquidity is 0.189.
a. Hypothesis for Growth . variable
In growth, the value of sig.F is 0.029 <0.05 (Ho is rejected and Ha is accepted). Thus it can be said that the amount of growth affects the bond rating.
b. Hypothesis for Size . variable
In size the value of sig. F of 0.002 < 0.05 (Ho is rejected and Ha is accepted). So it can be said that the number of sizes affects the bond rating.
c. Hypothesis for Profitability variable
On the profitability sig.F profitability value is 0.439 > 0.05 (Ho is accepted) thus it can be said that the total profitability does not affect the bond rating.
d. Hypothesis for Liquidity variable
In liquidity the value of sig F liquidity is 0.189 > 0.05 (Ho is accepted) C thus it can be said that the amount of liquidity does not affect the bond rating.

Box's M . Analysis
Test Results

Box's M		118.687
F	Approx.	10.315
	df1	10.000
	df2	4899.199
	Sig.	.000

In the table above, Box's M analysis is used to test the assumption of discriminant analysis that the variance of the independent variables is the same. But the results of sig. F in Box's M does not meet the requirements because the value is 0.000 < 0.05 so you have to be careful.

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	Df	Sig.
1	.653	13.638	4	.009

The Wilk's Lambda table shows a high and significant chi-square number (13,638) (0.009 < 0.05), indicating that the discriminant model can be used to distinguish the behavior of the investment grade and non-investment grade groups.

Structure Matrix

	Function
	1
SIZE	.785
GROWTH	.536
LIKUIDITAS	-.315
PROFITABILITAS	.184

The structure matrix table shows the correlation between the independent variables and the discriminant function formed. It can be seen that Size and Growth variables are most closely related to the discriminant function compared to the relationship between profitability and liquidity variables with the discriminant function.
Canonical Discriminant Function Coefficients

Canonical Discriminant Function Coefficients

	Function
	1
GROWTH	.324
SIZE	1.246
PROFITABILITAS	2.271
LIKUIDITAS	-.129
(Constant)	-16.198

Unstandardized coefficients

Functions at Group Centroids

RANK	Function 1
non investmen grade	-.792
investmen grade	.634

Unstandardized canonical discriminant functions evaluated at group means

Based on the table of Canonical Discriminant Function Coefficients (such as multiple regression equations) the discriminant function can be made as follows:

Z score = -16,198 + 0.324 growth + 1,246 size + 2,271 profitability + -0.129 liquidity

The purpose of this function is to determine whether the rating belongs to the investment grade group or belongs to the non-investment grade group. The cut off Z to distinguish the two groups is -0.792 for the non-investment grade group and 0.634 for the investment grade group.

Classification Results[a]

			Predicted Group Membership		
		RANK	non investmen grade	investmen grade	Total
Original	Count	non investmen grade	13	3	16
		investmen grade	6	14	20
	%	non investmen grade	81.2	18.8	100.0
		investmen grade	30.0	70.0	100.0

a. 75.0% of original grouped cases correctly classified.

In the Classification Results table, in general it can be said that the discriminant model is able to correctly allocate more than 75% of cases. For members of the non-investment grade group, the correctness of the prediction is 81.2%, which means that the classification of members of the non-investment grade group is classified as a member of the investment grade group of 18.8%. As for the investment grade group, the correctness of the prediction reached 70%, which means that the classification of members of the investment grade group is classified as a member of the non-investment grade group by 30%.

This study uses discriminant analysis because in the bond rating there is a dummy with a nominal scale with 2 criteria. The independent variable with a metric scale (interval and ratio) and the dependent variable with a non-metric scale (nominal). The following will discuss hypothesis testing for each variable:

a. Company Growth (Growth)

Based on the theory, strong firm growth (Growth) is positively related to the rating and grade decisions given by bond rating agencies. In general, with good growth, the company will give an investment grade bond rating. Investors in choosing to invest in bonds will see the effect of growth or company growth. If the company's growth is considered good, the bond issuing company will have an investment grade bond rating. From the results of the discriminant analysis of the growth variable, it shows that the value of the growth variable is significant, meaning that the growth variable affects stock split decisions, it can be seen that on average, companies that have good corporate growth rates tend to have investment grade bonds. This means that it is in

accordance with research conducted by Amiratun Solichah (2011) which shows that the company growth variable (Growth) has an influence on bond rating predictions.

b. Company Size (Size)

Based on the theory, firm size (Size) has a positive correlation. This variable is proxied by total assets. In general, companies that will give a good rating (investment grade). In addition, company size can also have a correlation with the level of risk of bankruptcy or failure so that it can affect bond ratings. The results of the discriminant analysis show that the value of the size variable also shows a significant value, meaning that the size variable has an influence on the prediction of bond ratings. This is in accordance with the actual theory, because the greater the total assets of a company, the company tends to obtain an investment grade rating. So this study is in accordance with research conducted by Amiratun Solichah (2011) which shows that the firm size variable (Size) has an influence on bond rating predictions.

c. Profitability

Based on the theory, the profitability ratio as measured by ROA has a positive influence on the prediction of bond ratings because this ratio measures the company's ability to generate net income based on certain asset levels. However, in this study, it is known that profitability has no significant effect on bond ratings. So the results of this study are not in accordance with research conducted by Amiratur Solichah (2011) which shows that the profitability variable measured using ROA has an effect on bond ratings. This is possible because of differences in time and the companies studied and the analytical techniques used.

d. Liquidity

Based on the theory, the liquidity ratio as measured by the current ratio has a positive influence on the prediction of bond ratings, because this ratio measures the company's ability to meet its short-term obligations. A company that is able to fulfill its financial obligations on time means that the company is in good condition. However, in this study it is known that liquidity has no significant effect on bond ratings. So the results of this study are not in accordance with research conducted by Amiratun Solichah (2011) which shows that the liquidity variable measured using current assets has an effect on bond ratings.

VI. CONCLUSIONS

To see what factors can influence the prediction of bond ratings on companies listed on the Indonesia Stock Exchange using accounting factors, namely company growth (Growth) as measured by the book to market ratio, company size (Size) as measured using total assets, profitability is measured using return on investment (ROA) and liquidity is measured using current assets (Current Ratio). In taking or determining the sample, taken in a targeted manner, 36 series of bonds can be obtained from companies listed on the Indonesia Stock Exchange which are rated by Pefindo in 2017 to 2019. The data used are secondary data, data obtained and collected from documents owned by the company. In this study the variables that have a significant effect on the rating of Growth, and (Size) while the variables of profitability and liquidity do not have a significant effect on the rating of bonds.

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