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Analysis of The Effect of Financial Ratios to Probability Default of Indonesia's Coal Mining Company

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Abstract

The purpose of this study is to analyze the effect of debt equity ratio (DER), gross profit margin (GPM), net profit margin (NPM), Time Interest Earned (TIE) and current ratio (CR) to probability bankruptcy in Indonesia's coal mining company for period 2016 to 2018. This research use model panel data to estimate coefficient model. The results obtained that gross profit margin, EBIT / Interest and Current Ratio have significantly affecting probability bankruptcy. While the debt equity ratio and net profit margin did not have significant to affect the probability of bankruptcy in Indonesia's coal mining company that listed on the Indonesia Stock Exchange.

JEL classification numbers: B26, C23, C58, D53, E44, L25, L71, Q43.
Keywords: Debt equity ratio, Gross profit margin, Net profit margin, Time Interest Earned, Current ratio, Probability default.

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1. Introduction

The phenomenon of falling coal prices in recent years has impact to the business to become really down. Now, many coal mining companies do not choose to operate rather than have to waste a lot of costs, but the margins is obtained very thin. During the heyday, the coal selling price (HBA) reached a figure above US $ 125 per metric ton. This HBA began in early 2006 until mid-2012, but when it entered the beginning of 2013, the price of coal on the international market dropped and until the end of 2015. The fallen of the HBA was sharply caused by the emergence of various negative impacts from the operation of coal mining companies that are nothing but environmental and air pollution which has caused much debate among residents around coal mines. This impacted in many mining companies stopping their exploitation, and stock prices are falling down.

As one of the main sectors driving the country's economy, weakening share prices in the mining sector may indicate lower expectations and investor confidence in the company's performance in the mining sector. Some text book stated that changes in stock prices are influenced by various factors, including the company's fundamental conditions, supply and demand law, interest rates, foreign exchange fluctuation, foreign funds on the stock exchange, news and rumors, dividends, company profits, and other factors. It could be stated that performance company affect by fundamental or internal and external factor.

While the fundamental factors are factors related to the company's performance itself. The fundamental factor itself is a factor that could affect stock price movements, where one of the commonly is used as analysis tools to estimate stock price. Fundamental factor include financial ratios. Some analyst use this ratio to estimate the stock price in the market. Financial ratios could include liquidity ratios, probabilities, and activities. Therefore, the financial performance will be examined as a variable independent in this research. Profitability ratio could be seen as the company's ability to generate profits by using company resources, such as assets, capital or sales.

Along with fluctuations in stock prices and uncertain HBAs, it has caused business players in the mining sector to submit various loans to banks to continue their business activities. In case for applying bank loan, of course, the main step to consider is to measure the risk of a company's failure to repay a loan. If the loan is not able to be paid, it will have implications that are very influential to the company. Losses that will arise include a decrease in equity and shareholders must deposit funds so that cash does not become negative. The risk of a company's failure can be viewed from three types of information, namely the company's financial statements, the market price of debt and equity, the fund's valuation assessment of the company's prospects and risks (Ceosbie and Bohn 2003). Referring to the risk of failure, according to (Beaver, 1966); failure risk measurement can use the Univariate model using financial ratios. Furthermore, (Altman, 1968); uses a discriminant model to classify companies that fail or are able to pay debts called the Altman’s Z-Score Model. Based on the description above, the researcher is

interested in researching about the probability of default, using the Merton model and developing the model, which researcher using to gainst coal mining companies whose shares were transacted on the Indonesia Stock Exchange (IDX) during the last 6 years, 2013-2018. This study aims to determine the performance of the company in paying its receivables, and determine estimates if there is a default probability on the company that can cause bankruptcy. In addition, to find out what ratios are the most influential in the coal company default probability.

2. Theoritical Review

2.1 Theory

In empirical research, financial difficulties are sometimes difficult to define. Such difficulties can range from liquidity problems (short-term), which are the lightest financial difficulties, to the bankruptcy problem which is the most severe difficulty. So that financial difficulties can be seen with a fairly long span of time, ranging from the mild to the most severe. The internal factors in business sector bankruptcy consist of financial and non-financial factors originating from within the company itself. Financial factors include too much debt and inadequate capital. The non-financial factors that influence are management quality factors. The company going bankrupt is defined as a condition where the results of the company's operations are not enough to meet the company's obligations (Insolvency).

The prediction of a company's financial strength is generally carried out by external parties, such as investors, creditors, auditors, the government, and company owners. External parties usually react to distress signals, such as shipping delays, product quality problems, bank bills, etc., to indicate financial distress experienced by the company. Models to anticipate the existence of financial distress need to be developed, because this model can be used as a means to identify even to improve conditions before they arrive at a crisis. Companies that experiences to financial distress can resolve their problems informally or under court supervision. Discussion Bankruptcy should know about Economic Failure, Business Failure and Technical Insolvency and Legal Bankruptcy.

Economic failure, which means that the company's revenue cannot cover the total cost, including the cost of capital.

Business failure is used by Dun & Bradstreet, who is the main collector of failure statistics, to define a business that has stopped its operations by leaving losses to its creditors.

Technical insolvency is a condition where a company is considered as a company that experiences technical insolvency if the company cannot fulfill its short-term obligations that are due. It's could indicates a temporary lack of liquidity, where if given a grace period, a company experiencing technical insolvency may be able to increase cash, pay its obligations, and be able to survive.

Insolvency in bankruptcy is a situation where the book value of a company's total liabilities exceeds the actual market value of its assets. This is a more serious condition than technical insolvency because in general this is a sign of economic

failure, and this often results in business liquidation.

Legal bankruptcy. Although many people use the term bankruptcy to refer to a company that has failed, a company is not legally bankrupt unless the company has been declared bankrupt by applicable law.

In the accounting literature, academics or researchers often conduct research with the aim of predicting a situation using historical data, usually financial statements. They observe financial statements for several years and try to see the specific phenomena in them and then draw conclusions in the form of prediction models.

2.2 Previous Research

Research on measuring the possibility of bankruptcy has been widely carried out. Summary The measurement of failure risk was started by (Beaver, 1966); using the Univariate model that uses financial ratios. Furthermore, (Altman, 1968); used a discriminant model to classify companies that failed or were able to pay debts known as the Altman's Z-Score Model.

(Merton, 1974); introduces the failure model with the Black-Scholes Model modification of option prices. Merton stated that the failure of the company can be estimated by using indicators of total assets, equity and corporate debt. Increasing debt and lack of assets unable to repay the debt resulted in companies failing to repay the debt. The Merton model was modified by KMV so that the company's failure mode was known as the KMV Model. The model is based on the modification of the Black-Scholes-Merton framework that the default conditions are considered to be able to occur at any time and are not necessary when the obligations are due. This Merton KMV model calculates Expected Default Frequency (EDF), which is the probability of failure during the coming years or years for companies whose shares are traded.

(Manurung, 2008); conducted a study of listed companies in LQ 45 that were considered to have described the development of the stock market as a whole. With the results of banks having a higher default probability compared to companies in other industries. Purnamawati (2014) studied comparative performance analysis of ASEAN Bank after Global Crises. The research found that there were significant differences of indicators ROA, ROE and LDR in the financial performance of banks in Indonesia, Thailand and Malaysia; (2) There was no difference of CAR indicator in banking finance in Indonesia, Thailand and Malaysia.

(Wu and Elango, 2019). investigated Corporate Default and estimated company defaults by taking a sample of 75,667 company data between the period 1975 to 2007 using logistic regression and Merton. In the case of the Merton model, the distance to the default variable combines the market variables to predict the default probability. Default probability is calculated as the difference between the value of a company's assets and the nominal value of its debt, adjusted for the standard deviation of the value of the company's assets. After doing research on the Merton model of the probability of default and TLMTA (leverage to market value of assets) has a sizable marginal effect compared to other variables. This is significant because

it is caused when the distance to default decreases or when leverage increases, there is an increase in credit risk, which leads to an increase in bankruptcy. Therefore, regressions containing accounting and Merton variables have improved accuracy when compared without Merton's distance to default, which is supported empirically and by comparison of ROCs. The scope of this research can be increased by considering data outside the 2007 period, which might reduce predictability. However, losses are expected to occur minimally because the model includes variables for macroeconomic effects over time.

(Hasan, Manurung and Usman, 2019). explore Determinants Bank Profitability with Size as a Moderating Variable. In his journal explaining the determinants of bank profitability with size as a moderating variable. Internal ratios and macroeconomic variables are used to determine bank profitability. Return on Assets and Return on Equity are bank profitability variables. The Panel Data Model is used to determine the profitability of banks in Indonesia for the period 2007 to 2018. This study found that Net Interest Margin, Operational Cost Ratio to Operating Profit, Capital Adequacy Ratio and Loan to Deposit Ratio significantly affect bank profitability from the return of Equity. . The Fed Rate and Consumption of Cement have a significant effect on bank profitability on asset returns. Net Interest Margin, Non-Performing Loans, Operational Cost Ratio with Operating Profit, and Loan to Deposit Ratio significantly influence bank profitability from Return on Equity. Cement consumption has a significant effect on bank profitability on Return on Equity. Assets as a moderating variable with CAR, BOPO, Consumption of Cement and Fed Rate have a significant effect on bank profitability on asset returns. Assets with cement consumption have a negative and significant effect on bank profitability on Return on Equity.

(Sjam, 2009); explore bankruptcy using a prediction model of company failure probability. The research sample is non-financial service companies listed on the Indonesia Stock Exchange (IDX). The observation period was 2003-2004, so the sample size was n = 114 units. Multiple discriminate analysis of 114 analysis samples produces discriminant function as a predictor of the probability of failure of a company. Financial ratios that affect the probability of failure of a company are profitability ratios, namely Return on Investment (ROI). In addition, the results of the study indicate that ROI is the dominant financial ratio affecting the probability of failure of the company. By using a cutoff value = - 0.3605, companies with a Z-Score value <- 0.3605 are classified as failing companies. Companies that have a Z-Score> - 0.3605 are classified as a company that does not fail. While non-financial service companies that have Z-Score = - 0.3605 are on the verge of failure (gray area). The accuracy of the classification of discriminant models against the analysis sample is 70.2%. While the accuracy rate of the prediction of discriminant models to the probability bankruptcy for non-financial service companies listing on the Indonesia Stock Exchange in 2005 was 64.91%.

3. Research Design

The type of this research is quantitative research that will use descriptive analysis and causal analysis. According to (Manurung, 2019). quantitative research method is a research method based on the philosophy of positivism, used to examine specific populations or samples, quantitative or statistical data analysis with the aim of testing established hypotheses, namely examining coal mining companies (mining) that are used as the sample. This research examines the effect of debt to equity ratio (DER), gross profit margin (GPM), net profit margin (NPM), EBIT / Interest (TIE) and current ratio (CR), on financial distress of mining sector companies in Indonesia.

The data used for this research is secondary data for period of 2013 to 2018. The Data is collected from website of the company and Jakarta Stock Exchange. Data of 17 company has been collected with the same data for period of 2013 and 2018. This research only used 3 year which is period of 2016 to 2018 to make data Expected Default Frequency.

This research will use model panel data to estimate relationship between debt to equity ratio (DER), gross profit margin (GPM), net profit margin (NPM), EBIT / Interest (TIE) and current ratio (CR) affecting probability bankruptcy. Then, estimate Expected Default Frequency use Merton Model (1974) that adjust Black-Scholes (1973) model. Expected Default Frequency is measured by:

$$s = -\frac{1}{T}\log\left[N(d_2) + \frac{V_0}{D} Exp(r*T) * N(-d_1) \right] \quad (1)$$

If value asset (V_0) today is less than debt today (D) at the end of the year, so the company was considered default.

Variables Measurement

As mentioned previously that this study used financial ratios to determine expected default frequency as follows:

Liquidity ratio is indicating the company's ability to pay all short-term financial obligations using the company's current assets (Brigham and Ehrhardt, 2005, Chapter 13). The liquidity position is related to the company's ability to pay off obligations that are due in the short term, and the possibility of the company having problems in fulfilling these obligations. The ratio is as follows:

$$CR = \frac{\text{Current Assets}}{\text{Current Liabilitie s}} \quad (2)$$

Leverage Ratio

This ratio is used to measure the extent to which companies are financed by debt. In other words, this ratio is used to determine the company's ability to finance assets,

which is obtained by comparing the company's total liabilities with the total assets or securities of shareholders. The ratio is calculated as follows:

$$DER = \frac{Debt}{Equity} \tag{3}$$

Profitability Ratios

This ratio is used to measure management effectiveness shown by profits generated from sales and investment of the company. There are two types - the first shows the probability in relation to sales, and the second shows the probability in relation to investment. Together, these two types of probability ratios indicate the effectiveness of a company's operations. The ratio is Gross Profit Margin that is calculated as follows:

$$GPM = \frac{\text{Gross Profit}}{\text{Net Sales}} \tag{4}$$

Net Profit Margin

This ratio is the final result of a company's operations for a period and is an effective indicator to draw conclusions about the company's management capabilities. This ratio indicates how much net profit is obtained from each Rupiah sale. This ratio is the ratio between net income and net sales and it calculate as follows:

$$NPM = \frac{\text{Net Income}}{\text{Net Sales}} \tag{5}$$

Time Interest Earned

This ratio measures the ratio between the amount of interest due to in this year and Operational profit. This ratio stated that the company has ability to generate operating profit by reducing the cost of selling goods and operating costs from total revenue. This ratio will be calculated as follows:

$$TIE = \frac{\text{Interest Payment}}{\text{Operationa l Profit}} \tag{6}$$

This five ratio will use as independent in this research.

4. Results

4.1 Descriptive Analysis

Descriptive analysis will use data in table 1 that it contain the minimum, maximum, mean (mean), standard deviation, skewness and kurtosis values of each research variable.

Table 1: The following is an explanation of each variable related to descriptive statistics

	EDF	DER	GPM	NPM	TIE	CR
Minimum	0,3872	-2,1140	-1,9404	-20,7190	-787,5333	0,1691
Maximum	1	34,0556	1,0000	13,9777	489,3897	111,3126
Median	0,9082	2,2396	0,2262	-0,0528	24,7728	4,2477
STDEV	0,1542	5,0973	0,4062	3,6391	146,2784	15,4363
Skewness	(2,2705)	5,2105	-3,2245	-2,5649	-2,6174	6,9440
Kurtosis	4,8772	31,3970	16,7291	25,3479	21,1163	49,0056
Jarque-Berra	80,4900	1917,60	562,49	1158,74	820,88	4540,38

Source: Researcher Process

The average value of the Expected Default Frequency (EDF) of coal companies listed on the Indonesia Stock Exchange (IDX) during 2013-2018 was 90.81%. Furthermore EDF has a maximum value of 1 and a minimum value of 0.387 with a standard deviation of 15.4, the Skewness value of -2,270 and kurtosis of 4,877. This Figure indicate that fluctuation Probability Default Frequency among company is high, even the figure closed to 1.

The average value (mean) of Debt to Equity Ratio (DER) of coal companies listed on the Indonesia Stock Exchange (BEI) during the 2013-2018 period was 2.23, this figure shows that the company's capital ability to meet all its obligations is not good because of the ratio which is quite high. Furthermore DER has a maximum value of 1, and a minimum value of -2.113, with a standard deviation of 0.154. While the Skewness value is 5,210 and kurtosis is 31,397. This indicates that the distribution is not ideal and a low ratio indicates a company's poor performance in paying its receivables.

The average value (mean) Gross Profit Margin (GPM) of coal companies listed on the Indonesia Stock Exchange (BEI) during the 2013-2018 period was 22.6%.This figure shows that the company's performance is not good because the ratio is quite low. Furthermore GPM has a maximum value of 1, and a minimum value of - 1,940, with a standard deviation of 0.406. While the Skewness value is -3.224 and kurtosis is 16.729. This indicates that the distribution is not ideal and the value of the company's GPM ratio is relatively low. It means that the company has an

underperformance in managing its profits, this can be one of the causes of the company's bankruptcy probability. The lowest GPM value is owned by PT. Garda Tujuh Buana, Tbk (GTPO) in 2016, while the highest GPM value is owned by PT. Earth Resources (BUMI) in 2016.

The average value (mean) of Net Profit Margin (NPM) of coal companies listed on the Indonesia Stock Exchange (BEI) during the 2013-2018 period was -0,052. This figure shows that the company's performance is not good because the ratio is quite low. Furthermore NPM has a maximum value of 13,977, and a minimum value of -20,719, with a standard deviation of 3,639 and the Skewness value is -2,564 and kurtosis is 25,347. This figure stated that the management capability of company is low to manage its net profit.

The mean value (mean) of EBIT / Interest of coal companies listed on the Indonesia Stock Exchange (IDX) during the 2013-2018 period is 24.773. Furthermore TIE has a maximum value of 489,390, and a minimum value of -787.533, with a standard deviation of 146.278, the Skewness value is -2,617 and kurtosis is 21,116. The low ration in this figure indicates the poor performance of the company in managing operating costs outside the interest or tax elements.

The mean value of the current ratio (CR) of coal companies listed on the Indonesia Stock Exchange (IDX) during the 2013-2018 period was 4,247. Furthermore CR has a maximum value of 111.313 and a minimum value of 0.169 with a standard deviation of 15.436, the Skewness value of 6.944 and kurtosis of 49.006. This figure indicates that the low CR ratio which explains that the company's ability to repay debt is quite low, which can lead to a probability of failure for the company to pay its receivables.

4.2 Analysis of Determinant of Probability Bankruptcy

Panel data regression analysis is a regression analysis with data structure which is panel data. The panel data in this study are 17 coal companies and with a number of 3-year periods from 2016 to 2018. Estimation model used Model Panel Data and adjusted to standard of deviation of model to homogeny every time.

This research found that the Determinant of coefficient 0f 26.14% which is known R^2. It means that fluctuation of probability bankruptcy could be explained by 5 variables which is debt to equity ratio, gross profit margin, net profit margin, EBIT / Interest payment, and current ratio and the rest influenced by other variables outside the variables studied. The model is also significant using F test.

Table 2: Probability Bankruptcy Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0,945769	0,016751	56,46109	0
DER	0,000416	0,002157	0,193017	0,8478
GPM	-0,12081	0,051192	-2,359958	0,0227
NPM	-0,007054	0,011081	-0,636615	0,5276
TIE	0,000365	0,000185	1,972808	0,0547
CR	0,000636	0,000278	2,292483	0,0266

In the model, the coefficient value of Debt to Equity Ratio does not has impact to EDF at level of significant at 5%. This figure stated that fluctuation of DER does not effect to probability bankruptcy. The company could increase the debts to maximum of the company debts. This finding research support the previous research. The variable of Gross Profit Margin has negatively significant affecting the probability bankruptcy (EDF) at level of significant of 5%. NPM does not has negatively significant to affect Probability bankruptcy (EDF).This ratio should be significant then this ratio become high and impact to company does not bankrupt. The partial coefficient of Time interest earned (TIE) has positively significant effecting probability bankruptcy (EDF) at level of significant of 10%. This finding research does not support the theory that it should be negative as theory said. If this ratio is high, the company will enter to probability bankruptcy. Because the company is too High to pay interest.

The value of the Current Ratio (CR) coefficient partially has positively significant affecting the probability bankruptcy (EDF) at level of significant of 5%. The current ratio become higher, it will affect the probability bankruptcy to become higher. It should be negative relationship, so can support previous theory and previous research. Because the results is different, so this finding does not support previous theory and research.

5. Conclusion

This study has conclusion as follows:

1. The average value of the Expected Default Frequency (EDF) of coal companies listed on the Indonesia Stock Exchange (IDX) during 2013-2018 was 90.81%. Furthermore EDF has a maximum value of 1 and a minimum value of 0.387 with a standard deviation of 15.4, the Skewness value of -2,270 and kurtosis of 4.877. This Figure indicate that fluctuation Probability Default Frequency among company is high, even the figure closed to 1.
2. Gross profit margin, EBIT/TIE, and Current ratio have negatively significant impact to the probability of bankruptcy in coal companies listed on the Indonesia Stock Exchange (BEI) for the period of 2016 to 2018. The higher the ratio owned by the company the lower the probability bankruptcy.
3. Debt Equity Ratio and Net Profit Margin do not have significant to influence probability bankruptcy.

References

[1] Altman, E. I. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. Journal of Finance, Vol. 23 (4), pp. 589 – 609.
[2] Beaver, W. H. (1966). Financial Ratios as Predictors of Failure. Journal of Accounting Research, Vol. (4), pp. 71 – 111.
[3] Black, F. and M. Scholes (1973). The Pricing of Options and Corporate Liabilities, Journal of Political Economy, Vol. (81), pp. 351 – 367.
[4] Brigham, Eugene F. and Ehrhardt, Michael. C. (2005). Financial Management: Theory and Practice. South-Western, Cengage Learning.
[5] Crosbie, P. and J. Bohn (2003). Modeling Default Risk. KMV Corporation, USA.
[6] Hasan, M. S. A., Manurung, A. H. and Bahtiar Usman (2020). Determinants of Bank Profitability with Size as Moderating Variable. Journal of Applied Finance & Banking, vol. 10(1), pp. 153-166.
[7] Koes Pranowo, K., Achsani, N. A., Adler H. Manurung and Nunung Nuryartono, (2010). Determinant of Corporate Financial Distress in an Emerging Market Economy: Empirical Evidence from the Indonesian Stock Exchange 2004-2008. European Journal of Social Sciences, Vol. 16(1), pp. 138 – 149.
[8] Lau, A. H. (1987). A Five State Financial Distress Prediction Model. Journal of Accounting Research 25(1), pp. 127 – 138.
[9] Lugovskaya, L. (2010). Predicting default of Russian SMEs on the basis of financial and non-financial variables. Journal of Financial Service Marketing, Vol.14, pp. 301–313.
[10] Manurung, Adler Haymans. (2008). Probabilitas Default Perusahaan (Company Probability). The Ary Suta Center on Strategic Management, July, pp. 7 - 22.
[11] Manurung, Adler H. (2019). Model and Estimation in Finance and Management and Accounting, PT Adler Manurung Press.
[12] Merton, R. C. (1974). On the Pricing of Corporate Debt: The Risk Structure of Interest Rates. Journal of Finance, 29, pp. 449 – 470.
[13] Purnamawati, I. G. A. (2014). Comparative Performance Analysis of ASEAN Bank After Global Crises, (Analisis komparatif kinerja keuangan perbankan ASEAN setelah krisis Global). Jurnal Keuangan dan Perbankan, 18(2), pp. 287 – 296.
[14] Tian, S., & Yu, Y. (2017). Financial ratios and bankruptcy predictions: An international evidence. International Review of Economics & Finance, 51, pp. 510-526.
[15] Sjam, Amelina A. (2009). Financial Ratio Indicate Probability Failure of Financial Services in Listed Indonesia Stock Exchange (Rasio-Rasio Keuangan yang Mengindikasikan Probabilitas Kegagalan Perusahaan-Perusahaan dalam Industri Jasa Keuangan yang Listing di Bursa Efek

Indonesia), Research Funded By University of Maranatha, Bandung. Indonesia http://repository.maranatha.edu/id/eprint/5128

[16] Whitaker, R. B. (1999). The Early Stages of Financial Distress. Journal of Economics and Finance, 23 (2), pp. 123 -133.

[17] Wu. J., & Elango. P., (2019). Prediction of Corporate Default Using Logistic Regression, Thesis Master Degree, Simon Fraser University. TRITA-SCI-GRU.