

# Determinant Of Financial Leverage In Mining Coal Companies On Indonesia Stock Exchange

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**Abstract:** This study aims to examine the effect of several variables such as firm size, profitability, firm age and efficiency on DAR (debt to asset ratio) as proxy for the financial leverage of coal mining sector companies listed on IDX 2015 – 2019. Differences results of these variables effect on DAR indicates the need for further research on the determinants of financial leverage. By using multiple linear regression test it was found that the firm size variable had a positive significant effect on financial leverage, while profitability and firm age had a significant negative effect. Efficiency as measured with DEA (data envelopment analysis) has positive relation but not significant effect to the financial leverage. In general, the results of this study support the theory of trade-off and pecking orders.

**Index Terms:** Financial Leverage, Firm Size, Profitability, Firm Age, Efficiency, DEA

## 1 INTRODUCTION

Liabilities is one of the options for companies in determining the source of funding. In fulfilling the company's operational funds, liabilities is one of the options used by the company in the midst of crisis conditions, especially when there is a decline in commodity price for the mining sector. This sector are placed fifth as the largest user of foreign debt after government administration services, the financial and insurance services sector, manufacturing industry sector and the electricity, gas, steam or water and air [2]. Generally, almost all sectors experienced an increase in liabilities amount in 2015 – 2019. This is indicated that the company's need for liabilities usage grew every years. The high use of liabilities raise the risk of default by the company. Moody's Investors Service revealed, India and Indonesia are the most vulnerable countries to declining debt repayment capabilities, especially companies in the commodity sector. The high use of debt impacted on the increase of the risk of bankruptcy, however debt ratios also have an important role in providing financial information to stakeholders. Moody's believes that the higher debt to income ratio, it means the company is in a poor financial condition. For its condition, the company's ability to gain profit is decreasing, and in the risk to be in financial distress. In other hand, the smaller the ratio means the company ability to cover interest of its liabilities decreases. The strategy to control the amount of optimal liabilities usage is important thing that must be taken by company. Debt usage as source of funding called financial leverage. Debt ratio is the common ratio used to proxy financial leverage [16], [10], [4], [23]. This ratio described as the proportion of company assets financed by debt. It can be interpreted that leverage is debt proportion used by company to financed their asset for company's operational. Theory used to determine the company leverage is capital structure theory, named trade – off and pecking order theory. Trade of theory states that debt usage is one of the company strategy to minimize income tax. Pecking order theory discusses of hierarchy or order of the company's source of funds. This theory states that companies will use internal source first before external source of funding such as liabilities and share. Other theory related to capital structure is agency cost theory. Agency theory declares based on monitoring cost that doing by stakeholders. This theory assumes that by increasing debt, the agency cost will be decreases. So, the manager can use the cost for other expenses. The revenues earned by coal companies is depend on the amount of coal production. Revenue increase can

happened if the companies make efficiency in their coal production. The efficiency-risk hypothesis by Berger (2002) focus on efficiency policy in firm and its effect on capital structure. Firm with higher efficiency have more chance of expecting high return, so it had tendency to avoid financial distress. Base on trade – off theory, companies with high return will raise their liabilities. Previous study state there are many factors has affect on financial leverage proxies by debt to asset ratio or DAR. DAR has been used as financial leverage proxy by several studies, [3], [11], [9], [23], [20]. In general, some factors that can affect DAR are profitability, firm size, firm age and efficiency. Firm size is one of the factor commonly used to determine financial leverage. The larger of company's size, the information about the company will be more available in the market thereby reducing the asymmetric information. By reduce it, the company easily obtain funding source from the creditors. The large companies have less debt [25], while [16] shows firm size does not have a significant relationship with DAR. Return on asset is ratio used to measure the company's profitability. Profitability is company abilities to gain profit in form of sales, total asset, or equity. Positive relation between profitability and leverage support by trade-off theory, which is more profitable company will have low chance to bankruptcy and have more incentive to get debt for bigger profit from tax avoidance [7] or to increase firm performance [19]. In other hand pecking order theory state when company have high profit, they will use as internal source of fund. This statement supported by [9], [20]. Firm age is an important determine of capital structure [3], [12]. Summarized in [3] reveals fact that young companies are more prone to information asymmetry problems, they tend to use debt and avoid financing with equity. So it means that the older the companies, the higher the use of debt and the younger the companies the smaller the leverage ratio. The results of [12] revealed a negative relation between the firm age and financial leverage. This result support by pecking order theory [21] that stated the older the companies, the capable to accumulate funds and the less needed to borrow both long and short term. Efficiency is one of factor that affect on financial leverage [18], [3], and [26]. The higher scores of firm efficiency the higher cash holding of the companies, so the loan capability ability of firm will raise and shows company's quality to creditors. It means, this will reduce cost of debt and which lead to positive relation between financial leverage and firm efficiency. The efficiency – risk hypothesis

state a high scores of efficiency can replace equity capital to protect the company from future crises [3]. That hypothesis also said the company with low equity ratio have tendency to increase their debt ratios. This formula further support a positive relation between firm efficiency and financial leverage. Previous study has conducted research on 27,260 observational data from China, Japan, Germany and India regarding the relationship between efficiency and financial leverage [18]. This research find that efficiency has negative affect on debt ratios. The pecking order theory support this result, it is stated that firm performance has negative relation with the level of debt. Based on this theory, firm tend to using internal source of resource. Thus, efficient firms may rely less on debt capital because they can generate more internal capital. There are two methods to measure firm efficiency, parametric and non-parametric approaches. Parametric approach included Distribution Free Approach (DFA), Stochastic Frontier Approach (SFA), and Thick Frontier Approach (TFA), while Free Disposal Hull (FDH) dan Data Envelopment Analysis (DEA) [2] are included on non-parametric approach. From these methods, DEA methods chosen to this research because it can measure multiple input and output without knowing the relationship between them. It also can be used for input and output data in difference units, and the units that are compared can be seen directly from the result [8]. The different results in previous studies about the effect of some factors like profitability, firm size, firm age and efficiency to the financial leverage shows a gap that needed on future research. This research using mining coal company because it has complex problem of risk [28].

#### RESEARCH PURPOSE

1. To find out the efficiency scores of mining coal companies on Indonesia Stock Exchange
2. To analyzes the effect of firm size, profitability, firm age and efficiency on financial leverage

## 2 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### a. Pecking Order Theory

This theory states that firm tends to use low level of debt when they have high level of profit. This happens when the company has a high level of profitability, they will use it as a source of internal funds. Specifically, this theory has a preference in determining the source of funds. The order of selecting funding sources based on the pecking order theory is internal funding sources, debt or bond, and the last is equity.

### b. Trade – off theory

The theory suggests that in order to achieve an optimal capital structure, companies must be able to balance the benefits and sacrifices as a result of using debt. Based on this theory, managers will consider the trade-off between tax advantages and bankruptcy costs in making funding source decisions. In other words, in achieving the optimum capital structure, the company must have a tax advantage that is greater than the value of the bankruptcy costs [6]. The conclusion of the trade-off theory is to provide an understanding of the wise use of debt and the risks of using debt excessively [27].

### c. Signalling theory

Signal theory is an action taken by managers to provide a signal to external parties regarding the manager's view of the

company's prospects [7]. Signalling theory was first introduced by [24] which states that the determining of a company's capital structure is influenced by differences in information or asymmetric information between managers and stakeholders. In many numbers of research about determining financial leverage, firm size is the commonly variable that using by researcher. Firm size is defined as the size of a company which is assessed based on total assets, total sales, total profits and others by [7]. Compared to small companies, large companies tend to have larger assets so that the larger the size of the company, the greater the size of the assets. Companies with large assets can use their assets as collateral to obtain loans, but it also indicates that the company is in good condition and able to meet its cost of debt [10]. The result studied by [10] said, firm size has positive significant affect on financial leverage. This result supported by [31], which state that financial decision of 16 Malaysian REIT companies with a study period of 10 years (2005 – 2014) were significantly influenced by firm size. The positive effect of firm size on firm leverage is also summarized in several studies such as [3], [16].

### H1 : Firm size is affect on financial leverage

Profitability is company's capabilities to earn profit in relation to sales, total asset, and equity. Firm with high profitability will be has low level of bankruptcy risk and creditors have a tendency to fund the company [20]. Another study shows that financial leverage has positive relationship with profitability cause of asymmetry information [24]. Company with high profitability tends to downward their use of debt. Different finding was made by [12], [5], [1]. These studies state that there is a negative effect of profitability on the company's leverage ratio.

### H2 : Profitability is affect on financial leverage

In providing loans, creditors will consider the firm age. Through the age of the company, the creditors will know the time span of the company in competing and taking existing investment opportunities for the sustainability of its business [30]. According to [30], the old firm generally have more stable profitability ratio the the young firm. Because of the better business experience. Firm age has negative effect on on financial leverage [4]. This result is supported by pecking order theory which This is based on the pecking order theory where older companies will have good internal financial management, thereby reducing the use of external funds.

### H3 : Firm age is affect on financial leverage

The efficiency-risk hypothesis [3] stated that the high level of efficiency can replace equity capital to protect the company from future crises. It also said that the low ratio of equity indicates the company has high ratio of leverage. The result study of [3] shows that efficiency has positive effect on financial leverage, while [18] find difference result. Those research find that efficiency score has negative effect on financial leverage. This result is consistent with the statement in the pecking order theory that companies apply debt capital only when retained earnings are exhausted and increase external equity capital only as a last resort.

**Tabel 2. Operational Variable Definition**

Variable	Proxy	References
Firm Size	Log total aktiva	[7]
Firm Age	Log firm age	[28]
Profitability	<i>Return on Asset</i>	[20]
Leverage	<i>Debt to asset ratio</i>	[10]

#### H4 : Efficiency is affect on financial leverage

### 3 METHOD

#### Population and Sample

This study uses data on the financial statements of the coal mining sector listed on the IDX in 2015 – 2019. In selecting the number of samples, the authors use a purposive sampling technique with the following criteria: a) Have a complete financial report between 2015 – 2019. b) The data is positive for the variables used in measuring efficiency. With the 2 criteria above, the authors get 10 coal mining companies that meet the requirements.

1. Adaro Energy Tbk. (ADRO)
2. Baramulti Suksessarana Tbk. (BSSR)
3. Darma Henwa Tbk. (DEWA)
4. Golden Energy Mines Tbk. (GEMS)
5. Indo Tambangraya Megah Tbk. (ITMG)
6. Resource Alam Indonesia Tbk. (KKG)
7. Mitrabara Adiperdana Tbk. (MBAP)
8. Samindo Resources Tbk. (MYOH)
9. Bukit Asam Tbk. (PTBA)
10. Toba Bara Sejahtera Tbk. (TOBA)

#### Variable Measurement

In measuring efficiency variables, this study uses a non-parametric approach with DEA. This approach uses input and output variables to get an efficiency score. Output variables that used is: coal production, operating profit, and dividend per share, while the input variables are total asset, labor cost and operational cost [13] [15]. The efficiency equation through this approach is as follows [9]:

$$\text{Maximise } h_0(u, v) = \frac{\sum_r u_r Y_{rj}}{\sum_i v_i X_{ij}} \quad (1)$$

with

$$\frac{\sum_r u_r Y_{rj}}{\sum_i v_i X_{ij}} \geq 1, i = 1, \dots, n \quad (2)$$

$$u_r, v_i > 0$$

Noted :

- $h_0$  = optimum score of efficiency from each DMU j  
 $Y_{ri}$  = amount of output r that produced by DMU j  
 $X_{ij}$  = amount of input i that used by DMU j  
 $U_{ri}$  = weight of the output r produced by each DMU j  
 $V_{ij}$  = weight of the input i that used by each DMU j

The measurement of other variables like firm size, profitability, firm age and financial leverage will be shown in table 2.

### MULTIPLE REGRESSION ANALYSIS

$$\ln DAR_{it} = \alpha + \beta_1 \ln SIZE_{it} + \beta_2 \ln ROA_{it} + \beta_3 \ln AGE_{it} + \beta_4 \ln EFF_{it} + \varepsilon$$

Note:

DAR : Financial Leverage

SIZE : Firm Size

ROA : Profitability

AGE : Firm Age

EFF : Efficiency

### 4 RESULT AND DISCUSSION

#### Efficiency Score by DEA

The results of DEA (Data Envelopment Analysis) test to get the efficiency score in this study are as follows: Based on table 3. it can be seen that the company has an overall good efficiency score, although there are 2 firms with score below 70%.

**Tabel 3. DEA test result**

Firm	2015	2016	2017	2018	2019
ADRO	1	0,958	1	0,890	0,994
BSSR	1	1	1	0,892	1
DEWA	1	1	1	0,903	1
GEMS	0,689	0,934	1	0,963	1
ITMG	1	1	1	1	0,94
KKGI	0,984	0,923	1	0,448	0,975
MBAP	1	0,876	1	0,984	1
MYOH	1	1	0,975	0,961	1
PTBA	1	1	1	1	0,972
TOBA	1	1	1	1	1

### Classic assumption test result

Classical assumption test is performed to obtain BLUE (Best Linear Unbiased Estimator) regression results or unbiased results. Based on the purpose of the test, several assumptions must be met, such as the variation in the research data (multicollinear), there is no data correlation between t and the period t -1 (autocorrelation), and there is no close relationship between the independent variables (heteroscedasticity), so the resulting data is distributed normal. The data normality test in this study was tested using the Kolmogrov-Smirnov statistic or abbreviated (K-S). In table 3. it can be seen that the significance value is much greater than 5% (>5%) which means the data distribution is normal.

**Tabel 4. Hasil Uji Kolmogrov-Smirnov**

Description	Kolmogrov-Smirnov	Sig.
Data Distribution	0,710	0,695

This research uses Glesjer test in testing the occurrence of heteroscedasticity. This test is carried out by regression all independent variables to the absolute residuals of research data. The results of the Glejser test in table 4. reveal that the overall significance value is above 5%, which means that there are no heteroscedasticity.

**Tabel 5. Glejser test result**

Variable	t-statistic	Sig.
SIZE	-0,662	0,511
ROA	1,824	0,075
AGE	0,246	0,807
EFF	-0,769	0,446

Durbin-Watson testing is used to know whether there is autocorrelation in regression model. Durbin-Watson value on this research is 1,744. The lower and upper limits of this study are between 1.3779 – 1.7214. The value of 1.744 is greater than 1.7214 and less than 2.6221 (4 – du), then there is no autocorrelation in the regression model of this study. The last classic assumption test is multicollinearity testing. The result of this testing can be seen by VIF value. If the value less than 10, then there is no multicollinear in regression model. VIF value of this research served on table 6. The table shows that the VIF value of all variables are less than 10, so it is concluded there is no multicollinearity.

**Tabel 6. Multicollinear test result**

Variable	VIF
SIZE	1,054
ROA	1,173
AGE	1,029
EFF	1,218

### Multiple Regression Result

Based on the results of the classical assumption test, it can be concluded that the regression model has fulfilled these assumptions. Furthermore, the author will describe the results of multiple regression tests which are summarized in table 7. Based on the results of the multiple regression test in table 7, the regression equation can be formulated as follows:

$$\ln \text{DAR} = -1,177 + 0,113 \ln \text{SIZE} - 0,052 \ln \text{ROA} - 0,203 \ln \text{AGE} + 0,274 \ln \text{EFF} + e$$

Note:

F value: 5,079\*\*, R-Square = 0,254,

\* significance at 5%, \*\* significance at 1%.

**Tabel 7. Multiple Regression Result**

Variabel	Unstandardized Coefficient	Standardized Coefficient	t-value
Constant	-1,177		-3,746
SIZE	0,113	0,383	3,011**
ROA	-0,052	-0,265	1,908*
AGE	-0,203	-0,358	2,838**
EFF	0,274	0,138	0,994

Firm size has t-statistic value greater than 1% significance t-table, which is 3.011 > 2.404. The conclusion of the hypothesis is to reject H0 and accept H1, firm size has a significant positive effect on the company's financial leverage. Trade – off theory support that result, where companies have tendency to raise their debt because of tax and avoid financial distress. Several number of studies support this result, [4], [5] and [10]. Profitability has negative affect on financial leverage with coefficient -0,052. T-statistic value of this variable is 1,908 which is greater than 5% significance t-table value 1,676. Conclusion of the hypothesis is reject H0 and accept H2, profitability has an effect on financial leverage in significance at 5%. This result support some research like [4], [18], [25] also pecking order theory where is companies with high profitability tend to downwards their debt. Firm age has negative effect on financial leverage with coefficient -0,203. Furthermore, the results of the t-statistic are greater than t-table at 1% significance, 2.838 > 2,403. Conclusion of the hypothesis is reject H0 and accept H3, firm age is affect on financial leverage. According to pecking order theory, the older firm has good finance management so their need of debt is decreasing. Some studies supported this result is [4] dan [10]. Efficiency has t-statistic value less than t-table. The result of hypothesis testing is accept H0, it means efficiency does not affect on financial leverage. The coefficient value shows 0.274 which means that efficiency shows a positive relationship to financial leverage even though it does not have a significant effect. These results do not support the research of [18]; [25] and pecking order theory. Firm size has highest effect on financial leverage than other variables with standardized coefficient 0.358. This is quite reasonable because the number of company assets is often used as collateral for creditors in providing loans. In addition, the firm size also indicates that the demand for the company's products is high, which means the company tends to avoid financial distress and is able to fulfill its obligations. Overall, the independent variables affect financial leverage with F value of 5.079 which is greater than the F table at 1% significance which is 3.72. The independent variable affects the financial leverage with coefficient of determination of 25.4% with the rest being influenced by other variables.

## 5 CONCLUSION

The purpose of this study is to examine the effect of variables that affect the financial leverage of coal mining sector companies listed on IDX in 2015 – 2019. Based on the results of hypothesis testing, there are three proven hypotheses, there are H1, H2 and H3. The three hypotheses state that there is an effect of firm size, profitability and firm age on financial leverage. Firm size has positive and significance effect on leverage, while profitability and firm age has negative

effect. Firm size has the highest effect than other independent variables. These result supported by trade – off theory that state the company tends to increase the use of debt when they have large of asset to reducing tax. On the other hand, pecking order theory supports the results of hypothesis testing H2 and H3 where profitability and firm age has negative and significance effect on financial leverage. The companies with high profit indicate that their internal financial in good condition then downwards using debt. Likewise for firm age, the longer established company will have experience in internal financial management. Good internal finance can be used as a source of company operational funds which has an impact on decreasing the use of debt. The results of this study are useful as reference for future research, especially in research on capital structure or corporate financial leverage. Based on the results, The company is expected to consider the amount of assets and business management to run longer also their profitability.

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