Correlation Between Financial Performance Indicators and Capital Structure of Coal Mining Industry Listed on the Indonesia Stock Exchange

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Abstract

This research examines the correlation between capital structure (as proxied by Debt-to-Equity Ratio) and several financial performance indicators, including profitability, asset structure, liquidity, and firm size. This research focuses on 18 coal mining companies listed on the Indonesia Stock Exchange (IDX) by at least 2020. The data is derived from the financial reports published on the IDX between 2020 and 2022. Multiple Linear Regression technique is being employed to determine the correlations. Before employing the Multiple Linear Regression technique, several tests were conducted to examine the data's validity and reliability, including normality, multicollinearity, autocorrelation, and heteroscedasticity tests. Multiple Linear Regression is employed after the data passes the tests, consisting of partial regression, ANOVA, and goodness-of-fit tests. This research found that profitability and liquidity negatively correlate with capital structure. At the same time, asset structure and firm size positively correlate with capital structure. Overall, the result of this research supports Pecking Order Theory, in which firms are preferred to use internal financing first. When firms generate higher profits and cash flow, they may consider re-balancing external financing. This research also concludes that profitability, asset structure, liquidity, and firm size represent 47.7% of the variables correlated with capital structure. Future research may be conducted to seek other variables that have not been included in this research yet but are correlated with capital structure.

Keywords: asset structure; capital structure; firm size; liquidity; multiple linear regression; profitability.

A. INTRODUCTION

The coal mining industry is consistently exposed to various external factors: the volatility of the global coal price index, certain policies issued, growing concern about climate change, and increasing urgency of countries worldwide to shift to renewable energy. While in Indonesia, there are numerous policies related to the coal mining industry, including production limitation, Domestic Market Obligation (D.M.O.), and royalty. Also, Indonesia has set up a roadmap for the shift to renewable energy.

Besides the external factors, the coal mining industry must also deal with its internal challenges. One of them is that the industry is considered a capital-intensive industry. It requires a huge amount of capital to run the business. A long list of activities must be performed to deliver the coal to the buyer. It includes exploration, topsoil removal, overburden removal, coal getting, crushing, hauling, stockpiling, and shipment to the buyer. After extracting the coal, they must perform several activities in the exploited mine area, including overburden dumping, topsoil placement, and rehabilitation/reclamation. Each activity requires a significant amount of capital.

With high uncertainty, volatile industry, and yet capital-intensive, the companies must implement accurate strategies to tackle all the challenges. Achieving optimal capital structure would be one of the strategies that can be performed. The optimal capital structure would help the companies to run the business efficiently in terms of the cost of capital. The next question would be, to re-balancing the capital structure, what factors or indicators the managers need to consider for consideration.

There are two main theories related to capital structure: Pecking Order Theory (Stiglitz, 1973) and the Trade-off Theory (Kraus & Litzenberger, 1973). Pecking Order Theory explains that firms prioritize internal financing before acquiring external financing. Internal financing would come from retained earnings of the company. Internal financing is preferred because it provides lower risks of financial distress from the burden of interest payments on debt. It also allows the firms to maintain control and ownership of the company rather than when firms acquire equity financing. The other theory, the Trade-off Theory, suggests a tax advantage of debt as

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interest payments are tax-deductible. However, debt also comes with costs and the potential risk of financial distress and bankruptcy. When acquiring equity financing, there is also agency cost, which is the potential conflict of interest between shareholders and debtholders. Firms should seek the optimal capital structure by ensuring that the marginal costs offset the marginal benefits of debt.

Numerous research has been performed in the past on various industries to seek the financial performance indicators correlating with capital structure. However, the results were varied. This research aims to determine the correlation between financial performance indicators with capital structure, specifically for the coal mining industry in Indonesia. Capital structure is proxied by Debt-to-Equity Ratio;

Profitability is the ability of the firm to generate profits from its revenue, operations, assets, or equity. This research indicates profitability by Return on Assets (ROA). Several previous research found that profitability has a negative significant correlation with capital structure (Fauziah & Iskandar, 2015; Karadeniz et al., 2009; Onofrei et al., 2015; Paredes Gómez et al., 2016; Sutomo et al., 2019, 2020). However, several other research found that profitability has no significant correlation with capital structure (Lussuamo & Serrasqueiro, 2021; Panova, 2020; Salim & Susilowati, 2019; Zulvia & Roza Linda, 2019). Based on Pecking Order Theory, firms prefer to utilize their internal financing first. Thus, when firms can generate higher profits or cash flow, they may consider reducing the debt. Therefore, this research will test the first hypothesis: profitability negatively correlates with capital structure.

H1: Profitability has a negative significant correlation with capital structure.

Asset structure shows the composition of assets owned by the firms. It is indicated by the ratio of fixed assets compared to total assets. Fixed assets are tangible assets. The higher the fixed assets, the higher the ability of the company to acquire debt and utilize them as collateral, as explained by the Trade-off Theory. Previous research found that asset structure positively correlates with capital structure (Ali et al., 2022; Arif & Mai, 2020; Ghani et al., 2023; Sutomo et al., 2020). However, previous research also found different results(Lussuamo & Serrasqueiro, 2021; Panova, 2020; Paredes Gómez et al., 2016; Pham & Hrdý, 2023). This research would test the second hypothesis: asset structure positively correlates with capital structure.

H2: Asset structure has a positive significant correlation with capital structure

As indicated by Current Ratio, liquidity reflects the firm's ability to pay its short-term liabilities with its short-term asset, including cash, inventories, and receivables. According to Pecking Order Theory, the higher the firms' liquidity, the more they tend to lower their debt and prioritize utilizing their internal funds. Previous research found that liquidity negatively correlates with capital structure (Onofrei et al., 2015; Panova, 2020; Pham & Hrdý, 2023; Salim & Susilowati, 2019). However, Ghani et al. (2023) found that liquidity has no significant correlation with capital structure. This research would test the third hypothesis: liquidity has a negative significant correlation with capital structure.

H3: Liquidity has a negative significant correlation with capital structure

Firm size reflects the total assets owned by the firm. The higher the firm size, the higher the ability of the firms to acquire debt and collateralize the assets. It is based on the Trade-off Theory. Previous research found that firm size positively correlates significantly with capital structure (Ghani et al., 2023; Suarez, 2016; Sutomo et al., 2020). However, several other research found that firm size has a negative significant correlation with capital structure (Arif & Mai, 2020; Fauziah & Iskandar, 2015; Paredes Gómez et al., 2016; Pham & Hrdý, 2023). This research would test the fourth hypothesis: firm size positively correlates with capital structure.

H4: Firm size has a positive significant correlation with capital structure

B. RESEARCH METHOD

This research is conducted by the quantitative method as it analyses numerical data. The statistical technique is used to identify the relationship between independent and dependent variables. The independent variables are profitability, asset structure, liquidity, and firm size. The dependent variable is capital structure. The data is collected from financial reports published by the coal mining companies on the Indonesia Stock Exchange (IDX). This research analyses financial reports from 2020 to 2022; thus, the companies must already be listed at least in 2020. As of 1 May 2023, 23 coal mining companies are listed on the IDX. However, only 18 coal mining companies fulfilled the requirements of this research.

This research analyses the data with the Multiple Linear Regression technique. Before employing the technique, several tests must be conducted to test the validity and reliability of the data, including Descriptive Statistics, Normality Test, Multicollinearity Test, Autocorrelation Test, and Heteroscedasticity Test. The multiple

Linear Regression technique consists of a Partial Regression Test (t-Test), ANOVA Test (F-Test), and Goodness-of-Fit Test (R2 Test).

Descriptive Statistics is a process to identify the characteristics and patterns of the data. It shows the minimum, maximum, mean, and standard deviation values. The normality Test is a statistical procedure to assess whether the data set follows a normal distribution (bell-shaped curve of a normal distribution). Multicollinearity Test is to identify whether two or more independent variables are highly correlated with each other. They should not be correlated with each other as it would lead to unreliable interpretations. Autocorrelation Test is conducted to check whether there is a correlation between independent variables at certain periods and independent variables at different periods. There should not be any correlation between the time series of data to avoid misleading interpretations. Heteroscedasticity Test is conducted to check whether the data has a constant variance of errors across all levels of the independent variables. Multiple Linear Regression can be performed after the data passes all the tests, consisting of three tests. The partial Regression Test (t-Test) is used to determine the correlation between the independent and dependent variables partially. ANOVA Test (F-Test) determines the correlation between independent variables simultaneously with the dependent variable. Goodness-of-Fit Test (R2 Test) determines how well the independent variables describe the variables that correlate to capital structure.

C. RESULTS AND DISCUSSION

Normality Test is conducted with One-sample Kolmogorov-Smirnov Test. The data is in normal distribution if the Asymp. Sig. Value is greater than 0.050. The below table shows that the Asymp. Sig. The value is at 0.200, which is greater than 0.050. The result concluded that the data is normally distributed.

Table 1. One-sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		54
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.44446456
Most Extreme Differences	Absolute	.104
	Positive	.104
	Negative	-.088
Test Statistic		.104
Asymp. Sig. (2-tailed)		.200[c,d]

Source: research data, 2023

Multicollinearity Test uses Variance Inflation Factor (V.I.F.) and Tolerance Method. In order to conclude that the data is free from multicollinearity, the V.I.F. value must be less than 10, and the Tolerance value must be greater than 0.10. The below table shows that all V.I.F. values are less than ten and Tolerance values are greater than 0.10. The result concluded that the data is free from multicollinearity.

Table 2. Multicollinearity Test

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	.004	.278		.013	.989		
	PROF	-1.074	.375	-.335	-2.865	.006	.720	1.388
	AS	.935	.721	.137	1.298	.200	.890	1.124
	LG10_LIQ	-.919	.218	-.477	-4.208	.000	.768	1.303
	LG10_FS	.215	.075	.307	2.867	.006	.858	1.165

Source: research data, 2023

Autocorrelation Test is conducted with Durbin-Watson Test. The data is free from autocorrelation if the Durbin-Watson value is between 1.7234 and 2.2766. As shown in the below table, the Durbin-Watson value is at 1.884. Since the value is between 1.7234 and 2.2766, the result concluded that the data is free from autocorrelation.

Table 3. Autocorrelation Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.719[a]	.516	.477	.46225	1.884

Source: research data, 2023

Heteroscedasticity Test is conducted. The data is free from heteroscedasticity if the Sig. Value is greater than 0.050. As shown in the table, all Sig. Values are greater than 0.050. The result concluded that the data is free from heteroscedasticity.

Table 4. Heteroscedasticity Test

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.426	.189		2.252	.029
	PROF	-.212	.255	-.137	-.831	.410
	AS	-.013	.491	-.004	-.026	.979
	LG10_LIQ	-.085	.149	-.091	-.570	.572
	LG10_FS	-.017	.051	-.049	-.324	.747

Source: research data, 2023

Multiple Linear Regression is applied since the data has passed all the required tests. The constant and coefficients of the equation are shown in the below table.

Table 5. Constant and Coefficients

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.004	.278		.013	.989
	PROF	-1.074	.375	-.335	-2.865	.006
	AS	.935	.721	.137	1.298	.200
	LG10_LIQ	-.919	.218	-.477	-4.208	.000
	LG10_FS	.215	.075	.307	2.867	.006

Source: research data, 2023

The equation can be written as follows:
Capital Structure = 0.004 – 1.074Profitability + 0.935Asset Structure – 0.919Liquidity + 0.215Firm Size

A partial Regression Test (t-Test) is performed to identify the correlation between the independent variable partially and the dependent variable. The independent variable is significantly correlated with the dependent variable if the Sig. Value is lower than 0.050. As shown in the below table, profitability, liquidity, and firm size are partially correlated with capital structure. However, asset structure is partially not correlated with capital structure.

Table 6. Partial Regression Test

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.004	.278		.013	.989
	PROF	-1.074	.375	-.335	-2.865	.006
	AS	.935	.721	.137	1.298	.200
	LG10_LIQ	-.919	.218	-.477	-4.208	.000
	LG10_FS	.215	.075	.307	2.867	.006

Source: research data, 2023

ANOVA Test (F-Test) determines whether all independent variables are simultaneously correlated with capital structure. It has a significant correlation if the Sig. Value is lower than 0.050. The below table shows that Sig. The value is 0.000. It concluded that all independent variables are simultaneously correlated with capital structure.

Table 7. ANOVA Test

ANOVAᵃ

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.182	4	2.796	13.083	.000ᵇ
	Residual	10.470	49	.214		
	Total	21.652	53			

Source: research data, 2023

Goodness-of-Fit Test describes how well the independent variables can represent the correlation between variables and capital structure. The below table shows that the adjusted R2 value is at 0.477 or 47.7%. It means that profitability, asset structure, liquidity, and firm size represent 47.7% of all the variables correlated with capital structure.

Table 8. Goodness-of-Fit Test

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.719ᵃ	.516	.477	.46225

a. Predictors: (Constant), LG10_FS, LG10_LIQ, AS, PROF

Source: research data, 2023

As explained in the above results, profitability significantly correlates with capital structure. Since the coefficient is -1.074, profitability negatively correlates with capital structure. Therefore, hypothesis 1 is proved to be correct. This result supports the Pecking Order Theory, in which firms prioritize internal financing before acquiring external financing. When firms can generate higher profits, they tend to lower their debt.

Asset structure significantly correlates with capital structure, with a coefficient of 0.935. Therefore, hypothesis 2, which stated that asset structure has a positive significant correlation with capital structure, proved correct. This result supports the Trade-Off Theory, in which firms with higher asset structures may increase their debt since they have more assets to be collateralized.

Liquidity significantly correlates with capital structure, with a coefficient of -0.919. Therefore, hypothesis 3, which stated that liquidity has a negative significant correlation with capital structure, is proved correct. This result supports the Pecking Order Theory, which explains that firms prioritize internal financing to fund their investments and operations.

Firm size significantly correlates with capital structure with a coefficient of 0.215. Therefore, hypothesis 4, which stated that firm size positively correlates with capital structure, is proved correct. This result supports the Trade-Off Theory. Firms with higher total assets would have more flexibility to acquire debt since they have more assets as collateral.

D. CONCLUSION

The results show that profitability and liquidity have a negative significant correlation with capital structure, while asset structure and total assets have a positive significant correlation with capital structure. Profitability has the highest coefficient among the four independent variables, followed by asset structure and liquidity. From these results, we could assume that the companies' managers may consider re-balancing the capital structure when there is a significant change in profitability. Asset structure and liquidity would be the next factors when managers consider re-balancing the capital structure.

This is also consistent with the nature of the industry. Due to high uncertainty and volatility, coal mining companies should prioritize internal financing to minimize the risks of financial distress and bankruptcy cost. When they cannot generate sufficient profits and cash flow for investments and operations, they may consider acquiring external financing by considering the asset structure, liquidity, and firm size positions. It is to anticipate if they have too much debt while the coal price drops significantly, without knowing when the coal price and demand would recover.

The four independent variables represent 47.7% of all variables correlated with capital structure. Future research may be conducted to seek other variables that have not been included in this research but are correlated to capital structure.

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