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Comprehensive Evidence of Capital Structure and Firm Performance in Indonesia

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Abstract
This article investigate the effect of debt on firm performance in Indonesia. Annual unbalanced panel data from non-financial firm that listed between the year of 2010 and 2018 are examined. Besides using proxy of debt ratios, we also categorized debt based on its maturity: short-term and long-term debt ratios. To provide robust results, various methods are used in this study. Our method is not only limited on static regression (ie: pooled ordinary least square, fixed effect, and, random effect), but also dynamic panel regression, such as generalized method of moment-first difference. In addition, nonlinear regression is also conducted to investigate whether the effect of debt on firm performance in Indonesia follows U inversed pattern. Our result shows that there is negative effect between all debt category and firm performance. This result may indicate the existence of debt mismanagement in Indonesia as this negative effect is not resulted from U-inversed pattern. In addition, we found that short-term debt has a significant role in reducing firm performance. In other words, firms' monitoring of debt, especially in short-term debt, is substantial. We suggest that firms should consider increasing the proportion of long-term debt over short-term debt since long-term debt has no negative significant effect on the firm's performance.
Keywords: Capital Structure, Firm Performance, Financing, Short-Term Leverage, Debt.

Introduction

Capital structure topics have often been discussed and become an essential issue in finance. Capital structure studies were first popularized by Modigliani and Miller (1958) and are commonly called MM theory. This theory states that the proportion of equity and debt has no significant effect on firm value. However, their theory is based on unrealistic conditions, such as perfect market conditions and no taxes. Modigliani and Miller extend their own theory by including taxes. This shows that debt could induce tax savings and increase firm performance compared with firms that have no debt. Using different paradigms, Jensen and Meckling (1976) and (Jensen, 1986) suggested that debt can minimize conflicts of interest among stakeholders. Finally, trade-off theory points out that the relationship between debt and firm performance is U-inversed shaped. Thus, an ideal proportion is needed to maximize firm value.

However, the empirical evidence shows a variable result, whether leverage has a positive or negative effect or is irrelevant. Debt has a positive effect on firm performance in developed countries (Berger & Bonaccorsi di Patti, 2006; Gill, Biger, and Mathur, 2011; Margaritis & Psillaki, 2010). However, some studies of developed countries report a reversed result (Goddard, Tavakoli, and Wilson, 2005; Yazdanfar & Öhman, 2015). This, mixed results of the relationship between firm leverage and firm profitability are also found in developing countries. Some studies show that financial leverage has a positive effect on firm performance

(Chadha & Sharma, 2015; Detthamrong, Chancharat, and Vithessonthi, 2017; Kyereboah-Coleman, 2007), while others have found opposite results (Ahmed Sheikh and Wang, 2013; Dawar, 2014; El-Sayed Ebaid, 2009; Foong and Idris, 2012; Zeitun and Saleh, 2015).

This study extends the literature on the relationship between capital structure and firm performance in Indonesia. Similar studies that analyze its effect in Indonesia have several limitations, such as using small sample sizes, studying only one sector, and a limited estimation strategy. For example, Sakinah and Anggono (2014) and Suardi and Noor (2015) relied only on data on agriculture firms listed on the Indonesian Stock Exchange. Kartikasari and Merianti (2016) sampled listed manufacturing firms. Studies that use dynamic panels with Indonesian data are rare. In addition, Muchtar et al. (2018) conducted the only study that used dynamic panel regression to analyze Indonesian data.

This study contributes in two ways. First, we offer a comprehensive analysis that is not limited to only one sector and uses many analysis methods (pooled ordinary least squares, fixed effects, random effects, and dynamic panel GMM difference). By employing various methods, a more robust and accurate understanding of the relationships between the variables could be provided. Second, we categorize the capital structure variables based on maturity. This approach allows us to capture the differences of how various capital structure may impact firm performance. In short, we can capture the difference effect short- and long-term debt influence financial outcomes.

Literature Review and Hypotheses

Theoretical Review

Modigliani and Miller (1958) explained the link between capital structure and firm performance is Modigliani and Miller (1958). This theory is famously called debt irrelevance theory. This theory states that, under perfect financial market conditions, there is no difference between choosing debt or equity in a firm's financial management. However, this theory is difficult to apply in reality because it has strict assumptions such as symmetric information between firm insiders and outsiders, no transaction costs, and no taxes. In short, this theory states that debt has no relevant role in firm performance.

However, Modigliani and Miller (1958) extended their theory by including taxes. This theory states that leverage creates tax shields. This tax shield will benefit the firm because the firm will pay less income tax. Thus, debt will raise firm performance as the cost that should be paid by the firm is reduced.

Agency Theory (Jensen, 1986; Jensen and Meckling, 1976), also explains the benefit of firm debt from different perspectives. Having debt may increase firm performance as it decreases the agency problem. The creditor sets a covenant to secure their loans. This covenant can limit managers from conducting non-value-added activities for the firm. In addition, debt increases liquidation exposure; it pushes managers to manage the firm's cash flow well because the firm is responsible for paying interest. In addition, unless managers can manage properly, there will be personal losses in terms of salaries, reputation, or manager perquisites (Williams, 1987).

While the previous theory refers to a linear relationship, the trade-off theory depicts that the relationship between debt ratio and firm value is inversed U. Thus, there is a trade-off between the benefit of the tax shield and bankruptcy risk in increasing debt (Kraus & Litzenberger, 1973; Myers, 1984). This theory states that there is an optimum point in the relationship between debt ratio and firm value. If a firm increases its debt beyond the optimum level, the tax shield benefit will be lower than the bankruptcy risk and will reduce the firm's

value. In applying trade-off theory, firms set the proportion of debt and equity after balancing the tax advantages of debt against the costs of possible financial distress.

Empirical Evidence

Empirical studies of capital structure and firm performance are mixed. The inconsistent findings may be attributed to differences in methodologies, sample sizes, location, and time periods across studies. Thus, in this section, we describe the findings based on the data from these studies in developed and developing countries.

Several studies have also identified a positive relationship between leverage and firm performance in developed countries. Using non-financial firm data from the United States, Gill et al. (2011) found a significant positive relationship between debt (total, short-term, and long-term debt) and firm performance. The ordinary least squares method was chosen to explain the relationship. Margaritis and Psillaki (2010) analyzed the impact of leverage on a firm's performance in French manufacturing firms. Firm efficiency is chosen as a performance measure, and it is found that leverage positively affects a firm's efficiency. Berger and Bonaccorsi di Patti (2006) used the equity-to-total asset ratio to measure capital structure. This shows that a decrease in the equity proportion effectively reduces profit efficiency in the US banking industry. Profit efficiency was measured using a standard profit model. This model was derived from a distribution-free estimate, as suggested by Berger (1993).

Numerous studies also find a negative relationship between firm debt and firm profitability in developed countries. Yazdanfar and Öhman (2015) demonstrate a negative link between financial leverage and firm performance. This study categorized leverage into three measurements: accounts payable to total assets, short-term debts to total assets, and long-term debts to total assets. These three measurements have significantly negative effects on asset returns. Using data on manufacturing and services firms, Goddard, Tavakoli, and Wilson (2005) analyzed the impact of capital structure on firm performance in France, Italy, the United Kingdom, and Belgium. This study categorized the data based on countries. This has led to several regression and country-based models. It was found that an increased proportion of liabilities on equity has a negative association with returns on assets.

Several researches have shown a negative relationship between firm debt and its profitability in emerging economies. El-Sayed Ebaid (2009) analyzed the effect of firm debt on firm performance in Egypt. In this study, leverage was categorized into total debt, long-term debt, and short-term debt. Return on assets, return on equity, and the ratio of gross profit to sales are the measure of firm performance of this study. The result shows that all categories of leverage and returns on assets is significantly negative. Ahmed Sheikh and Wang (2013) conducted similar study using data from non-financial listed firms in Pakistan. The impact of total debt, short-term debt, and long-term debt on returns to assets remained significantly negative for each method. Foong and Idris (2012) analyze the impact of leverage on the performance of Malaysian insurance firms. In this study, return on equity was chosen as the measurement of firm performance. Their findings indicate that leverage has a significantly negative effect on firm performance. Dawar (2014) investigated the effect of financial leverage on firm performance using a sample of non-financial firms included in the S&P Bombay Stock Exchange index. The sample consists of 78 firms. The short-term debt ratio and long-term ratio are financial leverage proxies, while returns on assets and returns on equity are firm performance measurements. This study finds that the short-term and long-term debt ratios have significant negative effects on returns on assets and returns on equity. Zeitun and Saleh (2015) analyzed the impact of leverage on the performance of GCC firms by considering economic crises. Firm performance is measured by returns on assets and Tobin's Q, whereas firm's debt is measured by total debt to total assets. Their research revealed that debt considerably reduces

ROA and Tobin's Q across the entire sample, as well as in both the pre-crisis and post-crisis periods.

Positive associations between firm debt and firm performance have also been found in developing countries. Kyereboah-Coleman (2007) analyzed the impact of financial leverage on the amount of defaulted loans in Ghana microfinance. Their results show that leverage plays a significant role in reducing loan defaults. This implies that highly leveraged microfinance institutions enjoy economies of scale and reach more clientele. Chadha and Sharma (2015) investigated the effect of leverage on firm performance in manufacturing sector firms listed on the Bombay Stock Exchange. They employ the debt-to-equity ratio as a proxy to measure financial leverage. Their study shows that financial leverage has a positive effect on returns on equity and Tobins Q. Detthamrong, Chancharat, and Vithessonthi (2017) examine the relationship between leverage and firm performance in 439 non-financial firms listed on the Thailand stock exchange from 2001 to 2014. The results indicate a positive relationship between financial leverage and firm performance. To investigate the robustness of the results, the sample is categorized based on the cross-sectional mean value of the total assets. The result was consistent: Financial leverage has a positive effect on financial performance in a model that uses a sample of large firms and smaller-sized firms.

These inconsistent results led several researchers to include nonlinear variables, namely, the squared of the debt ratio. This variable refers to the potency of the inversed U-shaped relationship between financial leverage and firm value. Several empirical studies have employed this strategy. Le and Phan (2017) applied it to samples of non-financial firms listed on the Vietnamese stock exchange, while Dalci (2018) used manufacturing firms listed on the Chinese stock market. These studies include the squared form of the leverage variable. This method allows the relationship between leverage and firm performance to be nonmonotonic. Using this method, Le and Phan (2017) found a inversed U-shaped pattern in the relationship between debt ratio and return to equity, and Dalci (2018) found an inversed U-shaped pattern in the relationship between leverage and returns on assets.

Empirical Studies in Indonesia

Studies analyzing the effect of financial leverage and firm profitability on Indonesian firms are mostly limited to one sector industry and use only static regression. Sakinah and Anggono (2014) and Suardi and Noor (2015) analyze the impact of financial leverage on the performance of agricultural firms listed on the Indonesian Stock Market. These studies find that firm leverage has a negative impact on ROE, while leverage has no effect on ROA. Kartikasari and Merianti (2016) analyzed the impact of leverage on manufacturing firm profitability in Indonesian companies. They employed fixed effects regression as estimation strategy. The results show that leverage has a negative impact on manufacturing firms' returns on assets. Muchtar et al. (2018) is the only study that uses dynamic panel regression to analyze the effect of capital structure on firm performance. They found that leverage has a negative impact on asset returns.

Hypothesis Development

Paradoxes exist in capital structure studies. Some studies stated that financial leverage reduces agency costs, leading to increased firm performance (Chadha & Sharma, 2015; Detthamrong, Chancharat, and Vithessonthi, 2017; Kyereboah-Coleman, 2007). Jensen and Meckling (1976) and Jensen (1986) stated that debt reduces agency problems and increases firm performance. However, several studies have found a negative relationship between debt and firm performance (Ahmed Sheikh and Wang, 2013; Dawar, 2014; El-Sayed Ebaid, 2009; Foong and Idris, 2012; Zeitun and Saleh, 2015). Debt negatively affects firm performance when there are too many constraints from the creditor, thus limiting firm investment opportunities (Myers,

1984). Le and Phan (2017) conducted many capital structure studies and concluded that a negative relationship between debt and firm performance mostly exists in emerging economies. Thus, in this study, the following hypothesis was formulated:

H1: *Financial Leverage has a significantly negative effect on firm performance*

Some studies also find a nonlinear relationship between financial leverage and firm performance (Dalci, 2018; Le & Phan, 2017). Studies of hypotheses that use nonlinear relationships are motivated by inconsistent linear study results. Using nonlinear studies, the inconsistent results shown by the linear studies can be explained. The inversed U-shaped pattern between financial leverage and firm performance in the nonlinear regression also conforms to trade-off theory. This study also investigates whether a nonlinear relationship exists between financial leverage and firm performance. Our hypothesis is:

H2: *There is an inversed U-shape relationship between financial leverage and firm performance*

Research Method

This research is a quantitative, correlational study. Our sample comprises 493 non-financial firms listed on the Indonesian Stock Exchange. Firm-specific data are taken from the Indonesian Stock Exchange database, whereas macroeconomic data are provided by Statistics Indonesia. We chose years from 2011 to 2017 as our study period because there were no financial crises. Purposive sampling was used in this study. Firms in the financial sector, such as insurance and financial services firms, were excluded because of differences in their financial statements (Al-Najjar and Hussainey, 2011).

Regression analysis was conducted to analyze the effect of financial leverage on firm profitability. The data were set up in a panel. Thus, fixed effects (FE) and random effects (RE) should be employed to reduce unobserved individual heterogeneity. However, some problems remain, such as FE and RE. They do not control for the endogeneity problem caused by measurement errors, time-invariant endogenous variables, or reserve causality, which often occur in panel data (Cameron & Trivedi, 2005). To overcome this problem, the Generalized Method of Moments-First Difference (GMM-FD) was employed. In addition, a robust standard error was employed in all estimation strategies to overcome heteroscedasticity and autocorrelation.

To check the validity of the GMM-FD model, Arellano and Bond (1991) state that two tests should be employed. The first is the Hansen test, the purpose of which is to check for over-identifying restrictions. The GMM-FD requires over-identification if the restriction is valid. In other words, the value generated by the Hansen test should not be significant. The second test is the Arrellano and Bond autocorrelation test. In this test, the residual of the first difference (AR (1)) should be significant, while the residual of the second difference (AR (2)) should not correlate.

To test the relationship between leverage and firm performance, we conduct three regression models. The first was the static linear regression model, which was computed using pooled ordinary least squares, FE, and RE. The second model is the dynamic linear regression model, which uses the GMM-FD. The third model was a nonlinear model. Here, we use the following models in static linear regression:

Pooled Ordinary Least Square:

$$ROA_{i,t} = \alpha + \beta_1 CS_{i,t} + \sum \gamma C_{i,t} + \varepsilon_{i,t} \quad \text{.....(Eq.1)}$$

Fixed Effect:

$$ROA_{i,t} - \lambda\overline{ROA_i} = \alpha + \beta_1(CS_{i,t} - \overline{CS_i}) + \sum\gamma(C_{i,t} - \overline{C_i}) + (v_i - \overline{v_i}) + (\varepsilon_{i,t} - \overline{\varepsilon_i})$$ ...(Eq.2)

Random Effect:

$$ROA_{i,t} - \lambda\overline{ROA_i} = \alpha + \beta_1(CS_{i,t} - \lambda\overline{CS}) + \sum\gamma(C_{i,t} - \lambda\overline{C_i}) + (v_i - \lambda\overline{v_i}) + (\varepsilon_{,it} - \lambda\overline{\varepsilon_i})$$ .....(Eq.3)

ROA is firm performance i at time t and is measured by return on assets; CS is capital structure and is measured by total debt to total assets (T_LEV), long-term debt to total assets (LONG_LEV), and short-term debt to total assets (SHRT_LEV). C is a vector of the control variables. Idiosyncratic error is represented by ε. Unobserved heterogeneity is reflected by v. λ is a weighted value included to reduce unobserved heterogeneity by multiplying it by itself when the average unobserved heterogeneity (FE) cannot fully negate unobserved heterogeneity.

To strengthen our results, the GM difference was applied. This method is chosen because many studies have shown that the first lag of return on assets (ROA_{it-1}) affects the current firm performance ROA_{it}. Additionally, GMM can decrease the impact of the endogeneity problem in the model. The model of the GM difference is as follows:

$$ROA_{i,t} = \beta_1 ROA_{i,t-1} + \beta_{2it}\, CS_{i,t} + \sum\gamma\, C_{i,t} + \varepsilon_{i,t}$$ .....(Eq.4)

In addition to using linear regression, we also conducted nonlinear regression. A quadratic function is used in this study. Based on trade-off theory, there is an inversed U-shaped pattern in the relationship between financial leverage and firm performance or firm value. Specifically, leverage could increase firm performance unless financial leverage does not pass the particular point. This condition occurred because the benefit of the tax shield and the ability to realize an opportunity to invest exceeded the bankruptcy cost and financial distress. This point refers to the optimal debt that firms can apply to optimize their performance. If the level of leverage passes that point, firm performance decreases because the bankruptcy cost and financial distress exceed the benefit of leverage. To investigate whether an inversed U-shaped pattern exists in the relationship between financial leverage and firm performance, we input the quadratic form of the leverage variables into the pooled ordinary least squares. This method was adopted from Le & Phan (2017). Here, is the nonlinear regression model.

$$ROA_{i,t} = \alpha + \beta_1 CS_{i,t} + \beta_2 CS^2{}_{i,t} + \sum\gamma C_{i,t} + \varepsilon_{i,t}$$ .....(Eq.5)

Dependent and Independent Variables

Our dependent variables are returns on assets, based on studies of (Dalci, 2018; Le & Phan, 2017) which were used to measure firm performance. ROA is calculated by dividing net income by total assets. This ratio measures a firm's ability to create income at a certain level of its total assets. Three independent variables are used to measure capital structure: debt ratio, short-term debt ratio, and long-term debt ratio. These three measurements were based on studies by Ahmed Sheikh and Wang (2013), Dalci (2018), El-Sayed Ebaid (2009), and Le and Phan (2017). By employing these three variables, this study could determine whether there were any different effects when considering debt maturity. The operational definitions of these variables are total debt to total assets (T_LEV), short-term debts to total assets (SHRT_LEV), and long-term debts to total assets (LONG_LEV).

Control variables should be included to prevent omitted variable bias. Six variables were used as the control variables. The first is the natural logarithm of total assets (LNASSET): These measurements represent the size. Having large assets means that a firm has more opportunities to grasp investment momentum. In addition, superior assets indicate that firms

may enjoy economies of scale (Silberston, 1972). The second variable is the ratio of cash and cash equivalent to total assets (LIQ). This measurement reflects a firm's liquidity. High liquidity reduces the probability of bankruptcy (Amendola *et al.*, 2015). The third control variable was the ratio of fixed assets to total assets (TANG). This measurement represents a firm's tangibility. Tangibility is included because it indicates that the firm has collaterals. Having good tangible assets can reduce the cost of leverage (Frank and Goyal, 2009; Zhang and Kanazaki, 2007). The fourth control variable is the ratio of net income, depreciation, and amortization to total assets. These variables represent a firm's cash flow. These control variables are based on firm characteristics. In contrast, the fifth and sixth are macroeconomic variables, which should be included in the model because they reflect society's economic conditions. This study includes the growth of gross domestic product (GrGDP) and inflation (INF) as macroeconomic variables. Gross domestic product growth represents the economic cycle (Egbunike & Okerekeoti, 2018). In other words, it reflects the level of economic activity in certain countries. For inflation, we have no expectation of negative or positive effects on firm performance, because they are not always related to bad economic conditions. If the increase is in control, it reflects good economic activities, as moderate inflation is also necessary to prevent the Paradox of Thrift. Mild inflation stimulates people to invest rather than save money on deposit.

Results and Discussion

Statistic Descriptive

The descriptive statistics in Table 1 show the mean, standard deviation, minimum value, and maximum value. This section presents a basic data profile. Our sample consists of 493 firms, with 2,823 observations and unbalanced panel data. There is zero value in the minimum value of capital structure measurements (T_LEV, SHRT_LEV, and LONG_LEV). This implies that some firms do not engage in borrowing activities. The structure of total leverage (T_LEV) is almost balance, 12,3% for short-term leverage and 13,7% for long-term leverage. Compared to other studies, this is somewhat different, as most other studies in emerging countries (Dalci, 2018; Le & Phan, 2017) have larger short-term leverage over long-term leverage. The range, the gap between the maximum and minimum values, of returns on assets in our observations is very large at 55,439. This shows that there is a distinct gap in Indonesian-listed firms' performance.

The correlation matrix was constructed to show no multicollinearity. Because multicollinearity exists only between independent variables, only independent variable correlations are shown. The Pearson correlation test was chosen because all the variables were parametric. The correlation matrix in Table 2 shows that no correlation value is lower than -0.8 or higher than 0.8, indicating no multicollinearity. T_LEV, SHRT_LEV, and LONG_LEV cannot exist in the same model because these variables have a strong relationship. For example, if a firm increases its short-term debt, the total debt must also increase, and vice versa. Thus, the values of the correlation between T_LEV and SHRT_LEV, T_LEV and LONG_LEV, and SHRT_LEV and LONG_LEV are irrelevant.

Table 1. Statistic Descriptive

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	2823	0.050	1.021	−2.319	53.120
T_LEV	2823	0.260	0.192	0.000	0.996
SHRT_LEV	2823	0.123	0.135	0.000	0.924
LONG_LEV	2823	0.137	0.149	0.000	0.869
LNASSET	2823	2.153	1.682	1.544	2.641
TANG	2823	0.522	0.244	0.0002	1.259
CF	2823	0.092	1.447	−2.052	75.882
LIQ	2823	0.090	0.102	0.000	1.182
GrGDP	2823	0.054	0.005	0.049	0.062
INF	2823	0.049	0.022	0.030	0.084

Source: Researcher's Computation, (2025)

Note: ROA: the ratio net income after to total assets, T_LEV: the ratio of total debt to total assets, SHRT_LEV: the ratio of short-term debt to total assets, LONG_LEV: the ratio of long-term debt on total asset, LNASSET: natural logarithm of total asset, TANG: the ratio of fixed assets to total assets, CF: the ratio of net income plus depreciation and amortization to total assets, LIQ: the ratio of cash and cash equivalent to total assets, GrGDP denotes growth of domestic product, INF denotes annual inflation rate.

Table 2. Correlation Matrix

	T_LEV	SHRT_LEV	LONG_LEV	LNASSET	TANG	CF	LIQ	GrGDP	INF
T_LEV	1								
SHRT_LEV	0.632***	1							
LONG_LEV	0.711***	−0.094***	1						
LNASSET	0.091***	−0.136***	0.241***	1					
TANG	0.309***	−0.046**	0.440***	0.128***	1				
CF	−0.026	−0.029	−0.007	0.019	−0.012	1			
LIQ	−0.251***	−0.200***	−0.141***	0.043**	−0.283***	0.007	1		
GrGDP	−0.164***	−0.099***	−0.121***	−0.028	−0.217***	0.032*	0.046**	1	
INF	−0.033*	−0.024	−0.021	0.018	−0.083***	−0.005	0.006	0.028	1

Source: Researcher's Computation, (2025)

Note: ROA: the ratio net income after to total assets, T_LEV: the ratio of total debt to total assets, SHRT_LEV: the ratio of short-term debt to total assets, LONG_LEV: the ratio of long-term debt on total asset, LNASSET: natural logarithm of total asset, TANG: the ratio of fixed assets to total assets, CF: the ratio of net income plus depreciation and amortization to total assets, LIQ: the ratio of cash and cash equivalent to total assets, GrGDP denotes growth of domestic product, INF denotes annual inflation rate. Asterisk (***), (**), and (*) indicate statistically significant at 1%, 5%, and 10% significance level.

Pooled Ordinary Least Square (OLS) Regression

First, the pooled ordinary least squares (OLS) method was performed. Before describing the results, the specification test values are explained. The R^2 value in every model was high and had a significant F-test. These results indicate that the model is quite high and simultaneously has the power to explain the dependent variables. In other words, the models have a good independent variable selection.

All capital structure measurements have a negative effect on the returns on asset, since the values of coefficients of all debt ratios are negative and significant at 1%. These results remained, although a robust standard error was observed.

For control variables, all firm specific control variables have a consistent significant impact on firm performance. Only macroeconomic variables, such as, growth of gross domestic product and inflation, have no constant impact on firm performance. The effect of inflation is only significant in Models 4 and 6, and the impact of growth on gross domestic product is significant in Model 3.

Table 3. The effect of capital structure on firm performance-pooled OLS

VARIABLES	Without Robust SE			With Robust SE		
	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
T_LEV	−0.057***			−0.057***		
	(0.006)			(0.009)		
SHRT_LEV		−0.068***			−0.068***	
		(0.008)			(0.015)	
LONG_LEV			−0.038***			−0.038***
			(0.008)			(0.009)
LNASSET	0.006***	0.005***	0.006***	0.006***	0.005***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
TANG	−0.055***	−0.069***	−0.055***	−0.055***	−0.069***	−0.055***
	(0.005)	(0.005)	(0.005)	(0.009)	(0.008)	(0.009)
CF	0.705***	0.705***	0.705***	0.705***	0.705***	0.705***
	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)	(0.006)
LIQ	0.027**	0.027**	0.045***	0.027**	0.027**	0.045***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)
GrGDP	0.294	0.305	0.500**	0.294	0.305	0.500
	(0.237)	(0.238)	(0.238)	(0.317)	(0.322)	(0.326)
INFLASI	0.061	0.055	0.069	0.061*	0.055	0.069*
	(0.051)	(0.051)	(0.051)	(0.037)	(0.037)	(0.037)
Constant	−0.118***	−0.094***	−0.144***	−0.118***	−0.094***	−0.144***
	(0.019)	(0.020)	(0.020)	(0.020)	(0.021)	(0.019)
Observations	2,823	2,823	2,823	2,823	2,823	2,823
R-squared	0.997	0.997	0.997	0.997	0.997	0.997

Source: Researcher's Computation, (2025)

Note: ROA: ratio of net income to total assets, T_LEV: ratio of total debt to total assets, SHRT_LEV: ratio of short-term debt to total assets, LONG_LEV: ratio of long-term debt to total assets, LNASSET is the natural logarithm of total assets, TANG: the ratio of fixed assets to total assets, CF is the ratio of net income plus depreciation and amortization to total assets, LIQ is the ratio of cash and cash equivalent to total assets, GrGDP denotes growth of domestic product, and INF denotes annual inflation rate. Asterisks (***), (**), and (*) indicate statistical significance at 1%, 5%, and 10% significance level

Fixed and Random Effect Regression

Table 4 analyzes the impact of capital structure using the FE robust standard error. This shows that the effect of total debt ratio is insignificant (p-value > 0.10). The effect of the short-term debt ratio is significantly negative (p <0.01), whereas the long-term debt ratio has no significant effect (p-value > 0.10). For the control variables, all variables, except Models 1 and 2 had no significant effect.

Table 4. The Effect of Capital Structure on Firm Performance-FE robust standard error

VARIABLES	(1) ROA	(2) ROA	(3) ROA
T_LEV	−0.032		
	(0.024)		
SHRT_LEV		−0.061**	
		(0.029)	
LONG_LEV			0.018
			(0.023)
LNASSET	0.033***	0.033***	0.034***
	(0.012)	(0.012)	(0.012)
TANG	-0.036	−0.041*	−0.050*
	(0.028)	(0.023)	(0.027)
CF	0.704***	0.704***	0.704***
	(0.005)	(0.005)	(0.005)
LIQ	0.062**	0.059**	0.060**
	(0.026)	(0.025)	(0.026)
GrGDP	1.801***	1.758***	1.925***
	(0.351)	(0.354)	(0.366)
INF	0.108***	0.105***	0.106***
	(0.028)	(0.028)	(0.028)
Constant	−0.812***	−0.791***	−0.830***
	(0.256)	(0.254)	(0.254)
F-stat	3628.27	3646.46	3629.31
Observations	2,823	2,823	2,823
R-squared	0.998	0.998	0.998
Number of firms	493	493	493

Source: Researcher's Computation, (2025)

Note: ROA: the ratio net income after to total assets, T_LEV: the ratio of total debt to total assets, SHRT_LEV: the ratio of short-term debt to total assets, LONG_LEV: the ratio of long-term debt on total asset, LNASSET: natural logarithm of total asset, TANG: the ratio of fixed assets to total assets, CF: the ratio of net income plus depreciation and amortization to total assets, LIQ: the ratio of cash and cash equivalent to total assets, GrGDP denotes growth of domestic product, INF denotes annual inflation rate. Asterisk (***), (**), and (*) indicate statistically significant at 1%, 5%, and 10% significance level.

Table 5 presents the results obtained using the RE robust standard error model. Our result shows that there is significant negative impact between the total debt ratio and firm performance (p-value<0.01). The impact of the short-term debt ratio also significantly negative. However, only the long-term debt ratio is insignificant (p-value> 0.10) in the model. For the control variables, only the growth of gross domestic product in Models 1 and 2 had no significant effect.

Table 5. The Effect of Capital Structure on Firm Performance – RE robust standard error

VARIABLES	(1) ROA	(2) ROA	(3) ROA
T_LEV	−0.048***		
	(0.012)		
SHRT_LEV		−0.061***	
		(0.021)	
LONG_LEV			−0.019
			(0.013)
LNASSET	0.007***	0.007**	0.007***
	(0.003)	(0.003)	(0.003)
TANG	−0.051***	−0.063***	−0.057***
	(0.016)	(0.015)	(0.016)
CF	0.705***	0.705***	0.705***
	(0.005)	(0.005)	(0.005)
LIQ	0.043**	0.041**	0.051***
	(0.017)	(0.018)	(0.017)
GrGDP	0.534	0.539	0.708*
	(0.373)	(0.382)	(0.386)
INF	0.067**	0.063**	0.071**
	(0.028)	(0.027)	(0.028)
Constant	−0.169***	−0.152***	−0.189***
	(0.044)	(0.046)	(0.042)
Wald chi^2	21731.15	21851.42	21551.30
Observations	2,823	2,823	2,823
R-squared	0.997	0.997	0.997
Number of firms	493	493	493

Source: Researcher's Computation, (2025)

Note: ROA: the ratio net income after to total assets, T_LEV: the ratio of total debt to total assets, SHRT_LEV: the ratio of short-term debt to total assets, LONG_LEV: the ratio of long-term debt on total asset, LNASSET: natural logarithm of total asset, TANG: the ratio of fixed assets to total assets, CF: the ratio of net income plus depreciation and amortization to total assets, LIQ: the ratio of cash and cash equivalent to total assets, GrGDP denotes growth of domestic product, INF denotes annual inflation rate. Asterisk (***), (**), and (*) indicate statistically significant at 1%, 5%, and 10% significance level.

Dynamic Panel Model

In this study, the GMM-FD is examined to analyze the impact of capital structure on firm performance, as several studies have found that current firm performance correlates with past (Dalci, 2018; Goddard *et al.*, 2005; Le and Phan, 2017; Muchtar *et al.*, 2018; Zeitun and Saleh, 2015). The findings of the GMM-FD model are presented in Table 6. Before describing the results, several diagnostic tests were performed to determine whether the model was appropriate. These diagnostic tests are first- and second-order autocorrelations of residuals (AR(1) and AR(2)) and the Hansen test (J-statistic) of the over-identifying restriction.

Table 6. The effect of capital structure on firm performance-GMM-difference with robust standard error

VARIABLES	(1) ROA	(2) ROA	(3) ROA
T_LEV	−0.057*		
	(0.029)		
SHRT_LEV		−0.060**	
		(0.025)	
LONG_LEV			−0.002
			(0.029)
LNASSET	0.025**	0.024***	0.027***
	(0.010)	(0.009)	(0.010)
TANG	0.021	0.009	0.004
	(0.025)	(0.019)	(0.022)
CF	0.702***	0.702***	0.702***
	(0.001)	(0.001)	(0.001)
LIQ	0.065***	0.058***	0.060***
	(0.016)	(0.016)	(0.016)
GrGDP	1.299***	1.346***	1.491***
	(0.359)	(0.378)	(0.377)
INF	0.112***	0.111***	0.109***
	(0.034)	(0.035)	(0.035)
L.ROA	0.002*	0.002*	0.002*
	(0.001)	(0.001)	(0.001)
Wald chi^2	8.84×10^6***	4.76×10^6***	5.14×10^6***
AR(1)	−1.66*	−1.79*	−1.71*
AR(2)	−0.99	−0.94	−1.01
Hansen (J-statistic)	21.27*	21.87*	21.02
Prob-chi^2	0.095	0.081	0.101
Observations	1,808	1,808	1,808
Number of firms	439	439	439

Source: Researcher's Computation, (2025)

Note: ROA: the ratio net income after to total assets, T_LEV: the ratio of total debt to total assets, SHRT_LEV: the ratio of short-term debt to total assets, LONG_LEV: the ratio of long-term debt on total asset, LNASSET: natural logarithm of total asset, TANG: the ratio of fixed assets to total assets, CF: the ratio of net income plus depreciation and amortization to total assets, LIQ: the ratio of cash and cash equivalent to total assets, GrGDP denotes growth of domestic product, INF denotes annual inflation rate. Asterisk (***), (**), and (*) indicate statistically significant at 1%, 5%, and 10% significance level.

The result of the first-order autocorrelation of residuals was significant in all models, and the second-order autocorrelation of residuals was not significant. This indicates that the residual was not affected by the second-order serial autocorrelation for all models. The specification test results show that the Hansen J-statistic of over-identifying restrictions of Models 1 and 3 are not significant, meaning that both models have valid instruments, or the over-identifying restriction is satisfied. However, Models 1 and 2 are significant at 10 %. Indeed, Models 1 and 2 were not perfect. However, we are confident in this study because the p-values were 0.095 and 0.081, implying that the significance level was quite low.

The results in Table 6 show that each lagged dependent variable was significant ($p < 0.10$). This indicates that the dynamic model is relevant. From an economic perspective, this implies that firm management reflects returns on the previous year's assets as a basis for setting the firm's performance target. This result is consistent with that of Zeitun and Saleh (2015) and Muchtar et al. (2018).

All capital structure variables in this analysis have a negative relationship with returns on assets. However, only two variables showed significant values. These are the total debt ratio

(T_LEV) and the short-term debt ratio (SHRT_LEV). T_LEV has a slightly negative significant effect on returns on assets, since the p-value is less than 10 %, but higher than 5%. The effect of the SHRT_LEV was stronger ($p < 0.05$). long-term debt ratio (LONG_LEV) has no effect on returns on assets since the p-value is more than 10 %. Most of the control variables, except for tangibility, were significant.

Non-Linear Relationship

In this section, we investigate whether a nonlinear relationship exists between financial leverage and firm performance exists. This pattern may have occurred because many studies have found inconsistent results when linear regression was conducted. From a theoretical perspective, an inversed U-shape relationship between financial leverage and firm value has been stated in trade-off theory. Thus, using nonlinear regression analysis, we can investigate whether the relationship between financial leverage and firm performance conforms to trade-off theory.

Based on the nonlinear regression results in Table 7, an inversed U-shape does not exist. Indeed, the negative values of the squared capital structure variables, T_LEV2 and SHRT_LEV2, are significant. However, a non-linear relationship occurs when the non-square capital structure variable and the square capital structure variable are simultaneously significant in the same model (Destiartono, 2025; Destiartono and Firmansyah, 2024). Thus, the significance of the square capital structure variable does not support the existence of a non-linear relationship. All the control variables, except macroeconomic variables, were consistently significant. Among macroeconomic variables, only gross domestic product growth has a significant impact on firm performance.

Table 7. The effect of capital structure on firm performance-Nonlinear regression

VARIABLES	(1) ROA	(2) ROA	(3) ROA
T_LEV2	−0.101***		
	(0.024)		
T_LEV	0.012		
	(0.017)		
SHRT_LEV2		−0.164***	
		(0.036)	
SHRT_LEV		0.017	
		(0.020)	
LONG_LEV2			0.001
			(0.037)
LONG_LEV			−0.038*
			(0.020)
LNASSET	0.005***	0.005***	0.006***
	(0.001)	(0.001)	(0.001)
TANG	−0.055***	−0.067***	−0.055***
	(0.005)	(0.005)	(0.005)
CF	0.705***	0.705***	0.705***
	(0.001)	(0.001)	(0.001)
LIQ	0.035***	0.038***	0.045***
	(0.011)	(0.012)	(0.011)
GrGDP	0.296	0.340	0.500**
	(0.236)	(0.237)	(0.238)
INF	0.064	0.060	0.069
	(0.051)	(0.051)	(0.051)
Constant	−0.117***	−0.098***	−0.145***
	(0.019)	(0.020)	(0.020)
Observations	2,823	2,823	2,823
R-squared	0.997	0.997	0.997

Source: Researcher's Computation, (2025)

Note: ROA: the ratio net income after to total assets, T_LEV: the ratio of total debt to total assets, SHRT_LEV: the ratio of short-term debt to total assets, LONG_LEV: the ratio of long-term debt on total asset, LNASSET: natural logarithm of total asset, TANG: the ratio of fixed assets to total assets, CF: the ratio of net income plus depreciation and amortization to total assets, LIQ: the ratio of cash and cash equivalent to total assets, GrGDP denotes growth of domestic product, INF denotes annual inflation rate. Asterisk (***), (**), and (*) indicate statistically significant at 1%, 5%, and 10% significance level.

Discussion of Findings

Based on the consistency of the results, we find that total debt and short-term debt have significantly negative effects on firm performance. The consistent sign under the different methods indicates the robustness of our findings. This result is consistent with those of Ahmed Sheikh and Wang (2013), Dawar (2014), El-Sayed Ebaid (2009), Foong and Idris (2012), and Zeitun and Saleh (2015), while our results are inconsistent with those of Kyereboah-Coleman (2007), Chadha and Sharma (2015), and Detthamrong et al. (2017). In addition, we performed nonlinear regression because linear regression does not accommodate the trade-off theory. Thus, by performing two analyses, linear and nonlinear regressions, we can comprehensively explain the relationship between financial leverage and firm performance.

We find that almost all firm-level control variables have consistent results. Only the macroeconomic variables have unstable results. The positive influence of the natural logarithm of total assets on profitability in all the models indicates that most Indonesian firms can exploit their size to generate profits. Having a larger firm increases its ability to enjoy economies of scale (Silberston, 1972). The cash flow is significantly positive in all level models. This implies that firms with higher cash flows can undertake investments without using external funds. In

other words, firms incur lower investment costs. This finding is in line with those of Gregory (2005) and Chang et al. (2007). The coefficient of liquidity has a significantly positive in affecting firm performance. Amendola et al. (2015) explain that firms with high liquidity can mitigate financial distress better than firms with little liquidity. Coefficient tangibility had a negative impact on almost all models. Frank and Goyal (2009) and Zhang and Kanazaki (2007) explain that tangibility serves as collateral and could reduce the cost of leverage. However, if tangibility is used as collateral for excessive debt, it will negatively affect firm performance.

Conclusion

Our study provides evidence of the negative relationship between capital structure and firm performance. This outcome is in line with several studies conducted on emerging economies (Ahmed Sheikh and Wang, 2013; Dawar, 2014; El-Sayed Ebaid, 2009; Foong and Idris, 2012). This finding contradicts Jensen and Meckling (1976) and Jensen (1986), since debt cannot reduce the agency's problem and ultimately deteriorates firm performance. We also categorize the total debt ratio into two categories: short-term debt ratio and long-term debt ratio. The purpose of this categorization is to understand what type of debt generates a negative association between financial leverage and firm performance. We find that short-term debt has a significant negative effect on firm performance, while long-term debt has no significant effect, which is in line with Le and Phan (2017) and Dalci (2018) but contradicts Bodenhorn (2003). Short-term debt reduces a firm's ability to make future-based decisions, because it focuses more on repaying their short-term liability.

This study has several implications. Firms should increase their portion of long-term debt, instead of short-term debt, to fund their activities. The government could promote long-term debt by creating a policy that helps the firm restructure and renegotiate its long-term debt. The argument that the benefit of short-term debt is easier in debt restructuring, which controls the firm's risk-taking behavior (Bodenhorn, 2003), is not supported in Indonesia. Thus, the government should create a policy that allows active monitoring by the creditor, such as placing their representatives on the firm's board of directors, to prevent financial distress that occurs from management misconduct. However, this solution only fits the bank as creditor. Thus, for debt that rises from the bond market, the government should promote a bond that excludes intangible assets as collateral. This policy could relieve bondholders' concerns that the firm could not meet its liabilities.

In future studies, corporate governance will affect how companies decide on their mix of debt and equity, and these effects can vary between developed and emerging countries (Pham and Nguyen, 2020; Zhou *et al.*, 2021). Moreover, weak corporate governance is frequently observed in emerging economies, as it encourages firms to use debt recklessly, resulting in financial distress and poor firm performance (Kao *et al.*, 2019; Kijkasiwat *et al.*, 2022; Younas *et al.*, 2021).

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