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Examining the Impact of Capital Structure on Firm Value through Cost of Capital in Indonesian Plantation Firms

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ABSTRACT: *This study examines the direct and indirect effects of Capital Structure on firm value, with the Cost of Capital (CoC) serving as a mediator. Firm value reflects how effectively a company manages its resources and increases shareholder wealth, and an optimal Capital Structure the mix of debt and equity plays a crucial role in achieving this goal by affecting financial risk, CoC, and market perception. By minimizing the Weighted Average Cost of Capital (WACC), companies can enhance their market valuation. The research focuses on plantation companies listed on the Indonesia Stock Exchange (IDX), measuring Capital Structure using the Debt to Equity Ratio (DER). This analysis provides empirical evidence on how financing decisions influence firm value through CoC, offering practical insights for managers and investors in the plantation sector to develop effective capital policies that maximize corporate value.*

KEYWORDS: *Capital Structure, Firm Value, Cost of Capital, Debt To EquityRatio, Plantation Subsector*

I. INTRODUCTION

The fundamental goal of financial management for any company is to maximize firm value, which reflects management's effectiveness in utilizing resources and directly contributes to shareholder prosperity[1]. Achieving optimal firm value is largely determined by crucial strategic decisions, particularly the choice of Capital Structure the mix of debt and equity used to finance operations. An optimal Capital Structure is vital because it directly affects the firm's risk profile, overall Cost of Capital (CoC), and market valuation[2]. Conversely, a sub-optimal balance can increase financing costs and create perceived financial instability.

The Plantation Subsector on the Indonesia Stock Exchange (IDX) provides a significant and distinctive context for this study due to its high capital intensity and sensitivity to global commodity prices. This necessitates a focused examination of how financial policies translate into corporate value within the industry[3]. Previous theoretical work, beginning with the Modigliani and Miller (MM) propositions and evolving through the Trade-Off and Pecking Order Theories, has provided a solid foundation regarding the relevance of capital structure[4]. However, empirical studies examining the direct link between Capital Structure (measured by the Debt to Equity Ratio, DER) and Firm Value have yielded mixed results, especially in emerging economies like Indonesia.

This study addresses the gap by analyzing the mediating role of the Cost of Capital, which theoretically acts as the key mechanism: a poor capital structure raises risk, increases the Weighted Average Cost of Capital (WACC)[5], and reduces Firm Value. The research has two main objectives: first, to empirically examine the direct effect of Capital Structure (DER) on Firm Value; second, to investigate its indirect effect via CoC[6]. By confirming CoC as a mediator, this study provides a more comprehensive understanding of the Capital Structure, Firm Value relationship. The findings offer practical insights for managers and investors in the plantation sector to design effective financing policies that minimize WACC and maximize firm value[6].

II. LITERATURE REVIEW

2.1 Concept and Aspects of Capital Structure, Cost of Capital, and Firm Value

2.1.1 Capital Structuretax

Capital Structure refers to the way a company finances its operations and assets using a mix of debt and equity (Modigliani & Miller, 1958). It is a strategic decision that affects financial risk, the cost of financing, and ultimately firm value (Myers, 1984). The main aspect of Capital Structure is the Debt to Equity Ratio (DER), which indicates the company's reliance on borrowed funds versus shareholders' equity (Setiawan & Lestari, 2020). Other measures include Debt Ratio and Equity Ratio[7]. Optimal leverage provides tax advantages but excessive debt increases financial risk, whereas low leverage reduces risk but may limit growth opportunities (Graham & Harvey, 2001; Myers, 2001).

2.1.2 Cost of Capital (CoC)

The Cost of Capital represents the minimum return a firm must earn to satisfy its investors and creditors (Weston & Copeland, 2010). It is often measured as the Weighted Average Cost of Capital (WACC). Key

aspects include the cost of debt and cost of equity, weighted by their proportion in total financing[8]. Changes in Capital Structure influence WACC, which affects investment decisions and market valuation. A lower WACC increases the present value of expected cash flows, raising firm value, while a higher WACC decreases it (Damodaran, 2012; Myers, 2001).

2.1.3 Firm Value

Firm Value reflects investors' perception of a company's performance and future growth prospects (Brigham & Houston, 2012). It is commonly measured using Tobin's Q, which compares the market value of assets to their replacement cost (Tobin, 1969). Key aspects of Firm Value include profitability, growth potential, financial risk, and policies like Capital Structure and CoC, which together determine the company's market valuation (Setiawan & Lestari, 2020)[9].

Relationship Between Capital Structure, Cost of Capital, and Firm Value

The relationship among Capital Structure, Cost of Capital (CoC), and Firm Value is a key concept in corporate finance. Modigliani and Miller (1963) initially suggested that capital structure does not affect firm value, but with corporate taxes, debt provides a tax shield that reduces the Weighted Average Cost of Capital (WACC)[10]. Prior studies show this relationship is non-linear: moderate debt lowers WACC, while excessive debt increases financial risk, raising both the Cost of Debt and Cost of Equity, and thus WACC (Graham & Harvey, 2001). The optimal capital structure is where WACC is minimized, maximizing Firm Value[10]. Firm Value is the present value of expected future cash flows, discounted by CoC. An increase in CoC raises the discount rate and lowers Firm Value, while minimizing WACC increases market valuation (Myers, 2001; Setiawan & Lestari, 2020). This shows that CoC mediates the effect of Capital Structure on Firm Value: changes in leverage influence CoC, which in turn affects Firm Value[11].

Hypotheses Development:

H1: Capital Structure significantly influences the Cost of Capital.

H2: Cost of Capital significantly influences Firm Value.

H3: Capital Structure significantly influences Firm Value.

H4: Cost of Capital mediates the effect of Capital Structure on Firm Value.

III. RESEARCH METHODS

The research employed in this study utilizes an explanatory quantitative approach with a causal design, aiming to establish the cause-and-effect relationship between Capital Structure (X), the independent variable, and Firm Value (Y), the dependent variable, with the Cost of Capital (M) serving as the mediating variable. The core objective is to test the direct and indirect influences between these variables. The population of the study encompasses all companies listed in the Plantation Subsector on the Indonesia Stock Exchange (IDX) during a five-year observation period (2020–2024). The selection of the sample utilizes Purposive Sampling, a non-probability technique that applies specific criteria: (1) Companies must be consistently listed in the Plantation Subsector throughout the entire observation period; (2) Companies must publish complete annual financial reports containing all necessary data for variable calculation (including total debt, total equity, market capitalization, etc.); and (3) Companies must not have undergone delisting or stock suspension during the observed period. The resulting data will be in the form of firm-years, determined by the number of companies meeting all criteria multiplied by the number of observation years[12].

The data used is Secondary Data, consisting of quantitative financial information and stock prices collected from external sources. The primary sources include the official website of the Indonesia Stock Exchange (www.idx.co.id), the annual reports and financial statements of the sample companies, and reports compiled by official financial data providers. For the purpose of analysis, the variables are operationalized as follows: Capital Structure (X) is proxied by the Debt to Equity Ratio (DER), calculated as the ratio of Total Liabilities to Total Equity. Cost of Capital (M) is proxied by the Weighted Average Cost of Capital (WACC), which is measured using the standard formula:

$$WACC = (\frac{D}{D+E} \times R_d(1-_t) + \left(\frac{E}{D+E}\right) \times R_e$$

components like the Cost of Equity are typically derived using the Capital Asset Pricing Model (CAPM). Finally, Firm Value (Y) is proxied by Tobin's Q (TQ), measured as the ratio of the Market Value of Equity plus the Book Value of Debt, divided by the Total Assets (Book Value).

The data analysis technique involves a systematic sequence of statistical steps. First, Descriptive Statistics (mean, median, standard deviation, minimum, and maximum) are used to summarize the characteristics of the data. Second, the analysis proceeds to Panel Data Regression Modeling. Given the pooled nature of the data (cross-sections over time), the analysis begins by determining the most appropriate model among the three main approaches. The Common Effect Model (CEM), also known as Pooled Least Square (PLS), is the simplest method, assuming both the intercept and slope coefficients are constant across all companies and all time periods. The Fixed Effect Model (FEM) is more flexible; it allows the intercept to vary

across individual companies to capture unobserved heterogeneity (such as fixed characteristics of a company or industry), but it maintains the assumption that the slope coefficients of the variables are constant. Conversely, the Random Effect Model (REM) assumes that differences in the intercepts are randomly distributed and uncorrelated with the independent variables, making it suitable when differences between entities are assumed to be random rather than systematic. The selection of the best model is rigorously determined through three formal tests: the Chow Test (to choose between CEM and FEM), the Hausman Test (to choose between FEM and REM), and the Lagrange Multiplier Test (to choose between CEM and REM, if the Chow test rejects CEM)[13].

Third, Classical Assumption Tests are conducted on the residuals of the chosen model to ensure the reliability of the estimation results. These typically include the Normality Test (e.g., Kolmogorov-Smirnov), Multicollinearity Test, and tests for Heteroscedasticity and Autocorrelation, depending on the chosen model. Fourth, Regression Analysis is performed using the selected panel data model (CEM, FEM, or REM) to test the hypotheses. This analysis employs a two-stage approach, commonly referred to as Path Analysis, based on the framework by Baron and Kenny (1986). The analysis uses two structural equations: Equations 1, $WACC_{it} = \alpha_1 + \beta_1 DER_{it} + e_{it}$, test the influence of Capital Structure on Cost of Capital (Hypothesis 1). Equation 2, $PBV_{it} = \alpha_2 + \beta_2 DER_{it} + \beta_3 WACC_{it} + \mu_{it}$. The study tests the partial and simultaneous effects of Capital Structure and Cost of Capital on Firm Value. The mediating effect is examined using the Sobel Test or Bootstrap. The t-test is used for partial effects, the F-test for simultaneous effects, and R-Square measures the model's explanatory power.

IV. RESULTS AND FINDINGS

4.1 Descriptive Statistics

This research utilizes panel data from the plantation subsector companies listed on the Indonesia Stock Exchange (IDX) during the 2020-2024 period. The variables used are Capital Structure (DER) as the independent variable, Firm Value (PBV) as the dependent variable, and Cost of Capital (WACC) as the mediating variable. The analysis was performed using panel data regression and tested through mediation analysis (Path Analysis).

The selection of model 1 and model 2 was conducted by using the Chow-Test, Housman-Test and LM-Test. The results were as follows:

Table 1. Model Selection Results

	Chow Cross section F. Prob	Hausman Cross Section Random Prob	Lm (Cross Section Breusch Pagan Prob)	Best Model Selected
Model 1	0.0000	0.4335	0.5720	Common Effect Model (CEM).
Model 2	0.0000	0.2406	0.0000	Random Effect Model (REM)

Based on the results of the Chow-Test, Hausman-Test and LM-Test, the best estimation obtained for both model 1 and model 2 were the Random Effect model as follows:

Model 1 : $\boldsymbol{WACC_{it} = \alpha_1 + \beta_1 DER_{it} + e_{it}}$

Model 2 : $\boldsymbol{PBV_{it} = \alpha_2 + \beta_2 DER_{it} + \beta_3 WACC_{it} + \mu_{it}}$

4.1.2 Test of Goodness of the Model

The determination results show that the Adjusted R-squared for Model 1 is 0.254, indicating that 25.4% of the variation in WACC is explained by DER, while the remaining portion is influenced by other factors outside the model. Meanwhile, Model 2 has an Adjusted R-squared of 0.581, meaning that 58.1% of the variation in PBV is explained by DER and WACC, with the remaining 41.9% determined by variables not included in this study.

4.1.3 Statistical T-Test Results

For Model 1, the results of Statistical t-tests on Cost of Capital (WACC)

Variabel	Coefficient	Std.Error	T-Statistic	Prob	Result
LOG(DER)	0.010724	0.025190	0.425725	0.6718	Insignificant

From Table 2, Debt does not drive the Cost of Capital. An increase in DER does not significantly raise WACC, suggesting that the company can maintain a low cost of capital despite higher leverage.

For Model 2, the results of Statistical t-tests on Firm Value (PBV)

Variabel	Coefficient	Std.Error	T-Statistic	Prob	Result
LOG(DER)	0.671541	0.0375503	17.90621	0.0000	Significan
LOG(WACC)	0.021114	0.059040	0.357617	0.7216	Insignifican

From Tabel 3, DER shows a significant positive effect on PBV (Prob. 0.0000), indicating effective use of debt to boost firm value. Meanwhile, WACC has a non-significant effect on PBV (Prob. 0.7216), showing an inconsistent role in explaining firm value.

4.1.4 Hypothesis

1. Capital Structure and Firm Value (H1)

The test results indicate that Capital Structure (DER) has a significant and positive effect on Firm Value (PBV), with a Probability of 0.0000. This finding supports the Signaling Theory applicable to your sample, where an increase in the proportion of debt is perceived by the market as a positive signal regarding management's confidence in future prospects, cash flow stability, and profitability. Investors respond to this signal of strength by increasing their valuation of the firm, thereby Hypothesis H1 is accepted.

2. Capital Structure and Cost of Capital (H2)

Conversely, Capital Structure (DER) is proven to have no significant effect on the Cost of Capital (WACC), as shown by a Probability of 0.6718. This non-significance rejects the hypothesis of a direct and meaningful relationship between the debt ratio and the overall cost of capital. This finding suggests that variations in the debt ratio within the plantation sub-sector are not strong enough to alter investor risk perception or influence the WACC, which is more likely to be affected by larger external factors such as the central bank's interest rate or macroeconomic conditions, thus Hypothesis H2 is rejected.

3. Cost of Capital and Firm Value (H3)

The variable Cost of Capital (WACC) is also proven to have no significant effect on Firm Value (PBV), with a Probability of 0.7216. This inconsistency fundamentally rejects the main premise of valuation theory stating that the cost of capital is the primary determinant of firm value. This result indicates that during the observation period, investors did not use WACC as a primary indicator in their valuation, but rather focused more on other significant fundamental indicators, such as Capital Structure itself. Therefore, Hypothesis H3 is rejected.

4. The Mediating Role of Cost of Capital (H4)

The mediation test results using the Sobel Test show a very high P-Value (0.91959307), confirming that the Cost of Capital (WACC) does not play a significant role in mediating the effect of Capital Structure on Firm Value. This non-significance is logical because both pathways forming the mediation (DER - WACC and WACC - PBV) are individually non-significant. Consequently, the positive relationship between Capital Structure and Firm Value is entirely a direct effect, bypassing the Cost of Capital mechanism, and therefore Hypothesis H4 is rejected.

4.1.5 The Results of Sobel Test in Detecting the Effect of Mediating Variable

The sobel test result is showed in Table 4 below:

Variabel	Indirect Effect	p-value
DER	0.000216	0.9195

The Sobel Test shows that WACC does not mediate the effect of DER on PBV, as indicated by the very high p-value (0.9195) and the extremely small indirect effect. This means the relationship between DER and PBV is purely direct, with no mediation.

4.1.6 Discussion

1. The Relationship between Capital Structure and Firm Value (H1)

The research findings indicate that Capital Structure (DER) has a significant and positive effect on Firm Value (PBV) (Prob. 0.0000). This result is consistent with Signaling Theory and prior studies, confirming that efficiently managed debt is perceived by the market as a positive signal regarding management's confidence in future prospects and cash flow stability. Investors respond to this signal of strength by placing a higher valuation on the firm, indicating that, in the plantation sub-sector sample during 2020–2024, leverage successfully enhanced shareholder value.

2. The Relationship between Capital Structure and Cost of Capital (H2)

Conversely, Capital Structure (DER) is proven to have no significant effect on the Cost of Capital (WACC) (Prob. 0.6718). This finding contradicts the theory that debt should either suppress WACC via tax shield benefits or increase it due to high risk. The non-significance is attributed to the assumption that the WACC of plantation issuers is more susceptible to external macroeconomic factors (such as commodity price fluctuations or the central bank's interest rate) than internal corporate leverage decisions, thereby failing to significantly alter investor risk perception.

3. The Relationship between Cost of Capital and Firm Value (H3)

The variable Cost of Capital (WACC) is also proven to have no significant effect on Firm Value (PBV) (Prob. 0.7216). This discrepancy fundamentally rejects the classic theoretical premise that WACC is a primary determinant of firm value. The result implies that for the examined sample, investors do not utilize WACC as a key indicator in their valuation process. Instead, they tend to focus on other fundamental indicators that proved to be significant, such as the efficiency of the Capital Structure itself, rendering WACC fluctuations negligible in determining Firm Value.

4. The Mediating Role of Cost of Capital (H4)

The mediation test using the Sobel Test (P-Value 0.9195) shows that Cost of Capital (WACC) fails to play a significant role in mediating the effect of Capital Structure (DER) on Firm Value (PBV). This failure is due to the non-significance found in both partial paths involving WACC (H2 and H3). Consequently, it is concluded that the positive relationship between Capital Structure and Firm Value is entirely a direct effect, with no meaningful intermediary role played by the Cost of Capital.

V. CONCLUSION

This study aims to analyze the influence of Capital Structure (DER) on Firm Value (PBV) with Cost of Capital (WACC) serving as a mediator in plantation companies during the 2020–2024 period.

1. Capital Structure (DER) has a significant positive effect on Firm Value (PBV), supporting the Signaling Theory that optimal debt boosts firm valuation (Prob. 0.0000).
2. Capital Structure (DER) has no significant effect on the Cost of Capital (WACC), suggesting that WACC is governed by external factors rather than internal leverage decisions (Prob. 0.6718).
3. Cost of Capital (WACC) has no significant effect on Firm Value (PBV), indicating that WACC is not a primary valuation indicator for investors in this sector (Prob. 0.7216).
4. WACC fails to significantly mediate the relationship, confirming that the positive influence of Capital Structure on Firm Value occurs entirely through a direct effect (P-Value 0.9195).

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