Daengku: Journal of Humanities and Social Sciences Innovation *ISSN: 2775-6165 (online)*
Vol. 6 No. 4 (2026)
https://doi.org/10.35877/454RI.daengku4909

The Relationship Between DAR, Asset Growth, and DER on ROA in Indonesian CPO Companies with ROE Serving as an Intervening Variable

Khaeril Anwar Junaedi*, Muhammad Ali, Mursalim Nohong, & Arifuddin

Hasanuddin University, Perintis Kemerdekaan K.10 Street, Makassar 90245, Indonesia

Abstract

This study examines the relationships of Debt to Asset Ratio (DAR), Asset Growth (AG), and Debt to Equity Ratio (DER) with Return on Assets (ROA), while assessing Return on Equity (ROE) as an intervening variable in Indonesian crude palm oil companies. The sample consists of 195 firm-year observations from 25 companies listed on the Indonesia Stock Exchange during 2014–2024, forming an unbalanced panel dataset. Estimation was conducted using a Random Effects Model with year fixed effects and firm-clustered standard errors, supported by the Hausman specification test. Indirect relationships were evaluated through nonparametric bootstrap mediation analysis with 95% confidence intervals. The results show that DAR is negatively and significantly associated with ROE, whereas DER is positively and significantly associated with ROE. AG has a positive but statistically insignificant relationship with ROE. In the ROA model, DAR, AG, and ROE are positively and significantly associated with ROA, while DER is negatively and significantly associated with ROA. Bootstrap results indicate that ROE significantly intervenes in the relationships of DAR and DER with ROA, but not in the relationship between AG and ROA. The opposite directions of the direct and indirect relationships for DAR and DER suggest competitive or inconsistent mediation. These findings demonstrate that leverage and asset growth are associated with profitability through distinct pathways and that their implications depend on whether profitability is measured using assets or shareholders' equity.

Keywords: asset growth; debt to asset ratio; debt to equity ratio; return on assets; return on equity.

Received: 6 June 2026 Revised: 16 July 2026 Published: 31 August 2026

1. Introduction

In 2022, Indonesia was home to a total of 2389 large palm oil plantation companies, which comprised both state-owned and private entities. This total included 169 large state-owned enterprises and 2220 significant private firms (Indonesian Central Bureau of Statistics, 2024). Among these, 25 companies were listed on the Indonesia Stock Exchange (https://www.invesnesia.com/daftar-saham-cpo-di-bursa-efek-indonesia/ accessed May 18, 2025). Furthermore, the Indonesian Central Bureau of Statistics (BPS) reported in 2024 that the total exports of crude palm oil (CPO) and other palm oil products amounted to approximately US$23 billion.

Despite the long standing presence of palm oil companies in Indonesia, studies related to their financial performance are very limited, particularly for publicly listed companies on the Indonesia Stock Exchange. Recent evidence from Indonesia's palm oil plantation sub-sector indicates that financial performance determinants need to be evaluated within the specific characteristics of the industry (Susilo & Kurniasih, 2025). Until recently, there was just one online journal available that includes research on the impact of RSPO (Roundtable on Sustainable Palm Oil) certification and several other variables on the company value of 15 palm oil companies listed on the Indonesia Stock Exchange (Malau & Rambe, 2022). More intensive studies have focused on technical aspects of palm oil, such as planting, harvesting, and

* Corresponding author.
E-mail address: khaeriljunaedi@unhas.ac.id

post-harvest handling. Numerous other research efforts have also examined social aspects and environmental impacts, particularly those that could disrupt the sustainability of palm oil plantations.

As stated by Ningrum (2022), knowledge regarding a company's financial performance is essential as it provides a foundation for investors to make stock investments. Additionally, understanding the determinants of financial performance is important for managers because firm specific and macroeconomic factors can shape business outcomes and provide a basis for developing appropriate managerial strategies (Matias et al., 2024). Aristawati & Hariyanto (2025) assert that a company's financial performance is assessed through various metrics or measures that demonstrate how effectively the company utilizes its resources, its financial stability, and the efficiency of its operations. Commonly employed ratios in financial analysis include the Debt to Asset Ratio and the Debt to Equity Ratio. The former assesses the percentage of a company's assets that are financed through debt, whereas the latter indicates the relationship between equity and debt within the financing framework.

This study examines the statistical associations among capital structure, asset growth, and profitability in a sample of 25 Indonesian CPO companies listed on the Indonesia Stock Exchange, using available firm year observations from 2014 to 2024. To strengthen the foundation of this research, several relevant previous studies were reviewed (Abbas et al., 2020; Intan et al., 2024; Malau & Rambe, 2022; Muthalib et al., 2023; Nohong, 2016; Noja Baditoiu B. R. Buglea A. Munteanu V. P & Gligor Cimpoieru, 2024; Noor et al., 2024; Phassawan, 2023; Serrasqueiro et al., 2023; Setiawan, 2022; Sohilauw et al., 2019; Vuković et al., 2022; Yudha et al., 2023). From the findings of these studies, it is understood that various factors frequently raise concerns among researchers, including Return on Assets (ROA), Return on Equity (ROE), Debt to Asset Ratio (DAR), Debt to Equity Ratio (DER), Company Size, Asset Growth (AG), Exchange Rate, Economic Growth, and several additional variables. In light of this information, it was determined that this research would concentrate on analyzing the impact of DAR, AG, and DER on ROA, with ROE serving as an intervening variable.

Despite the extensive literature on capital structure and corporate profitability, evidence remains limited on how leverage and asset growth jointly influence the financial performance of CPO companies in Indonesia (Intan et al., 2024; Malau & Rambe, 2022; Noja Baditoiu B. R. Buglea A. Munteanu V. P & Gligor Cimpoieru, 2024; Phassawan, 2023; Serrasqueiro et al., 2023; Setiawan, 2022; Sohilauw et al., 2019; Vuković et al., 2022). This gap is relevant because the CPO industry operates under distinctive conditions, including high capital requirements, long investment horizons, commodity price volatility, and considerable exposure to financing costs. These characteristics may cause the relationships between debt structure, asset expansion, and profitability to differ from those reported in other nonfinancial industries. Accordingly, this study examines the direct and indirect effects of the Debt to Asset Ratio, Asset Growth, and Debt to Equity Ratio on Return on Assets, with Return on Equity serving as a mediating variable, using data from Indonesian listed CPO companies from 2014 to 2024. The study contributes sector specific empirical evidence on the financial mechanisms through which capital structure and asset growth may shape profitability in a resource intensive industry. Rather than proposing a new methodological approach, this study contributes sector specific empirical evidence on the relationships between capital structure, asset growth, and profitability within the Indonesian CPO industry.

2. Literature Review

2.1. Theoretical Framework

This study is primarily grounded in Agency Theory and Signaling Theory to explain the relationships between capital structure, financial performance, and investor interpretation of financial information in Indonesian CPO companies. Agency Theory is used to explain how debt financing may create both potential benefits and agency related costs for firms. Signaling Theory is used to explain how financial ratios may provide information to investors regarding profitability, leverage, and financial risk. Resource Based View Theory is employed as a complementary perspective to explain the role of Asset Growth in the expansion and utilization of productive assets. Accordingly, DAR and DER are interpreted mainly through capital structure decisions, agency costs, and financial risk, whereas Asset Growth is associated with the development and effective use of company resources.

Agency Theory explains that capital structure decisions may influence firm performance because debt can function as both a monitoring mechanism and a source of agency related costs (A. M. Ahmed et al., 2023). Debt financing may encourage managers to use company resources more efficiently due to repayment obligations and external monitoring by creditors. However, excessive debt may also increase interest expenses, financial distress risk, and potential conflicts between shareholders and creditors. Therefore, the relationship between leverage and profitability may depend on

whether the benefits of debt financing exceed its financial and agency related costs. In this study, DAR and DER represent the extent to which company assets and equity are financed through debt and are examined in relation to ROA and ROE.

Signaling Theory complements this perspective by explaining how financial information may be interpreted by external stakeholders. Financial ratios reported in corporate financial statements can provide signals regarding profitability, leverage, financial stability, and the company's capacity to manage its financial resources. ROA and ROE may signal the ability of a company to generate returns from its assets and shareholders' equity, while DAR and DER may indicate its financing structure and exposure to financial risk. Investors may use these indicators to assess the financial prospects and risk profile of CPO companies (Dwi Sunarsih & Nugraheni, 2025; Hilmi et al., 2025). Consistent with Signaling Theory, the relevance of these indicators depends on the quality and credibility of the financial information disclosed by the company (Nguyen, 2025; Puspitaningtyas et al., 2022).

Resource Based View Theory is applied specifically to Asset Growth. RBV emphasizes that firm performance may be influenced by the ability to acquire, develop, combine, and utilize strategic resources effectively (Arief et al., 2023; Kamasak, 2017). In the context of CPO companies, Asset Growth may reflect the expansion of productive resources, such as plantations, processing facilities, machinery, logistics infrastructure, and other operational assets. When these assets are managed efficiently, their expansion may support production capacity, revenue generation, and profitability. However, asset growth does not automatically improve financial performance because newly acquired assets may require substantial investment, long development periods, and effective managerial utilization before generating adequate returns.

Based on these theoretical perspectives, this study examines the statistical associations of DAR, Asset Growth, and DER with ROA and ROE. Agency Theory is used to explain the potential benefits and costs of debt financing, while Signaling Theory explains the relevance of financial ratios for investor assessment. RBV is applied specifically to explain how Asset Growth may be associated with financial performance through the expansion and utilization of productive resources. ROE is subsequently examined as an intervening variable because it represents shareholder based profitability that may be statistically associated with the relationships between capital structure, asset growth, and ROA. Based on Agency Theory, DAR and DER are expected to be associated with profitability because debt financing may create both financial discipline and agency related costs. Based on RBV, Asset Growth may be associated with profitability when additional assets are productively utilized. Signaling Theory further explains the relevance of ROA, ROE, and leverage indicators for investor assessment. These perspectives provide the basis for examining the proposed statistical associations.

2.1.1. Return on Asset

Return on Assets (ROA) is a profitability ratio that indicates a company's performance by comparing its profit (net income) to the total capital invested in assets. Iskandar (2021) and Nemati T. Javed M & Sidiqui (2021) use the following formula to calculate the ROA:

$$\boldsymbol{ROA = \frac{Net\ Profit}{Total\ Asset}}$$

2.1.2. Return on Equity

ROA and ROE should be examined jointly because they represent different dimensions of financial performance, namely asset efficiency and shareholder return (Lestari et al., 2025) . According to Siswanto (2021), profitability ratios measure a company's potential to generate profits by utilizing assets, capital, or revenue. Setiawan (2022) explains that profitability reflects the ability of investments in total assets to generate profitable returns for investors. In the palm oil sector, financial statement analysis through profitability, solvency, liquidity, and activity ratios is essential for assessing company performance (Alfarizi & Sartika, 2025). ROE can be explained as follows:

$$ROE = \frac{Net\ Profit\ After\ Interest\ and\ Tax}{Total\ Equity}$$

2.1.3. Debt to Asset Ratio

One financial measure that indicates a company's reliance on debt-based funding is the Debt to Asset Ratio (DAR). When a company faces difficulties in meeting its payment obligations, its financial risk can increase, indicated by a high Debt to Asset Ratio. This indicates that a significant portion of its assets are financed by debt. Conversely, a low Debt to Asset Ratio indicates that the company relies more on its equity, meaning its financial structure is more robust

and its debt burden is lighter. Investors and creditors use Debt-to-Asset Ratio analysis as a tool to assess a company's financial health and funding strategy (Aristawati & Hariyanto, 2025). The following formula is used to calculate DAR.

$$DAR = \frac{Long\ Term\ Debt\ +\ Short\ Term\ Debt}{Current\ Assets\ +\ Non\ Current\ Assets}$$

2.1.4. Asset Growth

Asset growth (AG) is commonly measured as the growth in a firm's total assets, reflecting changes in the scale of resources recorded in its balance sheet and used to support investment activities (Cooper et al., 2024). For managers, asset growth is a fundamental consideration, particularly when making investments related to after tax income in the hope of improving the company's overall growth performance. Rizka & Ulfida (2024) state that a company's progress can be assessed through the variation in the number of assets from one period to the next. Asset growth is calculated using the following formula:

$$AG = \frac{Ending\ Asset\ Value - Beginning\ Asset\ Value}{Beginning\ Asset\ Value}\ x\ 100\%$$

Evidence from Southeast Asian non-financial firms shows that capital structure may affect profitability differently, as DER can reduce ROA while DAR may have a different relationship with ROE (Lestari et al., 2025). This evidence indicates that the influence of capital structure on financial performance should be assessed through multiple leverage indicators rather than relying on a single ratio.

2.1.5. Debt-to-Equity Ratio

According to Rosyidi & Prasetya (2023), the Debt-to-Equity Ratio (DER) is a measure used to compare total liabilities to equity. They note that speculators and investors often rely on this ratio to assess the extent of a company's debt relative to its available equity. Furthermore, Annisa & Amalia (2024) explain that investors generally give positive ratings to companies that manage debt well, as this reflects superior risk management capabilities. The formula for calculating DER is as follows:

$$DER = \frac{Total\ Debt}{Total\ Asset - Total\ Debt}$$

3. Research Method and Materials

3.1. Type of Research

This study uses a quantitative explanatory research design with unbalanced panel data to examine the statistical relationship between capital structure, asset growth, and profitability in CPO companies in Indonesia. Specifically, this study analyzes the relationship between the Debt to Asset Ratio (DAR), Asset Growth (AG), and Debt to Equity Ratio (DER) and Return on Assets (ROA), while Return on Equity (ROE) is used as an intervening variable. This study answers three main questions: (1) whether DAR, AG, DER, and ROE have a statistically significant relationship with ROA in CPO companies in Indonesia; (2) whether DAR, AG, and DER have a statistically significant relationship with ROE; and (3) whether ROE exhibits a statistically significant indirect relationship between DAR, AG, and DER and ROA.All variables are measured quantitatively using financial information obtained from company financial reports. Observations are organized as company-year panel data, allowing the analysis to account for inter-company variation and changes over time. Because this study uses observational secondary data, the estimated relationships are interpreted as statistical associations, not as definitive evidence of causality. This research design aligns with the quantitative research approach proposed by Abdullah et al. (2021).

3.2. Data source

The population of this study consisted of 25 crude palm oil (CPO) companies listed on the Indonesia Stock Exchange (Invesnesia, 2024). The study was conducted from August to December 2025, using secondary data sourced from the companies' annual financial reports and accessed through publicly available online sources. The observation period covered 2014–2024, theoretically yielding a maximum potential sample size of 275 company-year observations.

However, differences in the availability and completeness of financial reports between companies resulted in a final usable sample size of 195 company-year observations. Therefore, this research dataset is an unbalanced panel because not all companies have complete data for each year during the observation period. Each observation represents a company's financial information for a specific year. The use of panel data allows the analysis to consider variations between companies as well as changes that occur over time. However, the research results need to be interpreted according to the characteristics of the available sample. Differences in reporting periods and the presence of unavailable observations have the potential to impact the comparability of data from each company across periods.

3.3. Research Variables and Relationships Between Variables

The variables used in this study are the endogenous variable, in this case the Return on Assets (ROA); the exogenous variables, consisting of the Debt to Asset Ratio (DAR), Asset Growth (AG), and Debt to Equity Ratio (DER); and the intervening (mediating) variable, namely the Return on Equity (ROE). The values of ROA, ROE, DAR, AG, and DER are determined through the formulas outlined in the Literature Review section. The interconnection among these five variables adheres to the framework described as presented in figure 1.

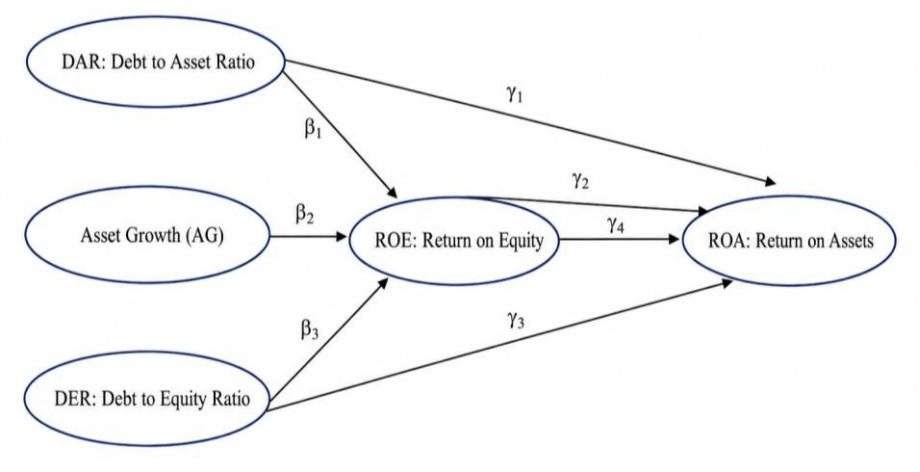

Figure 1. Conceptual Framework of the Relationships among Research Variables

Based on this framework, authors pose the following hypothesis:

H1: There is a significant direct effect of DAR on ROA.
H2: There is a significant direct effect of AG on ROA.
H3: There is a significant direct effect of DER on ROA.
H4: There is a significant direct effect of DAR on ROE.
H5: There is a significant direct effect of AG on ROE.
H6: There is a significant direct effect of DER on ROE.
H7: There is a significant direct effect of ROE on ROA.

3.4. Data Analysis

Hypothesis testing was conducted using a Random Effects Model (REM) on an unbalanced panel dataset consisting of firm-year observations from 25 Indonesian CPO companies over the 2014–2024 period. Panel-data regression was employed because it allows the analysis to account for variation across companies and changes over time, including differences in the number of available observations among firms (Baltagi, 2021). The REM assumes that unobserved firm-specific heterogeneity is uncorrelated with the explanatory variables included in the model. The appropriateness of this specification was evaluated using the Hausman test. The test did not reject the null hypothesis, thereby supporting the use of the Random Effects Model rather than the Fixed Effects Model (Baltagi, 2021, 2023).

The analysis was conducted using Python through Google Colab with panel-data estimation procedures. Standard errors were clustered at the firm level to account for potential heteroscedasticity and within-firm correlation over time. Firm-clustered robust standard errors provide more reliable statistical inference when error terms may be correlated among observations belonging to the same company (Abadie et al., 2023; MacKinnon et al., 2023). Year dummy variables

were included to control for common economic conditions, regulatory changes, commodity-market developments, and other period-specific factors affecting all sampled companies in a particular year. The inclusion of year dummy variables serves as a time-control mechanism and does not alter the primary estimation method, which remains the Random Effects Model (Baltagi, 2023; Wooldridge, 2025).

The first empirical model estimated the statistical associations of DAR, AG, and DER with ROE:

$$ROE_{it} = \alpha_0 + \beta_1 DAR_{it} + \beta_2 AG_{it} + \beta_3 DER_{it} + \sum_{\tau=2015}^{2024} \lambda_\tau D_{\tau t} + u_i + \varepsilon_{it}$$

where ROE_{it} represents the Return on Equity of company i in year t; DAR_{it}, AG_{it}, and DER_{it}represent the explanatory variables; α_0 is the intercept; β_1, β_2, and β_3 are the estimated regression coefficients; λ_t represents the coefficients of the year dummy variables; u_i represents the firm-specific random effect; and ε_{it}represents the idiosyncratic error term.

The first empirical model estimated the statistical associations of DAR, AG, and DER with ROE:

$$ROA_{it} = \gamma_0 + \gamma_1 DAR_{it} + \gamma_2 AG_{it} + \gamma_3 DER_{it} + \gamma_4 ROE_{it} + \sum_{\tau=2015}^{2024} \delta_\tau D_{\tau t} + v_i + \mu_{it}.$$

where ROA_{it} represents the Return on Assets of company i in year t. The coefficients γ_1, γ_2, and $\gamma_3$represent the direct statistical associations of DAR, AG, and DER with ROA, while γ_4 represents the statistical association between ROE and ROA. The terms v_i and μ_{it} represent the firm-specific random effect and the idiosyncratic error term, respectively. Descriptive statistics, skewness, excess kurtosis, Pearson correlation coefficients, and Variance Inflation Factor values were examined to describe the characteristics of the data and identify potential multicollinearity. The Durbin–Watson statistic was not used as the primary residual diagnostic because it is not sufficient for an unbalanced panel-data structure. Statistical inference was therefore based on standard errors clustered at the firm level.

3.5. Indirect and Total Effect

The indirect associations of DAR, AG, and DER with ROA through ROE were calculated using the product-of-coefficients approach:

$$IE_{DAR} = \beta_1 \times \gamma_4$$
$$IE_{AG} = \beta_2 \times \gamma_4$$
$$IE_{DER} = \beta_3 \times \gamma_4$$

The statistical significance of the indirect associations was assessed using a nonparametric bootstrap procedure with 95% confidence intervals. An indirect association was considered statistically significant when its bootstrap confidence interval did not include zero. The total association of each explanatory variable with ROA was calculated by adding its direct association with ROA to its corresponding indirect association through ROE:

$$TE_{DAR} = \gamma_1 + (\beta_1 \times \gamma_4)$$
$$TE_{AG} = \gamma_2 + (\beta_2 \times \gamma_4)$$
$$TE_{DER} = \gamma_3 + (\beta_3 \times \gamma_4)$$

where TE_{DAR}, TE_{AG}, and TE_{DER} represent the total statistical associations of DAR, AG, and DER with ROA, respectively. The total association combines the direct association estimated in the ROA model and the indirect association operating through ROE. The evaluation of the intervening role of ROE was based primarily on the statistical significance of the indirect associations rather than solely on the magnitude of the total associations. Direct hypotheses were evaluated using firm-clustered robust p-values at the 5% significance level, whereas indirect associations were evaluated using 95% bootstrap confidence intervals. Because the study uses observational secondary data, all estimated direct, indirect, and total relationships are interpreted as statistical associations rather than definitive causal effects.

4. Results and Discussion

4.1. Descriptive Statistics

Table 1 presents descriptive statistics for the five study variables based on 195 firm-year observations. All variables have the same number of observations, indicating that the final sample used in the analysis has complete data for the Debt to Asset Ratio (DAR), Asset Growth, Debt to Equity Ratio (DER), Return on Equity (ROE), and Return on Assets (ROA).

Table 1. Descriptive Statistics

Variable	N	Mean	Std. Dev.	Minimum	Q1	Median	Q3	Maximum	Skewness	Excess Kurtosis
DAR	195	0.8093	0.1135	0.5366	0.7213	0.8072	0.8921	1.1521	0.2273	−0.1869
AG	195	0.4952	0.1522	0.0587	0.3905	0.5001	0.5903	0.9007	−0.0513	0.0107
DER	195	1.0326	0.2670	0.3912	0.8557	1.0211	1.2025	1.8291	0.2626	0.1509
ROE	195	0.5810	0.1776	0.1395	0.4658	0.5607	0.6963	1.0850	0.2875	0.1236
ROA	195	0.4621	0.1096	0.2120	0.3761	0.4521	0.5375	0.7540	0.2191	−0.2166

The average DAR value is 0.8093, with a range of values between 0.5366 and 1.1521. The median value of 0.8072 is relatively close to the mean, indicating that the data distribution tends to be balanced around its central value. The standard deviation of 0.1135 indicates moderate variation in the proportion of debt to total assets across the company-year observations analysed. Asset Growth has a mean value of 0.4952 and a standard deviation of 0.1522. Its values range from 0.0587 to 0.9007, with a median of 0.5001. The closeness between the mean and median values indicates that the distribution of Asset Growth is relatively symmetrical. This is also reflected in the skewness value of -0.0513, indicating very little negative skewness. DER has the highest average value among leverage indicators, at 1.0326, with a standard deviation of 0.2670. DER values range from 0.3912 to 1.8291. The median DER of 1.0211 is relatively close to the mean, while the positive skewness value of 0.2626 indicates a slight rightward skew in the distribution.

The average ROE is 0.5810, with a standard deviation of 0.1776 and a range of 0.1395 to 1.0850. The median value of 0.5607 is slightly lower than the mean, in line with the relatively small positive skewness value of 0.2875. Meanwhile, ROA has a mean value of 0.4621 and a standard deviation of 0.1096, with a range of values between 0.2120 and 0.7540. The median ROA value of 0.4521 is also relatively close to the mean. Overall, skewness values range from -0.0513 to 0.2875, while excess kurtosis values range from -0.2166 to 0.1509. These values indicate that the distribution of the research variables is generally relatively symmetrical and does not exhibit extreme deviations in the degree of sharpness or thickness of the tails. However, these statistics are used primarily to describe the characteristics of the data distribution, not as a formal requirement for normality in Random Effects Model estimation.

4.2. Correlation and Multicollinearity Diagnostics

Table 2 presents the Pearson correlation coefficients between DAR, Asset Growth, DER, ROE, and ROA. DAR and DER exhibit a moderate positive correlation of 0.5338, which is understandable because the two variables represent different dimensions of corporate leverage. DAR measures the proportion of debt to total assets, while DER measures the proportion of debt to shareholders' equity. Asset Growth has a weak correlation with DAR and DER, at 0.0752 and -0.0141, respectively. Meanwhile, Asset Growth's correlation with ROA is positive at 0.2673, while its correlation with ROE is relatively weak at 0.0652.

DER has a positive correlation with ROE of 0.6454, while ROE is positively correlated with ROA of 0.6667. These results indicate that higher leverage relative to equity tends to be associated with higher equity-based profitability. Furthermore, companies with higher ROE also tend to report higher ROA. There are no pairwise correlation coefficients between the explanatory variables exceeding the general threshold of 0.80. However, the correlation matrix only depicts simple bivariate relationships and does not account for firm-specific heterogeneity, year effects, or the simultaneous influence of multiple variables in the regression model. Therefore, these correlation results should be treated as a preliminary diagnosis, not as conclusive evidence that multicollinearity is absent in the model.

Variance Inflation Factor (VIF) analysis was performed separately on the ROE and ROA equations to assess potential multicollinearity between the explanatory variables. In the ROE equation, VIF values ranged from 1.0099 to 1.4121, while tolerance values ranged from 0.7082 to 0.9902. DAR had the highest VIF value at 1.4121, followed by DER at 1.4044, while Asset Growth recorded the lowest VIF value at 1.0099. In the ROA equation, VIF values ranged from

1.0396 to 3.2766, with tolerance values ranging from 0.3052 to 0.9619. DER had the highest VIF value at 3.2766, followed by ROE at 2.3439 and DAR at 1.9127.

Table 2. Pearson Correlation Matrix

Variable	DAR	Asset Growth	DER	ROE	ROA
DAR	1.0000	0.0752	0.5338	0.0234	−0.1467
AG	0.0752	1.0000	−0.0141	0.0652	0.2673
DER	0.5338	−0.0141	1.0000	0.6454	0.0122
ROE	0.0234	0.0652	0.6454	1.0000	0.6667
ROA	−0.1467	0.2673	0.0122	0.6667	1.0000

All VIF values are below the general threshold of 5, while all tolerance values are above 0.10. These results indicate that the explanatory variables in both models do not experience serious multicollinearity issues. Although DAR and DER both represent dimensions of capital structure, their simultaneous inclusion does not create a level of linear dependence that could materially affect the stability of the estimated coefficients. Therefore, DAR, Asset Growth, DER, and ROE are retained in their respective Random Effects Model specifications.

Table 3. Multicollinearity Diagnostics

Equation	Variable	VIF	Tolerance
ROE	DAR	1.4121	0.7082
ROE	AG	1.0099	0.9902
ROE	DER	1.4044	0.7121
ROA	DAR	1.9127	0.5228
ROA	AG	1.0396	0.9619
ROA	DER	3.2766	0.3052
ROA	ROE	2.3439	0.4266

4.3. Random Effect Model Selection

The selection of panel data estimators is evaluated using the Hausman specification test. This test is used to assess whether firm-specific effects are systematically correlated with the explanatory variables in the model. Based on the null hypothesis, the Random Effects Model is considered a consistent estimator. Conversely, if the null hypothesis is rejected, the Fixed Effects Model is considered more appropriate.

Table 4. Hausman Specification Test

Dependent Variable	Hausman Statistic	Degrees of Freedom	p-value	Decision
ROE	3.686828	3	0.297327	REM not rejected
ROA	1.893098	4	0.755413	REM not rejected

The p-values for the ROE and ROA models are above the 5% significance level, at 0.297327 for the ROE equation and 0.755413 for the ROA equation, respectively. Therefore, the null hypothesis in the Hausman test cannot be rejected for both models. This result indicates that there is insufficient statistical evidence to conclude that firm-specific effects are correlated with the explanatory variables in the model. Therefore, the Random Effects Model is retained as the primary estimator for the ROE and ROA equations. However, these results cannot be interpreted as absolute proof that the Random Effects Model is a completely correct specification. The Hausman test only shows that based on the data and model used, the basic assumptions in the Random Effects specification cannot be statistically rejected.

4.4. Random Effect Estimation for ROE

Table 5 presents the results of the Random Effects Model estimation on the ROE equation. This model estimates the statistical relationships between the Debt to Asset Ratio (DAR), Asset Growth, and Debt to Equity Ratio (DER) and Return on Equity (ROE) after controlling for year-specific conditions. Statistical inference is performed using standard errors clustered at the firm level.

The estimated coefficient for DAR is negative and statistically significant ($\beta = -0.786735$; $p < 0.001$), with a 95% confidence interval of −0.9669 to −0.6066, which does not include zero. These results indicate that an increase in DAR is associated with a decrease in ROE after accounting for year-specific conditions and unobserved firm-specific

heterogeneity. Therefore, H4 is supported. Meanwhile, Asset Growth has a positive coefficient of 0.084165, but the relationship is not statistically significant at the 5% level (p = 0.1376). The confidence interval of −0.0272 to 0.1955 includes zero, indicating insufficient statistical evidence for a relationship between Asset Growth and ROE. Therefore, H5 is not supported, and the result cannot be categorized as marginally significant because the p-value exceeds both the 5% and 10% significance levels.

Table 5. Random Effects Estimation Results for ROE

Variable	Coefficient	Firm-Clustered SE	t-statistic	p-value	95% Confidence Interval	Direction	Hypothesis Decision
Constant	0.5560	0.0879	6.3278	<0.001	[0.3826, 0.7294]	Positive	—
DAR	−0.786735	0.091298	−8.6172	<0.001	[−0.9669, −0.6066]	Negative	H4 supported
Asset Growth	0.084165	0.056428	1.4915	0.1376	[−0.0272, 0.1955]	Positive	H5 not supported
DER	0.586925	0.039558	14.8372	<0.001	[0.5089, 0.6650]	Positive	H6 supported

DER has a positive and statistically significant relationship with ROE (β = 0.586925; p < 0.001), with a 95% confidence interval of 0.5089 to 0.6650 that does not include the zero value. This finding indicates that companies with higher levels of debt relative to equity tend to report higher equity-based profitability in the study sample. Thus, H6 is stated to be supported. Overall, the two leverage indicators show different directions of relationship with ROE. DAR has a negative relationship, while DER has a positive relationship with equity-based profitability.

4.5. Random Effect Estimation for ROA

Table 6 presents the results of the Random Effects Model estimation on the ROA equation. This model tests the statistical relationship between the Debt to Asset Ratio (DAR), Asset Growth, Debt to Equity Ratio (DER), and Return on Equity (ROE) with Return on Assets (ROA), taking into account unobserved firm-specific heterogeneity and year-specific conditions. Statistical inference is performed using robust standard errors clustered at the firm level to accommodate possible heteroscedasticity and correlation between observations within the same firm over time.

Table 6. Random Effects Estimation Results for ROA

Variable	Coefficient	Firm-Clustered SE	t-statistic	p-value	95% Confidence Interval	Direction	Hypothesis Decision
DAR	0.380509	0.022606	16.832110	<0.001	[0.335902, 0.425116]	Positive	H1 supported
AG	0.039100	0.007822	4.998720	<0.001	[0.023665, 0.054535]	Positive	H2 supported
DER	−0.418255	0.011589	−36.089504	<0.001	[−0.441123, −0.395387]	Negative	H3 supported
ROE	0.797941	0.019392	41.146995	<0.001	[0.759676, 0.836206]	Positive	H7 supported

DAR has a positive and statistically significant relationship with ROA, with an estimated coefficient of 0.380509 and a clustered standard error at the firm level of 0.022606. The p-value is below 0.001, while the 95% confidence interval ranges from 0.335902 to 0.425116 and does not include zero. These results indicate that an increase in DAR is associated with an increase in ROA after accounting for firm-specific and year-specific heterogeneity, thus supporting H1. Asset Growth also has a positive and statistically significant relationship with ROA, with a coefficient of 0.039100, a standard error of 0.007822, and a p-value below 0.001. The 95% confidence interval of 0.023665 to 0.054535 confirms the direction of the estimated relationship. Thus, the analysis provides sufficient statistical evidence to support H2.

In contrast, DER has a negative and statistically significant relationship with ROA, with an estimated coefficient of −0.418255, a standard error of 0.011589, and a p-value below 0.001. The 95% confidence interval ranges from −0.441123 to −0.395387 and is all below zero, so H3 is supported. ROE has the largest positive coefficient in the ROA equation, which is 0.797941, with a standard error of 0.019392 and a 95% confidence interval between 0.759676 and 0.836206. This relationship is significant at the 1% level, indicating that companies with higher equity-based profitability tend to report higher asset-based profitability, so H7 is supported. Overall, all explanatory variables in the ROA model show a significant relationship after controlling for firm-specific heterogeneity and year-specific conditions. DAR, Asset Growth, and ROE have a positive relationship with ROA, while DER has a negative relationship; however, because the study uses observational data, the estimation results are interpreted as conditional statistical relationships and not as definitive evidence of causality.

4.6. Indirect and Total Effect

The indirect relationship between DAR, Asset Growth, and DER with ROA through ROE was evaluated using a nonparametric bootstrap procedure. Statistical significance was determined based on a 95% bootstrap confidence interval. An indirect relationship is considered statistically significant if the confidence interval does not include zero.

Table 7. Bootstrap Estimates of Indirect Effects through ROE

Variable	Indirect Effect	95% Bootstrap Confidence Interval	Bootstrap p-value	Conclusion
DAR	−0.627768	[−0.772324, −0.457541]	<0.001	Significant
AG	0.067158	[−0.019255, 0.202875]	0.124	Not significant
DER	0.468331	[0.402619, 0.539184]	<0.001	Significant

The indirect relationship between DAR and ROA through ROE is negative and statistically significant, with an estimated coefficient of −0.627768. The 95% bootstrap confidence interval ranges from −0.772324 to −0.457541 and does not include zero. These results indicate that ROE forms a statistically significant indirect path in the relationship between DAR and ROA. Specifically, a negative relationship between DAR and ROE followed by a positive relationship between ROE and ROA results in a negative indirect relationship. Meanwhile, Asset Growth has a positive indirect relationship with ROA through ROE, with a coefficient of 0.067158. However, the 95% bootstrap confidence interval from −0.019255 to 0.202875 includes zero, while the bootstrap p-value of 0.124 exceeds the 5% significance level. Thus, statistical evidence is insufficient to conclude that ROE plays a significant intervening role in the relationship between Asset Growth and ROA.

The indirect relationship between DER and ROA through ROE is positive and statistically significant. The coefficient of the indirect relationship is recorded at 0.468331, with a 95% bootstrap confidence interval ranging from 0.402619 to 0.539184. Because this interval does not include zero and the bootstrap p-value is below 0.001, ROE is proven to form a statistically significant indirect path in the relationship between DER and ROA. Overall, the bootstrap results support the intervening role of ROE in the relationship between DAR and DER with ROA, but do not support the intervening role of ROE in the relationship between Asset Growth and ROA. This conclusion is based on the statistical significance of the indirect relationship, not solely on the magnitude of the total relationship.

The total relationship between each explanatory variable and ROA is calculated by summing the direct relationship between each variable and ROA and its indirect relationship through ROE. The results of this total relationship calculation are presented in Table 8.

Table 8. Direct, Indirect, and Total Effect on ROA

Variable	Direct Effect	Indirect Effect through ROE	Total Effect
DAR	0.380509	−0.627768	−0.247259
AG	0.039100	0.067158	0.106258
DER	−0.418255	0.468331	0.050076

DAR shows a positive direct relationship with ROA, but has a larger negative indirect relationship through ROE. Consequently, the total relationship between DAR and ROA is negative at -0.247259. Because the direct and indirect relationships are both statistically significant but in opposite directions, this pattern suggests competitive mediation or inconsistent mediation. Thus, the positive direct relationship between DAR and ROA is more than offset by the negative indirect relationship through ROE. AG shows equally positive direct and indirect relationships with ROA, resulting in a total positive relationship of 0.106258. Although the direct relationship with ROA is statistically significant, the indirect relationship through ROE is insignificant. Therefore, these results do not provide evidence of a significant intervening role of ROE in the relationship between AG and ROA. This positive total relationship is more appropriately interpreted as a descriptive combination of the direct and indirect coefficients, rather than as evidence of mediation.

DER shows a negative direct relationship with ROA and a positive indirect relationship through ROE. The positive indirect relationship is slightly larger than the negative direct relationship, resulting in a relatively small positive total relationship of 0.050076. As with DAR, the difference in direction between the direct and indirect relationships indicates competitive mediation or inconsistent mediation. Thus, DER is negatively related to ROA directly, but positively related indirectly through its positive relationship with ROE. Overall, the total relationship reflects the combination of the direct and indirect relationships of DAR, Asset Growth, and DER with ROA. However, determining the significance of the intervening role of ROE is primarily based on the bootstrap confidence intervals of the indirect relationships. Because the study uses observational data, these direct, indirect, and total relationships should be

interpreted as estimates of statistical relationships, not as definitive causal mechanisms. Table 9 summarizes the results of the seven direct hypotheses tested using the Random Effects Model with firm-clustered robust standard errors.

Table 9. Summary of Hypothesis Testing

Hypothesis	Relationship	Direction	Statistical Result	Decision
H1	DAR → ROA	Positive	Significant	Supported
H2	AG → ROA	Positive	Significant	Supported
H3	DER → ROA	Negative	Significant	Supported
H4	DAR → ROE	Negative	Significant	Supported
H5	AG → ROE	Positive	Not significant	Not supported
H6	DER → ROE	Positive	Significant	Supported
H7	ROE → ROA	Positive	Significant	Supported

Overall, six of the seven hypotheses were directly supported at the 5% significance level. H1, H2, H3, H4, H6, and H7 were declared supported because the estimated coefficients showed a statistically significant relationship and an appropriate empirical direction, while H5 was not supported because the positive relationship between Asset Growth and ROE was not statistically significant. The results of the hypothesis testing showed that both leverage indicators had a significant relationship with profitability, although the direction of the relationship was different for ROA and ROE. Asset Growth had a significant relationship with ROA, but not with ROE, while ROE showed a strong positive relationship with ROA. These findings indicate that the relationship between capital structure, asset growth, and profitability depends on the profitability indicator used in the analysis.

4.7. Discussions

The results of this study indicate that capital structure, asset growth, and profitability have a multidimensional relationship in Indonesian CPO companies listed on the Indonesia Stock Exchange. After considering unobserved firm-specific heterogeneity, year-specific conditions, and the dependence of observations within firms through the use of standard errors clustered at the firm level, DAR, Asset Growth, DER, and ROE exhibit different relationship patterns with the two profitability indicators. DAR and Asset Growth have a positive relationship with ROA, while DER shows a negative relationship with ROA. In the ROE equation, DAR has a negative relationship, DER has a positive relationship, while the relationship between Asset Growth and ROE is not statistically significant. ROE also shows a positive relationship with ROA. These findings emphasize the importance of measuring financial performance using more than one profitability indicator because ROA reflects the efficiency of overall asset utilization, while ROE describes the rate of return obtained by shareholders on invested capital (Siswanto, 2021; Setiawan, 2022; Lestari et al., 2025). These results also support the view that DAR, DER, ROA, and ROE need to be analyzed in an integrated manner, rather than separately, when assessing the financial condition of palm oil companies (Alfarizi & Sartika, 2025; Aristawati & Hariyanto, 2025).

The positive relationship between DAR and ROA suggests that an increase in the proportion of assets financed through debt may be associated with more productive asset use when borrowed funds are allocated to investments that generate economic value. This finding aligns with Agency Theory, which explains that debt can function as a managerial discipline mechanism through fixed payment obligations and external oversight from creditors (A. M. Ahmed et al., 2023; Lesmono & Siregar, 2021). In the capital-intensive CPO industry, external financing can support investment in plantation land, processing facilities, production machinery, transportation, warehouses, and other productive resources. When the rate of return generated by these assets exceeds their financing costs, debt-financed expansion can be associated with increased asset-based profitability. This interpretation is consistent with research findings showing that moderate and efficiently managed leverage can support company performance, while excessive leverage can degrade performance due to increased borrowing costs and the risk of financial distress (Dsouza et al., 2025; Khoza, 2025). From a managerial perspective, debt should not be assessed solely on its nominal value or proportion, but also on the ability of the financed assets to generate operating profits and cash flows in excess of the cost of financing.

In contrast to its relationship with ROA, DAR exhibits a negative relationship with ROE. These results indicate that increasing the proportion of assets financed through debt does not always translate into increased returns to shareholders. Interest expense, principal repayment obligations, and increased financial exposure can reduce available net income relative to shareholder equity. This finding reflects the cost dimension of Agency Theory and the trade-off perspective, which explains that a certain level of debt can provide monitoring and financing benefits, but can depress shareholder profitability if the cost of debt and financial risk increase excessively (A. M. Ahmed et al., 2023; Voutsinas

& Werner, 2025). The differing direction of the relationship between DAR and ROA and ROE demonstrates that debt utilization can support asset productivity but simultaneously exert pressure on shareholder returns. This situation is particularly relevant for CPO companies, as plantation expansion and the construction of processing facilities generally require substantial initial investment and a relatively long timeframe before assets reach optimal productivity.

The bootstrap analysis results provide further insight into the role of ROE in the relationship between DAR and ROA. DAR has a positive direct relationship with ROA, but its indirect relationship through ROE is negative and statistically significant. The magnitude of this negative indirect relationship exceeds the positive direct relationship, resulting in a negative total relationship. Because the direct and indirect relationships move in opposite directions, this pattern suggests competitive mediation or inconsistent mediation. Theoretically, these findings extend the application of Agency Theory by demonstrating that the benefits and costs of debt use can operate simultaneously through different profitability channels. Practically, management cannot assume that increased ROA from debt-financed assets will automatically improve shareholder welfare. Therefore, debt-based investments need to be evaluated not only based on asset productivity but also on interest-paying capacity, net profit retention, debt maturity structure, and their impact on shareholder returns. Several previous studies have also shown that financial performance variables can be a pathway that transmits or alters the relationship between a company's financial characteristics and its bottom line (Jannah & Sartika, 2022; Phassawan, 2023). However, the indirect relationship in this study remains interpreted as a statistical relationship, not as a definitive causal mechanism.

DER shows a different pattern of relationship. The negative relationship between DER and ROA indicates that companies with a higher proportion of debt compared to equity tend to have lower asset-based profitability. This finding aligns with research showing that high leverage can undermine company performance because interest obligations, refinancing risks, and reduced financial flexibility can limit resources available for productive operational activities (F. Ahmed et al., 2024; Lestari et al., 2025; Sodik & Manda, 2025). Empirical evidence from companies in Southeast Asia and other developing countries also suggests that the relationship between capital structure and profitability is highly dependent on financing costs, institutional conditions, and the company's ability to generate adequate returns on borrowed funds (Serrasqueiro et al., 2023; Sohilauw et al., 2019). In the context of the CPO industry, a high DER can become a greater burden when companies face declining commodity prices, rising operating costs, exchange rate volatility, or long investment maturation periods.

Conversely, DER has a positive relationship with ROE. This finding is consistent with the financial leverage mechanism in the DuPont framework, where an increase in the equity multiplier can drive ROE higher when a company uses a smaller equity base relative to its total assets (Lan, 2012; Nemati T. Javed M & Sidiqui, 2021). The use of debt can increase shareholder returns if the rate of return generated by the company's assets is higher than the cost of borrowing. However, a higher ROE resulting from an increase in DER does not necessarily indicate stronger underlying operational performance. Because ROE is calculated based on net income relative to equity, a decrease in the equity base or an increase in leverage can mechanically increase ROE even if net income and operational efficiency do not increase proportionally. This interpretation aligns with research on DER, ROE, and financial performance, which emphasizes that increases in shareholder profitability ratios due to leverage must be analyzed alongside the company's debt repayment capacity and financial risk level (Annisa & Amalia, 2024; Dwi Sunarsih & Nugraheni, 2025; Rosyidi & Prasetya, 2023). Therefore, an increase in ROE should not be used as the sole indicator of performance success if it occurs simultaneously with an increase in DER and a decrease in ROA.

The indirect relationship between DER and ROA through ROE is positive and statistically significant, while its direct relationship with ROA is negative. This positive indirect relationship is slightly larger than the negative direct relationship, resulting in a relatively small positive total relationship. The difference in direction between the direct and indirect relationships again suggests competitive mediation or inconsistent mediation. Theoretically, these findings confirm that leverage cannot be categorized as an absolute beneficial or detrimental factor because its consequences depend on the basis of profitability measurement used, namely assets or equity. These results also suggest that DAR and DER should not be treated as interchangeable indicators, even though they both measure leverage. DAR reflects the proportion of assets financed by debt, while DER indicates the ratio of funding from creditors to shareholders. These different denominators convey different economic meanings and can produce different patterns of relationships with profitability. These findings support the recommendation that capital structure be assessed using multiple leverage indicators, rather than a single ratio (Aristawati & Hariyanto, 2025; Lestari et al., 2025).

Asset growth has a positive and significant relationship with ROA, indicating that a company's asset growth is associated with increased asset-based profitability. This finding aligns with the Resource-Based View, which explains that a company's performance is determined by its ability to acquire, combine, develop, and utilize productive resources

effectively (Arief et al., 2023; Kamasak, 2017). In CPO companies, asset growth can reflect plantation expansion, processing plant construction, warehousing and logistics network development, additional machinery, and other operational infrastructure improvements. When these resources are utilized efficiently, asset growth can increase production capacity, reduce operational constraints, and drive revenue growth. This finding is generally consistent with research linking asset expansion, investment, and utilization of productive resources with improved financial performance (Park & Paientko, 2025; Priscilla Ramli A & Anwar, 2021; Rizka & Ulfida, 2024). These results also align with evidence on the link between corporate growth, investment efficiency, and financial flexibility (Cherkasova & Kuzmin, 2018; Cooper et al., 2024; Nohong, 2016).

However, Asset Growth did not have a significant relationship with ROE, and its indirect relationship with ROA through ROE was also statistically insignificant. These results suggest that asset expansion can be associated with increased asset-based profitability without immediately increasing shareholder returns. Newly developed plantations and other biological assets require a maturation period, while new processing facilities and infrastructure can increase depreciation expenses, operating costs, and initial financing requirements. Therefore, the benefits of asset growth may first be reflected in increased production capacity and asset utilization before being fully reflected in shareholder returns. This interpretation aligns with the view that the relationship between growth and profitability depends on asset utilization, investment quality, financing structure, and the time required for new assets to generate cash flows (Purnama et al., 2024; Rizka & Ulfida, 2024; Serrasqueiro et al., 2023). From a managerial perspective, increasing total assets should not be the sole performance objective. Investment evaluation should include cash flow projections, utilization rates, asset maturity periods, financing costs, and performance monitoring after the investment is realized.

The difference in results between ROA and ROE is also consistent with previous research on agricultural and palm oil companies. Several studies on agricultural and palm oil companies in Indonesia show that financial performance is influenced by a combination of company characteristics, financial indicators, certification, operational conditions, and company size (Intan et al., 2024; Malau & Rambe, 2022; Susilo & Kurniasih, 2025). Research on agricultural companies in Europe also shows that factors related to performance can differ by industry characteristics and institutional conditions (Vuković et al., 2022). This study extends this literature by showing that leverage and asset growth can have different relationships depending on whether profitability is measured by assets or equity. Therefore, the results do not support a universal conclusion that leverage or asset growth always has positive or negative consequences. The implications depend on the funding structure, asset productivity, and profitability indicators used in the analysis.

The strong positive relationship between ROE and ROA suggests that companies that generate higher returns to shareholders also tend to have higher returns on assets. This relationship is understandable economically because ROA and ROE are both profitability indicators and use net income as the primary component in their calculations. The DuPont framework also links ROE and ROA through the equity multiplier, which explains that operational efficiency and capital structure can influence both indicators (Lan, 2012). However, the use of the same net income component suggests that some of the identified relationship may be mechanical, rather than fully reflecting independent economic processes. These theoretical considerations require caution in interpreting ROE as an intervening profitability variable, rather than as a completely independent operational factor causally determining ROA. Therefore, management and investors need to analyze the components of ROE, including profit margin, asset turnover, and financial leverage, before concluding that an increase in ROE reflects improved operational performance.

From a Signaling Theory perspective, research findings indicate that financial ratios can convey diverse signals and are not always uniformly positive or negative. An increase in the Debt-to-Equity Ratio (DAR) may signal that a company has access to financing to support productive investments, but at the same time, it may also indicate increasing fixed liabilities and pressure on shareholder returns. Similarly, a high DER may be associated with increased ROE through leverage, but simultaneously indicates a decline in asset-based profitability and increased exposure to financial risk. Therefore, ROA and ROE need to be analyzed alongside DAR and DER to distinguish true improvements in operational performance from ratio changes primarily driven by funding structure. This interpretation aligns with the view that financial information will only provide relevant meaning to external stakeholders if it is presented credibly, completely, and analyzed in context (Nguyen, 2025; Puspitaningtyas et al., 2022). These findings are also consistent with research emphasizing the role of accounting information, corporate reporting, and information asymmetry in investor assessment processes (Usman et al., 2020).

The research findings also need to be understood within the context of the economic and institutional conditions facing the CPO industry. Corporate financial performance can be related to changes in commodity prices, exchange rate fluctuations, inflation, governance, sustainability requirements, investment decisions, and access to international financing. Previous research has shown that corporate performance and value can be related to macroeconomic

variables, exchange rates, governance mechanisms, hedging decisions, and policies related to environmental, social, and governance aspects (Noja Baditoiu B. R. Buglea A. Munteanu V. P & Gligor Cimpoieru, 2024; Noor et al., 2024; Setiawanta et al., 2020; Yudha et al., 2023). Research on commodity and export conditions also indicates that inflation and international price movements can impact the natural resource-based sector (Muthalib et al., 2023). Although year dummy variables have been used to control for general conditions occurring in each period, they do not identify the individual contributions of each economic and institutional factor. Therefore, management needs to integrate internal financial ratio analysis with monitoring of CPO prices, exchange rates, regulatory changes, and costs associated with meeting sustainability standards when formulating funding and investment strategies.

Overall, the research findings indicate that capital structure and asset growth are related to profitability through different statistical pathways and, in some cases, in opposite directions. Agency Theory is supported by the discovery of the disciplinary benefits and financial costs of concurrent debt use. Signaling Theory is expanded by the finding that leverage ratios can convey mixed signals to stakeholders. Meanwhile, the Resource-Based View is supported by the positive relationship between productive asset growth and ROA. From a managerial perspective, debt financing decisions need to be aligned with asset productivity, cash flow generation capacity, financing costs, and shareholder return objectives. Asset expansion should be evaluated based on its utilization rate and economic contribution, not solely on the basis of increased asset size. Furthermore, a high ROE should not automatically be interpreted as superior performance if the increase is primarily driven by leverage. For investors and creditors, DAR, DER, ROA, and ROE need to be analyzed together to obtain a more balanced assessment of operational efficiency, financial risk, and shareholder profitability.

Because this study uses observational secondary data, the estimated direct, indirect, and total relationships should be interpreted as statistical relationships, not as definitive proof of causality. The possibility of a reciprocal relationship remains, as more profitable firms may choose different capital structures, while leverage and asset growth may also be associated with changes in profitability. Nevertheless, the use of a Random Effects Model, controlling for year effects, standard errors clustered at the firm level, and bootstrapping analysis of indirect relationships provide stronger empirical evidence than pooled regression or conventional cross-sectional analysis. This approach allows the study to consider firm-specific heterogeneity, common conditions across periods, and the interdependence of observations within the same firm. Thus, this study provides empirical evidence specific to the CPO sector that the financial consequences of leverage and asset growth in Indonesian CPO firms depend on the interaction between asset productivity, financing costs, and the accounting basis used to measure profitability.

5. Conclusion

This study provides empirical evidence specific to the CPO sector regarding the relationship between capital structure, asset growth, and profitability in 25 Indonesian CPO companies during the 2014–2024 period. Using a Random Effects Model with year controls and standard errors clustered at the firm level, the results show that DAR and Asset Growth have a positive and significant relationship with ROA, while DER has a negative and significant relationship with ROA. In the ROE model, DAR shows a negative and significant relationship, DER shows a positive and significant relationship, while Asset Growth has no statistically significant relationship. ROE also has a positive and significant relationship with ROA. Thus, six of the seven direct hypotheses are supported, while the hypothesis regarding the relationship between Asset Growth and ROE is not supported.

Further bootstrap analysis results indicate that ROE has a statistically significant indirect role in the relationship between DAR and DER and ROA, but not in the relationship between Asset Growth and ROA. The direct and indirect relationships between DAR and DER move in opposite directions, suggesting either competitive mediation or inconsistent mediation. These findings indicate that the use of leverage can increase one dimension of profitability while simultaneously decreasing another, depending on whether performance is measured by total assets or shareholder equity. Meanwhile, asset growth appears to be more closely related to asset-based profitability than to direct returns to shareholders. This confirms that the economic contribution of additional assets is highly dependent on productivity, maturity level, funding structure, and the effectiveness of their utilization.

From a managerial perspective, debt financing decisions need to be aligned with a company's ability to generate operating profits and stable cash flows, and not solely assessed based on increasing ROE. High ROE can be partly due to the use of financial leverage, so it needs to be analyzed alongside ROA, DAR, and DER to obtain a more comprehensive picture of performance and risk. Similarly, asset growth must be accompanied by effective utilization and post-investment monitoring to ensure that additional resources generate adequate returns. Because this study uses observational secondary data, the estimated relationships should be interpreted as statistical relationships and not as

definitive proof of causality. Further research could incorporate firm-specific variables and additional macroeconomic variables, use alternative panel data estimators, and extend the observation period to provide a more comprehensive explanation of the financial performance of firms in the Indonesian CPO industry.

References

Abadie, A., Athey, S., Imbens, G. W., & Wooldridge, J. M. (2023). When should you adjust standard errors for clustering? *The Quarterly Journal of Economics*, *138*(1), 1–35. https://doi.org/10.1093/qje/qjac038

Abbas, D., Ali, M., Nohong, M., & Sobarsyah, M. (2020). Predicting the Financial Behavior of the Religious Organization Board in Indonesia. *Journal of Asian Finance, Economics and Business*, *7*(12), 1159–1166. https://doi.org/10.13106/JAFEB.2020.VOL7.NO12.1159

Abdullah, K., Jannah, M., Aiman, U., Hasda, S., Taqwin, Z. F. N., Masita, A., & Sari, M. E. (2021). *Quantitative Research Methodology*. Yayasan Penerbit Muhammad Zaini Anggota IKAPI (026/DIA/2012).

Ahmed, A. M., Nugraha, D. P., & Hágen, I. (2023). The Relationship between Capital Structure and Firm Performance: The Moderating Role of Agency Cost. *Risks*, *11*, 102. https://doi.org/10.3390/risks11060102

Ahmed, F., Rahman, M., Rehman, H., Imran, M., Dunay, A., & Hossain, Md. B. (2024). Corporate capital structure effects on corporate performance pursuing a strategy of innovation in manufacturing companies. *Heliyon*, *10*. https://doi.org/10.1016/j.heliyon.2024.e24677

Alfarizi, M., & Sartika, D. (2025). Financial Statement Analysis to Assess the Financial Performance of Palm Oil Companies Listed on the Indonesia Stock Exchange. *Sinergi International Journal of Management and Business*, *3*(3), 193–205. https://doi.org/10.61194/ijmb.v3i3.842

Annisa, M. L., & Amalia, R. F. (2024). Perbandingan Hutang terhadap Ekuitas, Arus Kas Operasi, dan Nilai Perusahaan Konstruksi (Debt to Equity, Operating Cash Flow, and Construction Firm Value). *Reviu Akuntansi, Manajemen, Dan Bisnis (Rambis)*, *5*(1), 17–32.

Arief, I., Hasan, A., Putri, N. T., & Rahman, H. (2023). Literature Reviews of RBV and KBV Theories Reimagined: A Technological Approach Using Text Analysis and Power BI Visualization. *International Journal on Informatics Visualization*, *7*(4). https://doi.org/http://dx.doi.org/10.62527/joiv.7.4.1940

Aristawati, K. A., & Hariyanto, D. (2025). The Influence of Debt to Asset Ratio, Debt to Equity Ratio, Return on Assets, and Return on Equity on Firm Value in Financial Sector Companies Listed on the Indonesia Stock Exchange. *Jurnal Manajemen Bisnis*, *12*(1), 195–210.

Baltagi, B. H. (2021). *Econometric Analysis of Panel Data* (6th ed.). Springer. https://doi.org/10.1007/978-3-030-53953-5

Baltagi, B. H. (2023). The two-way Mundlak estimator. *Econometric Reviews*, *42*(2), 240–246. https://doi.org/10.1080/07474938.2023.2178139

Cherkasova, V., & Kuzmin, E. (2018). Financial Flexibility as an Investment Efficiency Factor in Asian Companies. *Gadjah Mada International Journal of Business*, *20*(2), 137–164.

Cooper, M., Gulen, H., & Ion, M. (2024). The use of asset growth in empirical asset pricing models. *Journal of Financial Economics*, *151*, 103746. https://doi.org/10.1016/j.jfineco.2023.103746

Dsouza, S., Kathavarayan, K., Mathias, F., Bhatia, D., & AlKhawaja, A. (2025). Leveraging Success: The Hidden Peak in Debt and Firm Performance. *Econometrics*, *13*(3). https://doi.org/10.3390/econometrics13020023

Dwi Sunarsih, M., & Nugraheni, T. (2025). Debt To Asset Ratio, Debt To Equity Ratio, Return On Asset, Return On Equity, Net Profit Margin And The Effect On Stock Prices In Indonesia Energy Sector Companies. *Dinasti International Journal of Economics,Finance, and Accounting (DIJEFA)*, *5*(6). https://doi.org/10.38035/dijefa.v5i6

Hilmi, Marjulin, Lilis Puspitawati, & Rayyal Hayati. (2025). Financial Performance Causes Palm Oil Stock Prices In Indonesia To Rise? *Jurnal Akuntansi*, *29*(1), 127–147. https://doi.org/10.24912/ja.v29i1.2741

Intan, D. R., Malau, L. R. E., Rambe, K. R., & Damanik, M. (2024). Factors Affecting the Financial Perfomance of Agricultural Company's: Evidence From the Indonesia Stock Exchange. *AGRISOCIONOMICS - Jurnal Sosial Ekonomi Dan Kebijakan Pertanian*, *8*(2), 457–470.

Invesnesia. (2024). *Daftar Saham CPO (Kelapa Sawit) di Bursa Efek Indonesia 2024*. https://www.invesnesia.com/daftar-saham-cpo-di-bursa-efek-indonesia/

Iskandar, D. (2021). The Effect Of Profitability And Sales Growth On Company Value Moderated By Leverage. *International Journal of Management Studies and Social Science Research, IJMSSSR*, *3*(5), 32–41.

Jannah, S. M., & Sartika, F. (2022). The effect of good corporate governance and company size on firm value: Financial performance as an intervening variable. *International Journal of Research in Business and Social Science (*, *11*(2), 241–251.

Kamasak, R. (2017). The contribution of tangible and intangible resources, and capabilities to a firm's profitability and market performance. *European Journal of Management and Business Economics*, *26*(2), 252–275.

Khoza, F. (2025). The Impact of Liquidity and Leverage on the Financial Performance of the Johannesburg Stock Exchange-Listed Consumer Goods Firms. *Journal of Risk and Financial Management*, *18*(9). https://doi.org/10.3390/jrfm18090510

Lan, Z. J. (2012). Breaking Down ROE Using the DuPont Formula. *Financial Statement Analysis. AAII Journal – December 2012*.

Lesmono, B., & Siregar, S. (2021). Studi Literatur Tentang Agency Theory. *Ekonomi, Keuangan, Investasi Dan Syariah (EKUITAS)*, *3*(2).

Lestari, A., Ichsanti, N. K., & Ningsih, S. (2025). Capital Structure and Its Effects on Firm Performance and Value: Evidence from Non-Financial Firms in Southeast Asia. *JASa (Jurnal Akuntansi, Audit Dan Sistem Informasi Akuntansi)*, *9*(3), 503–511. https://doi.org/10.36555/jasa.v9i3.2921

MacKinnon, J. G., Nielsen, M. Ø., & Webb, M. D. (2023). Cluster-robust inference: A guide to empirical practice. *Journal of Econometrics*, *232*(2), 272–299. https://doi.org/10.1016/j.jeconom.2022.04.001

Malau, L. R. E., & Rambe, K. R. (2022). Efek sertifikasi RSPO dan determinan lainnya terhadap kinerja keuangan perusahaan perkebunan kelapa sawit di Indonesia. *Jurnal Ekonomi Modernisasi, 18(2) 2022, 184-198*, 184–198.

Matias, F., Rebelo, S., Andraz, G., & Guerreiro, J. (2024). The Influence of Firm Characteristics and Macroeconomic Factors on Financial Performance: Evidence from the Portuguese Hotel Industry. *Economies*, *12*(11). https://doi.org/10.3390/economies12110306

Muthalib, D. A., Muthalib, A. A., Nuryadi, A. M., Arifuddin, H., L.O.M., K., M., S., L.O., A., & Tambunan, R. (2023). The Effect of Crude Oil Price and Inflation on Algae Eksport in Indonesia. *International Journal of Energy Economics and Policy*, *13*(3), 507–511.

Nemati T. Javed M, A. R., & Sidiqui, U. (2021). Impact Of Asset Growth And Equity Multiplier On The Financial Performance Of Microfinance Banks Of Pakistan. *International Journal of Management Research and Emerging Sciences*, *11*(3), 123–136.

Nguyen, V. H. (2025). Corporate social responsibility disclosure and firm value: a signaling theory perspective. *Journal of Economics and Development*, *27*(2), 114–128. https://doi.org/10.1108/JED-02-2024-0067

Ningrum, E. , P. (2022). *Nilai Perusahaan (Konsep dan Aplikasi)* (Kodri, Ed.). Indramayu Jawa Barat: CV. Adanu Abimata.

Nohong, M. (2016). Inovasi, Pertumbuhan, Ukuran Dan Nilai Perusahaan Farmasi Di Indonesia. *Jurnal Keuangan Dan Perbankan*, *20*(2), 176–185.

Noja Baditoiu B. R. Buglea A. Munteanu V. P, G. G., & Gligor Cimpoieru, D. C. (2024). The impact of environmental, social and governance policies on companies' financial and economic performance: A comprehensive approach and new empirical evidence. *E&M Economics and Management, 27(1), 121–144. 2024*.

Noor, A. S., Alam, S., Nohong, M., & Sobarsyah, M. (2024). Investigating the impact of corporate governance and investment decisions on financial performance and firm value in insurance and banking sectors. *Published in Insurance Markets and Companies 30 December*. https://doi.org/10.21511/ins.15(2

Park, B., & Paientko, T. (2025). Assessing the Impact of Capital Expenditure on Corporate Profitability in South Korea's Electronics Industry: A Regression Analysis Approach. *Analytics*, *4*, 36. https://doi.org/10.3390/analytics4040036

Phassawan, S. (2023). The Mediating Effect of Profitability on The Relationship Between Working Capital Management And Sustainable Growth. *Studies in Business and Economics*, (18), 315–327.

Priscilla Ramli A, Y., & Anwar. (2021). Pengaruh Pertumbuhan Asset Dan Struktur Modal Terhadap Profitabilitas Perusahaan Sub Sektor Telekomunikasi Di BEI. *Tirtayasa Ekonomika, 16 (2)*, 190–200.

Purnama, M. G., Yuniarti, S., Terdpaopong, K., Subiyantoro, E., & Khouroh, U. (2024). Determinants of Company Value: Empirical Evidence from Consumer Goods Industrial Companies in Indonesia. *Jurnal Manajemen Bisnis*, *15*(1), 203–225. https://doi.org/10.18196/mb.v15i1.20114

Puspitaningtyas, Z., Sisbintari, I., Karyadi, H., & Dwimahendrawan, A. (2022). Is Accounting Information Relevant as an Early Warning Signal? *Jurnal Akuntansi Multiparadigma*, *13*. https://doi.org/10.21776/ub.jamal.2022.13.2.22

Rizka, N. R., & Ulfida, D. (2024). Asset Growth and Firm Performance: The Moderating Role of Asset Utilization. *BAJ (Behavioral Accounting Journal)*, *7*(2), 88–105.

Rosyidi, A., & Prasetya, H. (2023). Pengaruh Debt to Equity Ratio, Return on Equity, Dan Suku Bunga terhadap Harga Saham PT Unilever Indonesia Tbk Yang Terdaftar di Bursa Efek Indonesia Tahun 2011-2020. *PRAGMATIS Jurnal Manajemen Dan Bisnis*, *4*(1), 8–17.

Serrasqueiro, Z., Pinto, B., & Sardo, F. (2023). SMEs growth and profitability, productivity and debt relationships. *Journal of Economics, Finance and Administrative Science:*, (56), 404–419.

Setiawan, E. (2022). *Profitabilitas, Ukuran Perusahaan Dan Pertumbuhan Asset Serta Pengaruhnya Terhadap Leverage Pada Perusahaan* (E. Setiawan, Ed.). Perkumpulan Rumah Cemerlang Indonesia.

Setiawanta, Y., Utomo, D., Ghozali, I., & Jumanto, J. (2020). Financial Performance, Exchange Rate, and Firm Value: The Indonesian Public Companies Case. *Organizations and Markets in Emerging Economies*, *11*(2), 348–366.

Siswanto, E. (2021). *Buku Ajar Manajemen Keuangan Dasar*. Universitas Negeri Malang.

Sodik, F. J., & Manda, G. S. (2025). The Effect of Debt to Equity Ratio (DER) and Sales Growth on ROA of Manufacturing Companies listed on the IDX for the 2021-2024 Period. *International Journal of Economics and Management Research*, *4*(3), 79–89. https://doi.org/10.55606/ijemr.v4i3.500

Sohilauw, M. I., Ali, M., Pahlevi, C., & Nohong, M. (2019). Moderation of Customer Mentoring and Relationship Management (CMRM) to the relationship between capital structure decision with SME financial performance in Makassar City. *IOP Conf. Series: Earth and Environmental Science 235*.

Susilo, I., & Kurniasih, A. (2025). Financial Performance Determinants Moderated by Company Size: The Case of Palm Oil Plantation Sub-Sector in Indonesia. *International Journal of Social and Management Studies (IJOSMAS)*, *6*(5), 89–99. https://doi.org/10.5555/ijosmas.v6i5.535

Usman, B., O.T.F. Bernardesb, O. T. F., & Kananluaa, P. S. (2020). On the Nexus Between CSR Practices, ESG Performance, and Asymmetric information. *Gadjah Mada International Journal of Business*, *22*(2), 151–177.

Voutsinas, K., & Werner, R. A. (2025). Trade-off theory vs. the pecking order hypothesis: Japanese evidence on capital structure under financial constraints. *Structural Change and Economic Dynamics*, *74*, 944–962. https://doi.org/10.1016/j.strueco.2025.06.004

Vuković, B., Milutinović, M., Mijić, K., Krsmanović, B., & Jakšić, D. (2022). Analysis of financial performance determinants: evidence from the european agricultural companies. *Custos e @gronegócio Online - v. 18, n. 1, Jan/Mar –*, 285–306.

Wooldridge, J. M. (2025). Two-way fixed effects, the two-way Mundlak regression, and difference-in-differences estimators. *Empirical Economics*, *69*(5), 2545–2587. https://doi.org/10.1007/s00181-025-02807-z

Yudha, J. O. M., Oktavia, R., & Desriani, N. (2023). The Effect of Foreign Debt, Liquidity, Firm Size, and Exchange Rate on Hedging Decision. *Journal of Indonesian Economy and Business*, *38*(2), 133–146.