JUEB: **Jurnal Ekonomi dan Bisnis** **Vol. 5. No. 2 Juni 2026**
http://jurnal.jomparnd.com/index.php/jk *e-ISSN: 2828-8858 p-ISSN: 2829-0011*

Capital Structure and Profitability: The Moderating Roles of Liquidity and Firm Size in Pharmaceutical Companies Listed on the Indonesia Stock Exchange During 2020–2024

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Abstract

This study investigates the effect of capital structure on profitability and examines whether liquidity and firm size moderate the relationship in pharmaceutical companies listed on the Indonesia Stock Exchange during 2020–2024. Using a quantitative research design, the study analyzes balanced panel data from 10 pharmaceutical firms, resulting in 50 firm-year observations. Capital structure is measured by the Debt-to-Equity Ratio (DER), profitability by Return on Assets (ROA), liquidity by the Current Ratio (CR), and firm size by the natural logarithm of total assets (SIZE). The data were analyzed using the Fixed Effect Model (FEM) and Moderated Regression Analysis (MRA). The findings reveal that capital structure does not significantly affect profitability (p = 0.0849). In addition, liquidity does not moderate the relationship between capital structure and profitability (p = 0.5616). However, firm size significantly moderates the relationship (p = 0.0248), with a negative interaction coefficient, indicating that the influence of capital structure on profitability becomes weaker as firm size increases. These results suggest that debt financing is not the primary driver of profitability in pharmaceutical firms, particularly in the post-pandemic business environment. This study extends the capital structure literature by highlighting firm size as a significant contingency factor that shapes the effectiveness of leverage in improving profitability. The findings provide valuable insights for managers in formulating financing policies and for investors in evaluating the financial performance of pharmaceutical companies.

Keywords: *Capital structure, Liquidity, Firm size, Pharmaceutical companies, Profitability*

INTRODUCTION

Profitability is widely recognized as one of the most important indicators of corporate performance because it reflects a firm's ability to generate earnings and sustain long-term growth. For investors, creditors, and other stakeholders, profitability serves as a key benchmark in evaluating corporate prospects and long-term sustainability. Therefore, understanding the factors that influence profitability remains an important issue in financial management research, particularly in industries facing dynamic business environments and increasing competitive pressures.

The pharmaceutical industry is one of the strategic sectors that contributes significantly to economic development and public health. During the COVID-19 pandemic, pharmaceutical companies experienced substantial growth due to increased demand for medicines, vaccines, and healthcare products. However, the post-pandemic period has brought new challenges, including declining demand for pandemic-related products, rising production costs, fluctuations in imported raw material prices,

and intensified market competition. In Indonesia, these changing business conditions require pharmaceutical companies to manage financing decisions and operational resources more effectively to maintain financial performance and ensure sustainable growth. Consequently, understanding the determinants of profitability has become increasingly important, particularly in relation to capital structure decisions and firm-specific characteristics.

In an effort to improve profitability, companies must pay attention to various internal factors that influence their ability to generate earnings. One of the most widely discussed factors in financial management literature is capital structure, which reflects the proportion of financing derived from debt and equity. According to Trade-Off Theory, the use of debt may enhance firm performance through tax shield benefits. However, excessive debt utilization may increase financial distress costs and bankruptcy risks, potentially reducing profitability. Consequently, determining the optimal capital structure remains an important challenge for corporate managers. Given these competing effects, the relationship between capital structure and profitability continues to attract considerable attention among researchers and practitioners.

In addition to capital structure, liquidity is considered an important factor that may influence corporate profitability. Firms with strong liquidity positions generally possess greater financial flexibility and are better able to fulfill debt-related obligations, thereby supporting operational stability. Previous studies have suggested that liquidity may influence the effectiveness of debt utilization in generating profitability. Therefore, liquidity is expected to moderate the relationship between capital structure and firm performance.

Another important factor that may influence the relationship between capital structure and profitability is firm size. According to Signaling Theory (Spence, 1973), larger firms generally provide stronger signals of financial stability and lower risk, thereby enhancing their credibility among investors and creditors. Moreover, firms with larger asset bases typically possess greater resources and financing alternatives, which may affect the effectiveness of debt utilization in generating profitability. Empirical studies by Ahmed et al. (2023) and Alghifari et al. (2022) also suggest that firm size plays an important role in financing decisions and corporate performance. Therefore, firm size is expected to moderate the relationship between capital structure and profitability.

Table 1 presents the average values of capital structure, profitability, liquidity, and firm size of pharmaceutical sub-sector companies listed on the Indonesia Stock Exchange during the 2020–2024 period.

Table 1. Average Capital Structure, Profitability, Liquidity, and Firm Size

Year	DER	ROA	CR	SIZE
2020	0.928	0.088	2.340	28.665
2021	1.176	0.083	2.588	28.815
2022	2.380	0.078	2.481	28.895
2023	0.643	-0.026	2.679	28.800
2024	1.100	0.008	2.691	28.915

Source: Secondary Data (processed, 2026)

Ratio (DER) increased from 0.928 in 2020 to 2.380 in 2022, profitability,

measured by Return on Assets (ROA), declined during the same period. In addition, improvements in liquidity were not accompanied by corresponding increases in profitability, while firm size remained relatively stable despite substantial fluctuations in ROA. These patterns suggest that the relationship between capital structure and profitability may not be straightforward and indicate the presence of other factors that influence the effectiveness of leverage in generating profits. Therefore, examining the moderating roles of liquidity and firm size may provide a more comprehensive understanding of how capital structure affects profitability in pharmaceutical firms.

Previous studies have reported inconsistent findings regarding the relationship between capital structure and profitability. Adyatmika and Wiksuana (2018); Arhinful and Radmehr (2023); and Muhammad et al. (2023) found that capital structure significantly influences corporate performance. In contrast, Dangs et al. (2026) argued that the effect of leverage may vary across industries and firm characteristics. These inconsistent findings indicate that the relationship between capital structure and profitability requires further investigation. Therefore, the following hypothesis is proposed:

H1: Capital structure has a significant effect on profitability.

One factor that may influence the relationship between capital structure and profitability is liquidity. Firms with strong liquidity positions generally possess greater financial flexibility and are better able to fulfill debt-related obligations. Previous studies by Sunaryo et al. (2021) and Inrawan et al. (2025) suggest that liquidity may influence the effectiveness of debt utilization in generating profitability. Therefore, liquidity is expected to moderate the relationship between capital structure and profitability. The following hypothesis is proposed:

H2: Liquidity moderates the relationship between capital structure and profitability.

In addition to liquidity, firm size is also expected to influence the relationship between capital structure and profitability. According to Signaling Theory (Spence, 1973), larger firms generally provide stronger signals of financial stability and lower risk, thereby enhancing their credibility among investors and creditors. Moreover, firms with larger asset bases typically possess greater resources and financing alternatives, which may affect the effectiveness of debt utilization in generating profitability. Empirical studies by Ahmed et al. (2023) and Alghifari et al. (2022) also suggest that firm size plays an important role in financing decisions and corporate performance. Therefore, firm size is expected to moderate the relationship between capital structure and profitability. The following hypothesis is proposed:

H3: Firm size moderates the relationship between capital structure and profitability.

Despite the extensive literature on capital structure and profitability, several gaps remain. Previous studies have largely focused on the direct effect of capital structure on profitability, while limited attention has been given to the moderating roles of liquidity and firm size. In addition,

empirical evidence regarding these moderating effects remains inconclusive, particularly in the pharmaceutical industry. Research examining pharmaceutical companies listed on the Indonesia Stock Exchange during the post-pandemic period is still scarce, despite the sector's unique characteristics and changing business environment. Therefore, this study seeks to extend the existing literature by examining whether liquidity and firm size serve as important contingency factors in the relationship between capital structure and profitability.

Based on the foregoing discussion, this study aims to examine the effect of capital structure on profitability and investigate the moderating roles of liquidity and firm size among pharmaceutical companies listed on the Indonesia Stock Exchange during the 2020–2024 period. The findings are expected to contribute to the financial management literature and provide practical insights for managers in formulating effective financing policies.

METHOD

This study employs a quantitative approach with an associative design to examine the effect of capital structure on profitability and the moderating roles of liquidity and firm size. The study utilizes secondary data obtained from the annual financial statements of pharmaceutical sub-sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The data were analyzed using EViews 13 software through panel data regression and Moderated Regression Analysis (MRA).

The sample was selected using a purposive sampling technique based on criteria relevant to the objectives of the study. The sample selection process is presented in Table 2.

Table 2. Sample Selection Criteria

No.	Criteria	Total
1	Pharmaceutical sub-sector companies listed on the Indonesia Stock Exchange during the 2020–2024 period	13
2	Pharmaceutical sub-sector companies that did not publish complete audited annual financial statements during the 2020–2024 period	(3)
3	Total sample firms	10
4	Total observations (10 firms × 5 years)	50

Profitability (ROA) serves as the dependent variable, while capital structure (DER) is employed as the independent variable. Liquidity (CR) and firm size (SIZE) are incorporated as moderating variables. The operational definitions and measurements of the variables are presented in Table 3.

Table 3. Variable Measurement

Variable	Description	Measurement	Reference
Profitability (ROA)	Measures the firm's ability to generate profits from total assets	Net Income / Total Assets	Brigham & Houston (2020)
Capital Structure (DER)	Measures the proportion of debt financing relative to equity	Total Debt / Total Equity	Brigham & Houston (2020)
Liquidity (CR)	Measures the firm's ability to meet short-term obligations	Current Assets / Current Liabilities	Brigham & Houston (2020)
Firm Size	Measures	Ln Total	Ahmed

(SIZE)	the scale of company operations	Assets	et al. (2023)

Descriptive statistical analysis is employed to provide an overview of the characteristics of the research data through minimum values, maximum values, means, and standard deviations of each variable.

This study employs panel data regression analysis because the data consist of both cross-sectional and time-series observations. The model selection procedure involves the Chow Test and Hausman Test to determine the most appropriate estimation model. Based on these tests, the Fixed Effect Model (FEM) was selected because it controls for unobserved firm-specific effects and provides more reliable coefficient estimates. To examine the moderating effects of liquidity and firm size, Moderated Regression Analysis (MRA) was applied by incorporating interaction terms between capital structure and liquidity (DERxCR), as well as between capital structure and firm size (DERxSIZE). The regression models are specified as follows:

Model 1: Direct Effect of Capital Structure on Profitability

$ROA_{it} = \beta0 + \beta1DER_{it} + \varepsilon$

Model 2: Moderating Effect of Liquidity

$ROA_{it} = \beta0 + \beta1DER_{it} + \beta2CR_{it} + \beta3(DERxCR)_{it} + \varepsilon_{it}$

Model 3: Moderating Effect of Firm Size

$ROA_{it} = \beta0 + \beta1DER_{it} + \beta2SIZE_{it} + \beta3(DERxSIZE)_{it} + \varepsilon_{it}$

Where:

ROA_{it}= profitability of firm i in year t;
DER_{it}= capital structure of firm i in year t;
CR_{it} = liquidity of firm i in year t;
$SIZE_{it}$ = firm size of firm i in year t;
i = individual company (cross-section);
t = observation year (time period);
εit = error term.

The data were analyzed using EViews 13 software through several stages. Model selection tests, namely the Chow Test and Hausman Test, were conducted to determine the most appropriate panel data regression model. Subsequently, diagnostic tests, including normality, multicollinearity, heteroscedasticity, and autocorrelation tests, were performed to evaluate the adequacy of the regression model. Finally, panel data regression using the Fixed Effect Model (FEM) was employed to examine the effect of capital structure on profitability, while Moderated Regression Analysis (MRA) was applied to investigate the moderating roles of liquidity and firm size.

RESULTS AND DISCUSSION

1. Descriptive Statistics

The descriptive statistics of the research variables are presented in Table 4.

Table 4, Descriptive Statistics

	DER	ROA	CR	SIZE
Mean	1.246	0.046	2.556	28.818
Median	0.495	0.091	2.556	28.329
Maximum	16.765	0.310	6.517	31.013
Minimum	-1.945	-0.949	0.089	26.155
Std. Dev.	2.555	0.197	1.502	1.227
Observations	50	50	50	50

Source: Secondary Data (processed, 2026)

Table 4 presents the descriptive statistics of the variables used in this study. Capital structure (DER) has an average value of 1.246, while profitability (ROA), liquidity (CR), and firm size (SIZE) record mean values of 0.046, 2.556, and 28.818, respectively. The results indicate considerable variation in DER and ROA, as reflected by their relatively high standard

deviations. In contrast, CR and SIZE exhibit lower variability, suggesting that liquidity and firm size are relatively stable across firms and observation periods. The negative minimum value of DER (-1.945) indicates that one or more firms experienced negative equity during the observation period, which may occur when accumulated losses exceed shareholders' equity. Therefore, the negative DER value reflects financial distress conditions rather than a conventional capital structure.

Figure 1 illustrates the trends in the average Debt-to-Equity Ratio (DER) and Return on Assets (ROA) of pharmaceutical companies during the 2020–2024 period. The figure shows that changes in leverage were not consistently followed by changes in profitability, suggesting that the relationship between capital structure and profitability may not be straightforward.

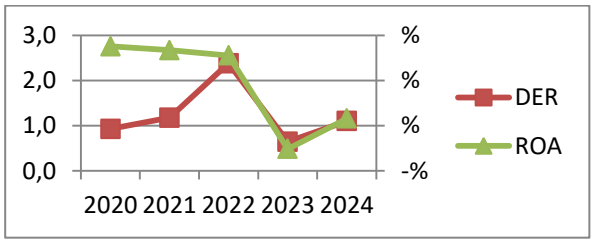

Figure 1. Trend of Average DER and ROA of Pharmaceutical Companies During 2020–2024

2. Model Selection

The results of the panel data model selection tests are presented in Table 5.

Table 5 Model Selection

Model	Chow Test (Prob.)	Hausman Test (Prob.)	Selected Model
Model 1	0.0000	0.0000	Fixed Effect Model
Model 2	0.0005	0.0394	Fixed Effect Model
Model 3	0.0000	0.0012	Fixed Effect Model

Source: Secondary Data (processed, 2026)

The results of the panel data model selection tests are presented in Table 5. The Chow and Hausman tests consistently produce probability values below the 5% significance level for all specified models, indicating that the Fixed Effect Model (FEM) is the most appropriate estimation approach. These results suggest the presence of unobserved firm-specific characteristics among pharmaceutical companies. From an economic perspective, differences in innovation capacity, operational efficiency, product development activities, and market share may affect profitability but are difficult to measure directly. Therefore, all hypothesis testing procedures in this study were conducted using the Fixed Effect Model.

3. Normality Test

The results of the normality test are presented in Table 6.

Table 6. Normality Test

Model	Statistic Type	Statistic	Prob.
	Skewness	-0.56515	0.714013
	Skewness		
Model 1	(Adj.)	1.70885	0.043739
	Kurtosis	1.609864	0.053714
	Normality	3.393499	0.183278
	Skewness	-0.69127	0.755301
	Skewness		
Model 2	(Adj.)	1.624989	0.052082
	Kurtosis	1.543889	0.061308
	Normality	3.440175	**0.179051**
	Skewness	-0.74543	0.771993
	Skewness		
Model 3	(Adj.)	1.9099	0.028073
	Kurtosis	1.481736	0.069205
	Normality	5.224231	0.073379

Source: Secondary Data (processed, 2026)

The results indicate that all models have probability values greater than 0.05, suggesting that the residuals are normally distributed. Therefore, the normality assumption is satisfied, indicating that the regression models are appropriate for further analysis.

4. Multicollinearity Test

The results of the multicollinearity test are presented in Table 7.

Table 7. Multicollinearity Test Results

	DER	CR	SIZE
DER	1	-0.34444	-0.06515
CR	-0.34444	1	0.136852
SIZE	-0.0652	0.13685	1

Source: Secondary Data (processed, 2026)

The correlation coefficients among all independent variables are below the commonly accepted threshold of 0.80, indicating the absence of multicollinearity in the regression models. These results confirm that the independent variables can be included simultaneously in the estimation model without causing bias due to high intercorrelations among the explanatory variables.

5. Heteroscedasticity Test

The results of the heteroscedasticity test are presented in Table 8.

Table 8 .Heteroscedasticity test

Model	Heteroskedasticity Test: Breusch-Pagan-Godfrey			
	Null hypothesis: Homoskedasticity			
Model 1	F-statistic	2.396	Prob. F(1,48)	0.128
	Obs*R-squared	2.377	Prob. Chi-Square(1)	0.123
	Scaled explained SS	19.542	Prob. Chi-Square(1)	0.000
Model 2	F-statistic	2.180	Prob. F(3,46)	0.103
	Obs*R-squared	6.223	Prob. Chi-Square(3)	0.101
	Scaled explained SS	37.282	Prob. Chi-Square(3)	0.000
Model 3	F-statistic	2.560	Prob. F(3,46)	0.066
	Obs*R-squared	7.154	Prob. Chi-Square(3)	0.067
	Scaled explained SS	42.406	Prob. Chi-Square(3)	0.000

Source: Secondary Data (processed, 2026)

Overall, all three research models exhibit Obs*R-squared probability values greater than 0.05. Therefore, it can be concluded that all regression models employed in this study satisfy the homoscedasticity assumption. In other words, the residual variances are constant across observations, indicating that the estimated regression results are reliable and free from heteroscedasticity-related bias.

6. Autocorrelation Test

The results of the autocorrelation test are presented in Table 9.

Table 9. Autocorrelation test

Model	Nilai Durbin-Watson statistic
Model 1	1.491471
Model 2	1.636873
Model 3	1.902402

Source: Secondary Data (processed, 2026)

The results of the autocorrelation test are presented in Table 9. The Durbin–Watson statistics for all models range from 1.49 to 1.90, which are relatively close to the benchmark value of 2 and fall within the acceptable range suggested by Gujarati and Porter (2012). Therefore, it can be concluded that the regression models do not suffer from serious autocorrelation problems and are suitable for further analysis.

Effect of Capital Structure on Profitability

The results of the panel data regression analysis using the Fixed Effect Model (FEM) to examine the effect of capital structure on profitability are presented in Table 10.

Table 10. Regression Results of Model 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0279	0.0211	1.3219	0.1939
DER	0.0147	0.0083	1.7676	0.0849
R-squared	0.6536	Mean dependent var		0.0462
Adjusted R-squared	0.5648	S.D. dependent var		0.1972

F-statistic	7.3587	Durbin-Watson stat	1.4915
Prob(F-statistic)	0.000002		

Source: Secondary Data (processed, 2026)

The regression model is statistically significant, as indicated by the F-statistic of 7.3587 and a Prob(F-statistic) value of 0.000002. In addition, the Adjusted R-squared value of 0.5648 indicates that approximately 56.48% of the variation in profitability can be explained by the variables included in the model, while the remaining variation is attributable to other factors not considered in this study.

The results indicate that capital structure, measured by the Debt-to-Equity Ratio (DER), does not have a significant effect on profitability among pharmaceutical companies listed on the Indonesia Stock Exchange during the 2020–2024 period. The insignificant effect suggests that changes in the proportion of debt and equity financing are not sufficient to significantly improve or reduce corporate profitability. Although leverage may provide additional financial resources, the benefits derived from debt financing may be offset by higher interest expenses and financial obligations, resulting in an insignificant net effect on profitability.

According to Trade-Off Theory proposed by Kraus and Litzenberger (1973), debt financing may enhance firm performance through tax shield benefits. However, as the level of debt increases, firms also face higher financial distress costs and bankruptcy risks. Under such circumstances, the benefits of debt financing may be balanced or even outweighed by the risks associated with debt, resulting in an insignificant relationship between capital structure and profitability.

The findings may also be explained by the characteristics of the pharmaceutical industry, which requires substantial long-term investment, significant research and development (R&D) expenditures, and compliance with strict government regulations. In addition, the post-pandemic business environment has altered the relationship between leverage and profitability. Following the COVID-19 pandemic, demand growth gradually normalized, while firms continued to face rising production costs, supply chain adjustments, and increasing competitive pressures. Consequently, profitability became more dependent on operational efficiency, product innovation, market expansion, and business strategies than on financing decisions alone. Therefore, additional debt financing was not necessarily translated into higher profitability.

The results are consistent with the empirical phenomenon observed among pharmaceutical companies during the study period. The average DER increased from 0.928 in 2020 to 2.380 in 2022, while ROA declined from 8.77% to 7.77%. Furthermore, when DER decreased to 0.643 in 2023, profitability continued to decline and eventually became negative. These patterns indicate that changes in leverage were not consistently followed by changes in profitability, thereby contributing to the statistically insignificant relationship between the two variables.

The findings support the study of Alarussi and Alhaderi (2018), who argued that corporate profitability is influenced not

only by capital structure but also by various internal factors, including asset utilization efficiency, operational activities, and firm characteristics. Similarly, Hossain (2021) suggested that profitability is determined by multiple financial factors, implying that capital structure is not the sole determinant of corporate performance.

However, the results contradict the findings of Adyatmika and Wiksuana (2018), Arhinful and Radmehr (2023), and Muhammad et al. (2023), who reported a significant effect of leverage or capital structure on corporate profitability. These differences may be attributed to variations in industry characteristics, research periods, economic conditions, and firm-specific attributes across the sampled companies.

Overall, the findings indicate that capital structure is not the primary determinant of profitability among pharmaceutical sub-sector companies during the 2020–2024 period. This suggests that firms should place greater emphasis on improving operational efficiency, asset management, liquidity management, innovation activities, and business development strategies rather than relying solely on increased debt financing as a means of enhancing profitability.

Moderating Role of Liquidity in the Relationship Between Capital Structure and Profitability

The moderating effect of liquidity was examined using Moderated Regression Analysis (MRA) by incorporating an interaction term between capital structure (DER) and liquidity (CR). The regression results are presented in Table 11.

Table 11. Regression Results of Model 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.1331	0.0809	-1.6449	0.1085
DER	-0.0098	0.0425	-0.2316	0.8181
CR	0.0526	0.0263	1.9969	0.0532
DER_CR	0.0303	0.0518	0.5858	0.5616
R-squared	0.6915	Mean dependent var		0.0462
Adjusted R-squared	0.5914	S.D. dependent var		0.1972
F-statistic	6.9098	Durbin-Watson stat		1.6369
Prob(F-statistic)	0.000002			

Source: Secondary Data (processed, 2026)

Based on the regression results, the F-statistic is 6.9098 with a Prob(F-statistic) value of 0.000002, indicating that the regression model is statistically significant. In addition, the Adjusted R-squared value of 0.5914 indicates that capital structure, liquidity, and their interaction explain 59.14% of the variation in profitability, while the remaining 40.86% is explained by other factors outside the scope of the model.

The results reveal that the interaction term between DER and CR (DER×CR) has a positive coefficient of 0.0303 with a probability value of 0.5616. Since the probability value exceeds the 5% significance level, liquidity, proxied by the Current Ratio (CR), does not moderate the effect of capital structure on profitability. These findings indicate that a firm's ability to meet its short-term obligations is unable to either strengthen or weaken the relationship between capital structure and profitability. Although high liquidity is theoretically expected to support the effective utilization of debt by reducing financial risk and improving operational stability, the findings suggest that this theoretical expectation does not apply to

pharmaceutical companies during the observation period.

This result may be explained by the characteristics of the pharmaceutical industry, which is characterized by complex business cycles and substantial expenditures on research and technological development. Corporate profitability in this sector is influenced not only by the ability to fulfill short-term obligations but also by factors such as operational efficiency, product innovation, marketing strategies, and the ability to respond to changing market demands. Furthermore, the post-pandemic business environment may have altered firms' liquidity management practices, making profitability more dependent on strategic decisions and operational performance than on the availability of current assets. Consequently, high liquidity does not necessarily improve the effectiveness of debt utilization in generating profits.

The insignificant moderating effect may also be related to the liquidity proxy employed in this study. Although the Current Ratio is widely used to assess a firm's ability to meet short-term obligations, it primarily reflects the proportion of current assets relative to current liabilities and does not necessarily capture the firm's actual cash-generating capacity. Alternative liquidity measures, such as the Quick Ratio and Cash Ratio, may provide different perspectives on corporate liquidity and could potentially yield different empirical results.

The findings further suggest that liquidity plays a more direct role in influencing firm performance rather than serving as a contingency factor that alters the relationship between capital structure and profitability. This finding is consistent with Sudiyatno and Suwarti (2022), who argued that liquidity is an important determinant of corporate performance. Similarly, Bintara (2020) found that liquidity is associated with profitability but does not necessarily explain how debt-financing decisions affect financial performance. Furthermore, Nugraha et al. (2020) and Imronudin et al. (2023) reported that liquidity and leverage contribute to corporate performance through different mechanisms, implying that the relationship between the two variables is not always interactive in nature.

However, the findings contradict those of Sunaryo et al. (2021) and Inrawan et al. (2025), who reported that liquidity significantly moderates the relationship between leverage and profitability. These differences may be attributed to variations in industry characteristics, research periods, and economic conditions. Unlike many industries in which working capital management directly supports production and sales activities, pharmaceutical companies operate in a highly regulated environment and require substantial investment in research and development, innovation, and product commercialization. Consequently, the moderating role of liquidity observed in previous studies may not necessarily apply to pharmaceutical companies during the 2020–2024 period.

Moreover, capital structure remains insignificant in both Model 1 and Model 2. When the direct relationship between capital structure and profitability is insignificant, liquidity is unable to alter or strengthen that relationship. Therefore, liquidity is not a contingency factor that determines the

effectiveness of debt utilization in enhancing profitability among pharmaceutical companies. Overall, the findings imply that improving a firm's ability to meet short-term obligations does not necessarily enhance the effectiveness of debt financing in generating profits. Hence, pharmaceutical companies should place greater emphasis on operational efficiency, asset utilization, product innovation, and growth strategies rather than relying solely on liquidity conditions to maximize the benefits of debt financing.

Moderating Role of Firm Size in the Relationship Between Capital Structure and Profitability

Based on the regression results, the F-statistic is 7.3590 with a Prob(F-statistic) value of 0.000001, indicating that the regression model is statistically significant and suitable for explaining variations in profitability among pharmaceutical companies. In addition, the Adjusted R-squared value of 0.6090 indicates that capital structure, firm size, and their interaction explain approximately 60.90% of the variation in profitability, while the remaining variation is attributable to other factors outside the model. This explanatory power is higher than that of Model 1 and Model 2, suggesting that the inclusion of firm size improves the model's ability to explain corporate profitability.

The results indicate that the interaction coefficient between capital structure and firm size (DER×SIZE) is negative and statistically significant. Therefore, firm size significantly moderates the effect of capital structure on profitability, supporting the third hypothesis. The negative interaction coefficient suggests that as firm size increases, the influence of capital structure on profitability becomes weaker. This finding implies that pharmaceutical companies with larger asset bases tend to rely less on debt financing as a primary means of enhancing profitability.

One of the most interesting findings of this study is that capital structure was insignificant in Model 1, but became statistically significant after firm size and the interaction term were incorporated into Model 3. This result indicates that firm size serves as an important contingency factor in explaining the relationship between capital structure and profitability. Therefore, differences in firm size should be considered when evaluating the effectiveness of debt utilization in enhancing profitability among pharmaceutical companies.

These findings can be explained through Signaling Theory proposed by Spence (1973). According to this theory, larger firms provide stronger signals of financial stability and lower risk, thereby enhancing their credibility among investors and creditors. Consequently, firms with substantial total assets generally possess greater resources to generate profits through operational efficiency, product innovation, business diversification, and broader market coverage. Therefore, increases in debt utilization do not necessarily result in significant improvements in profitability for larger firms.

The findings are also consistent with the Pecking Order Theory, which suggests that firms prefer internal financing over external debt whenever sufficient internal funds are available. Large pharmaceutical companies generally possess greater financial flexibility and stronger internal funding

capacity, enabling them to finance investment and operational activities without relying heavily on debt. Consequently, the contribution of leverage to profitability becomes weaker as firm size increases, resulting in a negative moderating effect.

The findings may also be explained by the characteristics of the pharmaceutical industry, which requires substantial long-term investments in research, product development, and technological innovation. Large pharmaceutical companies generally possess stronger internal financing capabilities to support such activities. As a result, their reliance on debt financing becomes relatively lower, causing the effect of capital structure on profitability to weaken as firm size increases.

The results are consistent with the findings of Ahmed et al. (2023), who reported that firm size influences the relationship between capital structure and profitability. The findings also support Alghifari et al. (2022), who argued that firm size is an important determinant of financing decisions and corporate performance. Similarly, Alarussi and Alhaderi (2018) identified firm size as one of the key determinants of corporate profitability. These findings suggest that differences in firm size should be taken into consideration when evaluating the effectiveness of debt utilization in enhancing profitability.

From a managerial perspective, the negative moderating coefficient implies that managers of large pharmaceutical companies should not rely excessively on debt financing as a strategy for improving profitability. Although larger firms generally have easier access to external financing, profitability appears to be driven more by operational efficiency, innovation capability, product development, and strategic resource allocation. Therefore, managers should prioritize internal resource utilization and long-term business development rather than increasing leverage as the primary mechanism for enhancing financial performance. Overall, the findings confirm that firm size is an important contingency factor in explaining the relationship between capital structure and profitability, leading to the acceptance of the third hypothesis.

CONCLUSION

This study examined the effect of capital structure on profitability and the moderating roles of liquidity and firm size in pharmaceutical sub-sector companies listed on the Indonesia Stock Exchange during the 2020–2024 period. The findings indicate that capital structure does not significantly affect profitability, and liquidity is unable to moderate the relationship between capital structure and profitability. In contrast, firm size significantly moderates the effect of capital structure on profitability by weakening the influence of leverage on corporate performance. These findings demonstrate that firm size serves as an important contingency factor in explaining the relationship between capital structure and profitability, whereas liquidity does not perform such a moderating role. Overall, profitability in pharmaceutical companies is determined not only by financing decisions but also by firm-specific characteristics, operational efficiency, and strategic capabilities.

From a managerial perspective, pharmaceutical companies should not rely excessively on debt financing as a strategy for improving profitability. Instead, managers are encouraged to prioritize operational efficiency, asset utilization, product innovation, and long-term business development strategies to achieve sustainable financial performance. In particular, larger firms should capitalize on their stronger internal financing capacity and broader financing alternatives to maintain financial flexibility and avoid excessive dependence on debt. From an investment perspective, investors should consider firm size and operational capabilities, in addition to leverage indicators, when evaluating the profitability prospects of pharmaceutical companies. Therefore, investment decisions should not be based solely on capital structure but should also take into account the overall competitiveness and financial characteristics of the firm.

This study has several limitations. First, it only considers capital structure, liquidity, and firm size as explanatory variables and focuses exclusively on pharmaceutical sub-sector companies during the 2020–2024 period. Second, liquidity is measured solely by the Current Ratio, which may not fully capture a firm's liquidity condition. Future research is recommended to employ alternative liquidity measures, such as the Quick Ratio and Cash Ratio, and to incorporate additional determinants of profitability, including asset turnover, sales growth, operational efficiency, corporate governance, innovation capability, and macroeconomic factors. Furthermore, extending the analysis to other industrial sectors and longer observation periods may provide more comprehensive evidence and enhance the generalizability of the findings

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