*Original Research Article*

Do Capital Structure and Profitability Influence Firm Value? Empirical Evidence from Indian Pharmaceutical Companies

.

ABSTRACT

|  |
| --- |
| In the Indian pharmaceutical industry, decisions regarding capital structure and profitability play a crucial role in maximizing firm value, emphasizing the ongoing importance of studies in this field. Hence, the study investigates how capital structure and profitability influence firm value. The sample includes 16 Pharmaceutical Companies from the Nifty Pharma Index covering six years from 2018 to 2023. LDER, LDA, and TDTA represent capital structure. Profitability is measured through ROE and ROA. PBV is used to assess firm value. Firm size and tangibility serve as control variables. The results of panel regression indicate that capital structure significantly and positively impacts firm value, as evidenced by the significant positive effect of the LDER on PBV. The results also indicate that increased profitability leads to higher firm value, with ROE demonstrating a statistically significant positive influence on PBV. While firm size exhibits a positive impact on firm value, tangibility insignificantly affects firm value. The results imply that Indian pharmaceutical companies should prefer debt in their capital structure, prioritizing long-term debt over equity to meet their capital needs, and enhancing profitability through improved ROE is a critical factor in increasing firm value.  |

*Keywords: Capital structure; Profitability; Firm value; Size; Tangibility; Pharmaceutical Companies; Panel regression*

1. INTRODUCTION

In the dynamic corporate finance landscape, several critical issues remain unresolved and are the subject of ongoing debate. Among these, the determination of optimal capital structure stands out as a pivotal concern, particularly regarding its impact on firm value. Since Modigliani and Miller introduced the irrelevance proposition, numerous theoretical discussions have emerged, leading to various theories such as the Net Income Approach (Durand, 1952), Net Operating Income Approach (Durand, 1952), (Modigliani & Miller, 1958), (Modigliani & Miller, 1963), Trade-off Theory (Kraus & Litzenberger, 1973), Pecking Order Theory (Myers & Majluf, 1984), and Market Timing Theory (Baker & Wurgler, 2002). Kraus and Litzenberger (1973) proposed an optimal capital structure that balances debt's tax benefits with the potential bankruptcy risks. According to (Rose, 1966), managers use the capital structure as a signalling mechanism to convey inside information to the market, suggesting a positive relationship between leverage and firm value. (Harris & Raviv, 1991) survey various theories based on agency costs, asymmetric information, and market interactions, providing a comprehensive overview of the field. (Baker & Wurgler, 2002) introduced the market timing theory, arguing that firms issue equity when market values are high and repurchase when low, leading to persistent effects on capital structure. Capital structure theories provide a framework for understanding how companies make financing decisions and how these decisions impact firm value (Al-Nimer et al., 2024). Financing decisions, whether through debt, equity, or a combination of both, have profound implications on a firm's profitability and ultimately on its overall value (Brealey et al., 2014). (I. M. Pandey, 2004) defines capital structure as a “proportionate relationship between debt and equity”. "Profitability refers to the capacity of a firm to generate earnings above its costs and expenditures, reflecting the efficiency with which a company utilizes its resources" (Lawrence & Zutter, 2012). The complex interaction between capital structure and profitability makes it essential to examine their combined effect on firm value. Given the importance of capital structure and profitability in determining firm value, the study focuses on these dynamics and examines the impact of capital structure and profitability on firm value in the Indian pharmaceutical industry.

Recent research studies on pharmaceutical companies' capital structure, profitability and firm value reveal contradictory results. (Jacob & Ajina, 2020) found that capital structure has no impact on financial performance, supporting the Modigliani and Miller theory. (Anisah et al., 2023) indicate that while capital structure does not have a direct effect on firm value, firm size can moderate this relationship in pharmaceutical companies. (Chen, 2023) suggested that companies with lower debt ratios tend to achieve more stable earnings and cash flows, potentially leading to higher performance indicators, implying that optimizing capital structure can enhance operating performance and mitigate risks. Similarly, (Marsiati et al., 2024) report that capital structure measured by the debt-equity ratio has a negative but significant effect on firm value in the pharmaceutical industry. (Venugopal et al., 2018) found that debt-equity ratio, long-term debt ratio, and short-term debt ratios positively correlate with shareholder value.

Conclusively, while the direct impact of capital structure on firm value in pharmaceutical companies may be debatable, its combined effect with factors such as firm size, profitability, and risk management are evident. Despite extensive research, a clear consensus has not yet been reached. Therefore, this research explores how capital structure and profitability affect the firm value of Indian pharmaceutical companies.

1. **Literature Review**
	1. **Capital Structure and Profitability**

Capital structure and profitability have been the focus of extensive research, emphasizing their significance for continuing research. (Ghayas & Akhter, 2018) observed a positive effect of short-term debt and total debt ratios on ROE in Indian pharmaceutical companies listed on the Bombay Stock Exchange (BSE), while long-term debt showed a weak-to-no effect. Similarly, (N. P. Singh & Bagga, 2019) reported a significant positive impact of capital structure on profitability in Nifty 50 companies. (Mathur et al., 2021) noted that market competition negatively moderates the relationship between capital structure and firm performance and suggested that Indian pharmaceutical companies should carefully consider their capital structure decisions, particularly in competitive markets, to optimize financial performance. (Prasad et al., 2024) found that a firm performance, measured by ROA, ROE, and EPS, indicated a significant negative relationship with the short-term debt ratio, long-term debt ratio, and total debt ratio. However, no significant relationship between Tobin’s Q and short-term and long-term debt was found. (Chadha & Sharma, 2015) investigated the relationship between capital structure and financial performance in a study of 422 Indian manufacturing firms and their findings revealed that financial leverage did not influence the financial performance indicators, such as ROA and Tobin’s Q. However, leverage was negatively and significantly correlated with ROE. (Vătavu, 2015) discovered that the most successful firms avoided using borrowed money by keeping a large percentage of equity in their capital structure. Concerning ROE and ROA, both total debt and short-term debt were negatively correlated (Vătavu, 2015). These firms that avoided debt and operated primarily with equity demonstrated stronger financial performance. (Pandey & Sahu, 2017) investigated the impact of capital structure and ownership structure on the accounting performance of BSE-listed Indian manufacturing firms and found that capital structure had a significantly negative effect on accounting performance, whereas nearly all forms of ownership structure positively influenced firm performance.

* 1. **Capital Structure and Firm Value**

Research on capital structure and its impact on firm value in India has yielded varied findings. (A. K. Singh & Bansal, 2016) examined the effect of financial leverage on firm performance and valuation using panel data regression for 58 FMCG companies listed on the NSE and BSE from 2007 to 2016. Profitability was measured using ROA and EVA. Enterprise value and Tobin's Q have been used to determine firm valuation. The findings revealed that financial leverage (D/E) significantly negatively impacted firm performance (ROA and EVA) and valuation (Tobin’s Q) (A. K. Singh & Bansal, 2016). (Aggarwal & Padhan, 2017) found a significant relationship between firm value and leverage, contradicting the Modigliani-Miller theorem in the Indian hospitality industry. (Rachmawati et al., 2022) reported a significant effect of capital structure on firm value in Indonesian pharmaceutical companies. Firm size did not significantly impact firm value, whereas profitability was identified as a significant factor influencing firm value in Indonesian pharmaceutical companies (Rachmawati et al., 2022). (Sudheer & Vishnu, 2022) analyzed 20 IT companies listed on the BSE and the results revealed that equity, size, and profitability had a significant positive impact on firm value. Conversely, short-term debt and liquidity demonstrated a significant negative effect on firm value and found no influence of long-term debt on firm value. (Anandita & Septiani, 2023) examined food and beverage companies and the study findings from panel data regression analysis revealed that capital structure and dividend policy had a negative but insignificant impact on firm value. Febrianti and Malini (2024) found a negative relationship between capital structure and firm value, indicating the importance of strategic financial decisions in enhancing firm value.

* 1. **Capital Structure, Profitability and Firm Value**

Several studies have demonstrated a link between capital structure, profitability and value. In Indonesia, the research found that ROA and ROE have a positive and significant effect on firm value for pharmaceutical companies listed on the Indonesia Stock Exchange (Akhyar et al., 2023). (Hirdinis, 2019) found that while capital structure had no impact on profitability, firm size significantly affected a company's profitability. Both firm size and capital structure were found to positively influence firm value, whereas profitability did not have any effect on firm value (Hirdinis, 2019). A study of US pharmaceutical companies found that higher profitability, measured by ROA, ROE, gross profit margin, and net profit margin, is positively correlated with firm value (Rahman et al., 2020). (Ismiyatun et al., 2021) found a negative relationship between profitability and firm value. (Prakoso et al., 2022)examined a sample of thirty-two real estate firms listed on the IDX and revealed that while firm size has a negative and negligible impact on firm value, capital structure and profitability have a significant positive impact on firm value. (Alghifari et al., 2022) considered 39 listed manufacturing firms in Indonesia for study and found that firm value is significantly positively influenced by capital structure, whereas significantly negatively influenced by profitability. Some research findings revealed that profitability moderates the influence of CSR on firm value (Hermawan et al., 2023). In conclusion, while profitability generally has a positive impact on firm value in pharmaceutical companies, the relationship can be complex and influenced by various factors such as leverage, CSR, and regional differences. These findings highlight the importance of considering multiple dimensions when examining the relationship between profitability and firm value in the pharmaceutical industry (Hermawan et al., 2023).

A review of the existing literature reveals that numerous studies have focused on the impact of capital structure and profitability on the firm value. Despite extensive research, there remains a lack of consensus on the relationship between capital structure, profitability, and firm value, highlighting the ongoing importance of studies in this field for Indian pharmaceutical companies (Panigrahi & Joshi, 2019). Therefore, this research explores the impact of capital structure and profitability on firm value of Indian pharmaceutical companies.

* 1. **Objectives and Hypotheses of Study**

This study aims to examine the relationship between capital structure, profitability, and firm value. The primary objectives of the study are:

1. To examine the effect of Capital Structure on the Firm Value of pharmaceutical companies in India.
2. To examine the effect of Profitability on the Firm Value of pharmaceutical companies in India.

Based on the objectives, the following null hypotheses have been framed:

H01: Capital Structure has no significant impact on Firm Value.

H02: Profitability has no significant impact on Firm Value.

1. **Research Methodology**

**3.1. Sample and Source of Data**

The present study focuses on the firms that constituted the Nifty Pharma Index as on 31st March 2023. Data for the relevant variables were collected over six years, from 2018 to 2023. The Nifty Pharma Index comprised 20 firms, four companies were excluded due to incomplete data and negative net worth during the study period. The final sample comprised 16 pharmaceutical companies in India. The data from 16 companies resulted in a balanced panel dataset, and each variable contains 96 observations. The secondary data for selected sample companies of the Nifty Pharma Index were sourced from annual reports and company websites.

**3.2. Independent Variables**

Based on previous studies, this research incorporates three capital structure measurements and two profitability indicators. Building on the work of previous researchers such as Chadha and Sharma (2015), Singh and Bansal (2016), (K. D. Pandey & Sahu, 2017), (Jacob & Ajina, 2020), Rachmawati et al. (2022), and Prasad et al. (2024), the long-term debt to equity ratio (LDER) has been employed to measure capital structure. Following Vătavu (2015) and (Ghayas & Akhter, 2018), the next measure to represent capital structure is the long-term debt to total assets ratio (LDA). The total debt to total assets ratio (TDTA) has been selected as a third measure to represent the capital structure (Vătavu, 2015); (Ghayas & Akhter, 2018). Return on equity ratio (ROE) is a widely used measure for profitability by previous researchers, hence, it has been selected as a profitability measure. In line with prior research by Vătavu (2015), Chadha and Sharma (2015), Ghayas and Akhter (2018), and Prasad et al. (2024), the ratio employed to measure the return on equity (ROE) is profit after tax to net worth. Following Chadha and Sharma (2015), Singh and Bansal (2016), Rachmawati et al. (2022), and Prasad et al. (2024), the next measure of profitability employed is the return on assets (ROA), calculated as the ratio of profit before interest and tax to total assets.

**3.3. Dependent Variables**

Price-to-book value ratio (PBV) has been employed to measure the firm value. Following Singh and Bansal (2016), (Aggarwal & Padhan, 2017), and Rachmawati et al. (2022), measured as the market price of equity share divided by the book value of equity share.

**3.4. Control Variables**

To account for other potential factors influencing firm value, this study includes firm characteristics such as Size and Tangibility as control variables. Chadha and Sharma (2015) and Ghayas and Akhter (2018) measured size through the natural logarithm of total assets and Singh and Bansal (2016) employed the natural logarithm of net sales as a proxy for size. Following Singh and Bansal (2016), the firm size is represented by the natural logarithm of net sales. Following Chadha and Sharma (2015), Vătavu (2015) and Singh and Bansal (2016), tangibility (Tang) has been included as a control variable measured by the ratio of fixed assets to total assets. Figure 1 shows the conceptual framework of the model.

Figure 1: Conceptual Framework

**3.5. Methodology Followed**

Panel data regression analysis was utilized to assess the influence of capital structure and profitability on the firm value of selected pharmaceutical companies in India. Three different regression models, FEM, REM, and Pooled OLS were employed in the study. In this regression analysis, panel data heterogeneity is addressed by applying either a fixed-effects or random-effects model (Wooldridge, 2010). Several tests were performed to determine the most suitable model. The Breusch and Pagan test determines the appropriate model between the REM and the Pooled OLS (Breusch & Pagan, 1980). F-test compares the FEM with the Pooled OLS. The most suitable fit between the REM and the FEM is identified through the Hausman test (Hausman, 1978). The study also calculates the data's fundamental statistical characteristics through descriptive statistics. The following are the hypotheses for these tests:

**Redundant Fixed Effect Test**

H0: POLS is the appropriate model

H1: FEM better fits the analysis.

**Breusch and Pagan Lagrange Multiplier Test**

H0: POLS is a suitable model.

H1: REM better fits the analysis.

**Hausman test**

H0: REM is the preferred model

H1: FEM better fits the analysis.

**Table 1. Selection of Model**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model | F-test | LM test | Hausman test  | Preferred model |
|  1 | 0.000 | 0.000 | 0.003 | Fixed Effect |
| 2 | 0.000 | 0.000 | 0.147 | Random Effect |
| 3 | 0.000 | 0.000 | 0.092 | Random Effect |
| 4 | 0.000 | 0.000 | 0.005 | Fixed Effect |
| 5 | 0.000 | 0.000 | 0.014 | Fixed Effect |
| 6 | 0.000 | 0.000 | 0.002 | Fixed Effect |

Source: Compiled by the author

Panel data observations consist of at least two key components: a time-series dimension, denoted as ‘t’, and a cross-sectional dimension, denoted as ‘i’.(Hsiao, 2022). The panel regression model, as per the preferred model, is as follows:

$PBV\_{it}=a\_{2}+β\_{1}LDER\_{it}+β\_{2}ROE\_{it}+β\_{3}Size\_{it}+β\_{4}Tang\_{it}+ε\_{it}+ µ\_{it}….…..$(1)

$PBV\_{it}= a\_{2}+β\_{1}LDTA\_{it}+β\_{2}ROE\_{it}+β\_{3}Size\_{it}+β\_{4}Tang\_{it}+ε\_{it}+µ\_{it}….…..$(2)

$PBV\_{it}= a\_{2}+β\_{1}TDTA\_{it}+β\_{2}ROE\_{it}+β\_{3}Size\_{it}+β\_{4}Tang\_{it}+ε\_{it}+µ\_{it}….…..$(3)

$PBV\_{it}= a\_{2}+β\_{1}LDER\_{it}+β\_{2}ROA\_{it}+β\_{3}Size\_{it}+β\_{4}Tang\_{it}+ε\_{it}+µ\_{it}…..…$(4)

$PBV\_{it}= a\_{2}+β\_{1}LDA\_{it}+β\_{2}ROA\_{it}+β\_{3}Size\_{it}+β\_{4}Tang\_{it}+ε\_{it}+µ\_{it}……....$(5)

$PBV\_{it}= a\_{2}+β\_{1}TDTA\_{it}+β\_{2}ROA\_{it}+β\_{3}Size\_{it}+β\_{4}Tang\_{it}+ε\_{it}+µ\_{it}$….... (6)

1. **Analysis and Discussion**
	1. **Descriptive Statistics and Correlation Analysis**

**Table 2. Descriptive Statistics**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | LDA | LDER | TDTA | ROA | ROE | SIZE | TANG | PBV |
|  Mean | 0.07 | 0.14 | 0.30 | 0.14 | 0.20 | 8.51 | 0.51 | 12.19 |
|  Median | 0.03 | 0.07 | 0.29 | 0.14 | 0.16 | 8.58 | 0.49 | 4.24 |
|  Maximum | 0.36 | 0.94 | 0.61 | 0.28 | 1.64 | 9.74 | 0.82 | 122.11 |
|  Minimum | 0.00 | 0.00 | 0.08 | 0.02 | 0.03 | 7.41 | 0.06 | 0.44 |
|  Std. Dev. | 0.08 | 0.17 | 0.13 | 0.06 | 0.19 | 0.65 | 0.16 | 23.21 |
| Observations | 96 |

Source: Compiled by the author

Table 2 represents the descriptive statistics of key financial measures used for analysis. LDA averages 0.07, suggesting low firm leverage. The LDER has a mean of 0.14, with values spanning from 0.00 to 0.94, indicating considerable variation in the use of long-term debt relative to equity. The average TDTA ratio (0.30) indicates that 30% of the firms' assets are financed through debt. The average ROA is 14%, reflecting consistent asset performance across firms. The pharmaceutical companies in India generate an average of 20% profit relative to their shareholders' investments. Size shows considerable variability across companies in the sample. The tangibility mean (0.51), suggests that pharmaceutical companies possess adequate tangible assets. The PBV ratio averages 12.19 times, indicating that most companies are overvalued. The wide range in market value, from 0.44 to 122.11 times, highlights substantial differences in market valuations relative to book values among firms.

**Table 3. Correlation Matrix of Independent Variables**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Probability | LDA | LDER | TDTA | ROA | ROE | SIZE | TANG |
| LDA | 1.00 |  |  |  |  |  |  |
| LDER | 0.87\*\* | 1.00 |  |  |  |  |  |
| TDTA | 0.68\*\* | 0.56\*\* | 1.00 |  |  |  |  |
| ROA | -0.15 | -0.30\*\* | 0.01 | 1.00 |  |  |  |
| ROE | -0.15 | 0.19 | -0.16 | -0.02 | 1.00 |  |  |
| SIZE | -0.06 | -0.17 | -0.10 | -0.02 | -0.26\*\* | 1.00 |  |
| TANG | 0.41\*\* | 0.46\*\* | 0.00 | -0.66\*\* | 0.02 | 0.08 | 1.00 |

Source: Compiled by the author, \*Significance at 5%, \*\*Significance at 1%

One approach to identifying multicollinearity is to assess the correlation structure among the independent variables. Table 3 presents the correlation matrix that reveals that debt ratios do not have a significant correlation with ROE and SIZE. LDER negatively correlated with ROA. Long-term debt ratios (LDA & LDER) and ROA have a considerable positive correlation with Tangibility. The VIF was estimated to identify multicollinearity among explanatory variables. “The variance inflationary factor shows how the variance of an estimator is inflated by the presence of multicollinearity” (Gujarati, 2009). A VIF below 10 is considered acceptable. If the VIF is 10 or higher, it indicates the presence of multicollinearity (Gujarati, 2009).

**Table 4. Variance Inflation Factor (VIF)**

|  |  |
| --- | --- |
| **Variables** | **Model**  |
| **1** | **2** | **3** | **4** | **5** | **6** |
| LDER | 1.1261 | - | - | 1.0945 | - | - |
| LDA | - | 1.1493 | - | - | 1.1016 | - |
| TDTA | - | - | 1.0351 | - | - | 1.1671 |
| ROE | 1.2624 | 1.0322 | 1.0204 | - | - | - |
| ROA | - | - | - | 1.2852 | 1.2389 | 1.2263 |
| SIZE | 1.2028 | 1.0200 | 1.0302 | 1.2510 | 1.3261 | 1.4117 |
| TANG | 1.1029 | 1.1210 | 1.0250 | 1.0389 | 1.0589 | 1.0431 |

Source:Compiled by the author

The variance inflation factors (VIFs) calculated for each regression model in *Table 4*, reveal that VIF values for these variables range from a maximum of 1.3261 to a minimum of 1.0250, confirming that the problem of multicollinearity does not exist among the independent variables as VIF is within the limits (Gujarati, 2009). This allows all indicators to be included simultaneously in the panel regression analysis.

* 1. **Results of Panel Regression Analysis**

**Table 5. Model 1 (Dependent Variables: PBV)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Std. Error | t-Stat. | P-Value |
| LDER | 46.8329 | 14.9589 | 3.130 | 0.0025 |
| ROE | 43.2281 | 8.7962 | 4.9144 | 0.0000 |
| SIZE | 5.4697 | 5.9974 | 0.9120 | 0.3646 |
| TANG | 10.6966 | 21.1835 | 0.5049 | 0.6151 |
| R-squared | 0.8337 |
| Adjusted R-squared | 0.7922 |

Source: Compiled by the author

Analysis of Model 1 in Table 5 reveals that LDER and ROE have a significant positive impact on PBV, indicating that the use of debt and higher profitability lead to higher firm value. Size and Tangibility as a control variable have no significant impact on PBV (p-value>0.05). The R-squared is 0.83, indicating that the above model explained 83% of the variability in PBV.

**Table 6. Model 2 (Dependent Variables: PBV)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Std. Error | t-Stat. | P-Value |
| LDA | -57.6914 | 30.1269 | -1.9149 | 0.0586 |
| ROE  | 59.4974 | 7.8292 | 7.5995 | 0.0000 |
| SIZE  | -8.1650 | 3.5940 | -2.2719 | 0.0255 |
| TANG | 22.1675 | 14.5758 | 1.5209 | 0.1318 |
| R-squared | 0.4235 |
| Adjusted R-squared | 0.3982 |

Source: Compiled by the author

Table 6 presents the results of model 2 which indicates that LDA has a negative impact on PBV but at a 10% significance level. Whereas ROE has a significant positive impact, indicating that companies with higher ROE tend to have higher PBV ratios. Size has a significantly negative impact on PBV whereas Tangibility has no significant impact on PBV. The R-squared is 0.4235 implying that 42.35% variations in PBV ratio are explained by independent variables.

**Table 7. Model 3 (Dependent Variables: PBV)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Std. Error | t-Stat. | P-Value |
| TDTA | -31.1606 | 18.0948 | -1.72208 | 0.0885 |
| ROE  | 60.8766 | 7.78232 | 7.82243 | 0.0000 |
| SIZE  | -8.42794 | 3.53981 | -2.38091 | 0.0194 |
| TANG | 13.3917 | 13.6137 | 0.98369 | 0.3279 |
| R-squared | 0.4250 |
| Adjusted R-squared | 0.3997 |

Source: Compiled by the author

Table 7 outlines the results of model 3, where it is found that TDTA has an insignificant impact on PBV. Whereas ROE significantly positively impacts PBV. It has been also observed that Size significantly negatively impacts PBV while Tangibility has an insignificant impact on PBV. The R-squared indicates that 42.49% of variations in PBV ratio are explained by independent variables.

**Table 8. Model 4 (Dependent Variables: PBV)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Std. Error | t-Stat. | P-Value |
| LDER | 57.5170 | 16.2081 | 3.54867 | 0.0007 |
| ROA  | -88.1739 | 33.5281 | -2.62985 | 0.0103 |
| SIZE  | 21.8198 | 6.72211 | 3.24597 | 0.0017 |
| TANG | -19.7158 | 22.5952 | -0.87257 | 0.3856 |
| R-squared | 0.7992 |
| Adjusted R-squared | 0.7490 |

Source: Compiled by the author

Table 8 highlights the outcomes of regression model 4, where it is found that LDER significantly positively impacts PBV, whereas ROA significantly negatively impacts PBV. In this model, Size positively impacts PBV and Tangibility insignificantly negatively impacts PBV. The R-squared indicates that 79.92% of the variations in the PBV ratio are explained by independent variables.

**Table 9. Model 5 (Dependent Variables: PBV)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Std. Error | t-Stat. | P-Value |
| LDA | -42.6735 | 46.3421 | -0.9208 | 0.3600 |
| ROA | -110.373 | 35.3440 | -3.1228 | 0.0025 |
| SIZE  | 17.7963 | 7.43082 | 2.3949 | 0.0191 |
| TANG | -15.2057 | 24.4930 | -0.6208 | 0.5366 |
| R-squared | 0.7685 |
| Adjusted R-squared | 0.7106 |

Source: Compiled by the author

Table 9 presents the results of regression model 5, revealing that LDA shows no effect on PBV as the p-value is >0.05, while ROA exerts an adverse influence on PBV. The analysis further reveals that Size has a favourable impact on PBV, whereas Tangibility demonstrates an insignificantly negative impact on PBV. The R-squared indicates that the independent variables explain 76.85% of the variation in PBV.

**Table 10. Model 6 (Dependent Variables: PBV)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Std. Error | t-Stat. | P-Value |
| TDTA | -42.6735 | 46.3421 | -0.9208 | 0.3184 |
| ROA  | -110.373 | 35.3440 | -3.1228 | 0.0018 |
| SIZE  | 17.7963 | 7.43082 | 2.3949 | 0.0048 |
| TANG | -15.2057 | 24.4930 | -0.6208 | 0.4929 |
| R-squared | 0.7690 |
| Adjusted R-squared | 0.7113 |

Source: Compiled by the author

Table 10 indicates the results of regression model 6, where it is noted that TDTA has no significant impact on PBV, and ROA significantly negatively impact PBV. The results also reveal that Size positively impacts PBV, and Tangibility insignificantly negatively impacts PBV. The R-squared indicates that the independent variables explain 76.89% of variation in the PBV ratio.

1. **Conclusion**

Capital structure decisions and profitability play a vital role in enhancing firm value within the Indian pharmaceutical sector. Selecting an optimal capital structure is a critical choice for every firm, as it has a direct impact on its value. The study aims to explore the influence of capital structure and profitability on the firm value of a selected sample of 16 Pharmaceutical Companies from the Nifty Pharma Index, which represents the Indian Pharmaceutical Sector, covering a study period of 6 years from 1st April 2018 to 31st March 2023. Three debt measures were employed as indicators of capital structure: LDER, LDA, and TDTA. Two indicators, ROE and ROA, were used as measures of profitability. Firm value has been measured by PBV. The control variables are firm size and tangibility. The panel regression technique was applied for hypothesis testing.

The empirical results indicate that the capital structure significantly enhances firm value, as evidenced by the significant positive impact of LDER on PBV. Therefore, the first null hypothesis stating that capital structure has no significant impact on firm value has been rejected. In contrast, LDA and TDTA show a negative but statistically insignificant effect on PBV. Profitability serves as an important determinant of firm value, as indicated by the regression results. An increase in return on equity (ROE) leads to a rise in price-to-book value (PBV), representing a strong positive relationship with firm value. Therefore, the second null hypothesis, stating that profitability has no significant impact on firm value, has been rejected. The results align with a prior study conducted by Rahman et al. (2020) and Akhyar et al. (2023), who found that return on equity positively impacts firm value. On the other hand, return on assets (ROA) exhibits a significant negative impact on price-to-book value (PBV), supporting the findings of Ismiyatun et al. (2021), who also found a negative relationship between profitability and firm value. The significant negative impact of ROA on PBV may indicate that, although assets are productively utilized, companies face limited reinvestment opportunities. When assets are fully leveraged and growth prospects are low, investors expect slower future growth and assign a lower price-to-book multiple, leading to reduced firm value. A firm's size significantly influences value, implying that larger firms have higher PBV ratios, on account of their established market presence and more stable growth prospects compared to smaller companies. Tangibility has no significant impact on firm value.

Conclusively, the findings of this study support the Trade-off Theory (Kraus & Litzenberger, 1973) of capital structure. This theory posits that firms seek to balance the advantages of debt, such as tax shields, with the potential downsides, such as financial distress (Kraus & Litzenberger, 1973). These findings advocate that Indian pharmaceutical companies should prefer debt in their capital structure, prioritizing long-term debt financing over equity for their operational funding. The observed positive relationship between long-term debt and the market value of pharma companies suggests that the benefits of debt outweigh its costs, reinforcing the idea that firms strategically optimize their capital structure to enhance firm value. The research findings enrich the existing literature on capital structure and are particularly relevant to the Indian pharmaceutical industry, offering valuable insights for shaping capital structure decisions.

**Limitations**

This study provides meaningful insights into how capital structure and profitability impact firm value in the context of Indian pharmaceutical companies. The analysis may be subject to potential endogeneity, which may arise from reverse causality or omitted variables, potentially biasing the results. While panel regression techniques such as fixed and random effects models were employed, the study did not incorporate advanced methods like instrumental variable approaches or GMM estimators that are specifically designed to address endogeneity. Future research would benefit from applying these techniques to strengthen causal interpretation and enhance the robustness of findings.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during writing or editing of this manuscript.

**Competing interests**

Authors have declared that no competing interests exist.

**References**

Aggarwal, D., & Padhan, P. C. (2017). Impact of capital structure on firm value: Evidence from Indian hospitality industry. *Theoretical Economics Letters*, *7*(4), 982–1000.

Akhyar, C., Husaini, Wardhiah, & Manalu, H. B. (2023). The Influence of Profitability, Capital Structure, Investment Decision, and Firm Size on Firm Value (A Study in the Pharmaceutical Sector Listed on the Indonesian Stock Exchange). *Journal of Accounting Research, Utility Finance and Digital Assets*, *1*(4), 399–407.

Alghifari, E. S., Solikin, I., Nugraha, N., Waspada, I., Sari, M., & Puspitawati, L. (2022). Capital structure, profitability, hedging policy, firm size, and firm value: Mediation and moderation analysis. *Journal of Eastern European and Central Asian Research (JEECAR)*, *9*(5), 789–801.

Al-Nimer, M., Arabiat, O., & Taha, R. (2024). Liquidity Risk Mediation in the Dynamics of Capital Structure and Financial Performance: Evidence from Jordanian Banks. *Journal of Risk and Financial Management*, *17*(8), 360.

Anandita, D., & Septiani, D. (2023). The Effect of Capital Structure, Dividend Policy and Cash Holding on Firm Value. *Business Management Analysis Journal (BMAJ)*, *6*(1), 78–89.

Anisah, A., Murad, M. A., Asriadi, A., Samudra, S., & Magfirah, D. (2023). Indonesian Pharmaceutical Companies: Capital Structure, Business Risk, Company Value and Firm Size as A Moderating Variable Analysis. *International Journal of Social Service and Research*, *3*(1), 122–128.

Baker, M., & Wurgler, J. (2002). Market timing and capital structure. *The Journal of Finance*, *57*(1), 1–32.

Brealey, R. A., Myers, S. C., & Allen, F. (2014). *Principles of corporate finance*. McGraw-hill. https://thuvienso.hoasen.edu.vn/handle/123456789/1415

Breusch, T. S., & Pagan, A. R. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *The Review of Economic Studies*, *47*(1), 239–253.

Chadha, S., & Sharma, A. K. (2015). Capital structure and firm performance: Empirical evidence from India. *Vision*, *19*(4), 295–302.

Chen, L. (2023). Impact of Capital Structure on the Operating Performance of Listed Companies in the Pharmaceutical Industry. *Advances in Economics, Management and Political Sciences*, *40*, 61–67.

Durand, D. (1952). Costs of debt and equity funds for business: Trends and problems of measurement. *Conference on Research in Business Finance*, 215–262. http://www.nber.org/chapters/c4790

Febrianti, S., & Malini, H. (2024). Determinants of capital structure and the effect on firm value: Evidence from Indonesia. *Asian Journal of Economics, Business and Accounting*, *24*(6), 407–421.

Ghayas, A., & Akhter, J. (2018). Impact of Capital Structure on Profitability: An empirical analysis of listed firms in India. *Asian Journal of Managerial Science*, *7*(2), 1–6.

Gujarati, D. N. (2009). *Basic econometrics*. McGraw-Hill.

Harris, M., & Raviv, A. (1991). The Theory of Capital Structure. *The Journal of Finance*, *46*(1), 297–355. https://doi.org/10.1111/j.1540-6261.1991.tb03753.x

Hausman, J. A. (1978). Specification Tests in Econometrics. *Econometrica*, *46*(6), 1251–1271. https://doi.org/10.2307/1913827

Hermawan, S., Sari, Y. A., Biduri, S., Rahayu, D., & Rahayu, R. A. (2023). Corporate social responsibility, firm value, and profitability: Evidence from pharmaceutical companies in Indonesia and Malaysia. *International Journal of Professional Business Review: Int. J. Prof. Bus. Rev.*, *8*(2), 1.

Hirdinis, M. (2019). Capital structure and firm size on firm value moderated by profitability. *International Journal of Economics and Business Administration*, 174–191.

Hsiao, C. (2022). *Analysis of panel data* (second). Cambridge university press.

Ismiyatun, I., Aryani, N., & Ispriyahadi, H. (2021). Determinants of firm value: Evidence from listed insurance companies in Indonesia. *Diponegoro International Journal of Business*, *4*(2), 82–94.

Jacob, T., & Ajina, V. S. (2020). Capital structure and financial performance of pharmaceutical companies in Indian stock exchange. *Asian Journal of Managerial Science*, *9*(2), 24–30.

Kraus, A., & Litzenberger, R. H. (1973). A state-preference model of optimal financial leverage. *The Journal of Finance*, *28*(4), 911–922.

Lawrence, G. J., & Zutter, C. J. (2012). Principles of managerial finance. *England: Pearson*.

Marsiati, L., Sari, P. P., & Kusumawardhani, R. (2024). THE INFLUENCE OF GROWTH OPPORTUNITIES, CAPITAL STRUCTURE, PROFITABILITY, AND DIVIDEND POLICY ON FIRM VALUE (In Pharmaceutical Companies Listed on the Indonesia Stock Exchange 2014-2022). *ECOBISMA (JURNAL EKONOMI, BISNIS DAN MANAJEMEN)*, *11*(1), 98–116.

Mathur, N., Tiwari, S. C., Sita Ramaiah, T., & Mathur, H. (2021). Capital structure, competitive intensity and firm performance: An analysis of Indian pharmaceutical companies. *Managerial Finance*, *47*(9), 1357–1382.

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, *48*(3), 261–297.

Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: A correction. *The American Economic Review*, *53*(3), 433–443.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*(2), 187–221.

Pandey, I. M. (2004). Capital structure, profitability and market structure: Evidence from Malaysia. *The Asia Pacific Journal of Economics & Business*, *8*(2), 78.

Pandey, K. D., & Sahu, T. N. (2017). An empirical analysis on capital structure, ownership structure and firm performance: Evidence from India. *Indian Journal of Commerce and Management Studies*, *8*(2), 63–72.

Panigrahi, C. M. A., & Joshi, V. (2019). Financing decisions: A study of selected pharmaceutical companies of India. *AADYA”-A Journal of Dr. GD Pol Foundation*, *9*, 78–90.

Prakoso, S. T., Wardhani, D. P., Amalina, N., Erikawati, C., & Utomo, C. W. (2022). The Role of Profitability in Mediating Capital Structure, and Firm Size on Firm Value Mediated by Profitability. *International Journal of Social Science*, *1*(5), 809–816.

Prasad, N., Verma, M. K., Tanwar, N., & Kumar, M. (2024). Capital Structure Impact on Firm Performance: An Empirical Study of the Pharmaceutical Sector in India. *Economic Affairs*, *69*(02), 843–848.

Rachmawati, W., Handayani, E., & Karim, A. (2022). The Effect of Profitability, Capital Structure and Firm Size on Firm Value (Study on Pharmaceutical Companies Listed on The Indonesia Stock Exchange 2016-2020). *Economics and Business Solutions Journal*, *6*(2), 105–120.

Rahman, M., Rodríguez-Serrano, M. Á., & Lambkin, M. (2020). Advertising efficiency and profitability: Evidence from the pharmaceutical industry. *Industrial Marketing Management*, *89*, 619–629.

Rose, H. (1966). *The Theory of Financial Management*. Oxford University Press Oxford, UK.

Singh, A. K., & Bansal, P. (2016). Impact of financial leverage on firm’s performance and valuation: A panel data analysis. *Indian Journal of Accounting*, *48*(2), 73–80.

Singh, N. P., & Bagga, M. (2019). The effect of capital structure on profitability: An empirical panel data study. *Jindal Journal of Business Research*, *8*(1), 65–77.

Sudheer, S., & Vishnu, N. S. (2022). Capital Structure and Firm Value: Indian IT Industry. *International Journal of Innovative Science and Research Technology*, *7*(3), 1490–1493.

Vătavu, S. (2015). The Impact of Capital Structure on Financial Performance in Romanian Listed Companies. *Procedia Economics and Finance*, *32*, 1314–1322. https://doi.org/10.1016/S2212-5671(15)01508-7

Venugopal, M., Bhanu Prakash Sharma G., & Ravindar Reddy M. (2018). Impact of Capital Structure on Shareholder Value in Indian Pharmaceutical Industry: An Empirical Approach Through Created Shareholder Value. *Global Business Review*, *19*(5), 1290–1302. https://doi.org/10.1177/0972150918788741

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data, second edition*. MIT Press.