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*Research Paper*

# Does Capital Structure Matter? Performance Insights from the Bangladeshi Pharmaceuticals Sector

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## ABSTRACT

**Purpose:** The purpose of this study is to experimentally examine how capital structure affects the performance of the pharmaceutical business in Bangladesh.

**Methodology:** The study's sample comprised various Bangladeshi pharmaceutical enterprises from 2018 to 2024. It explored how a company's performance might be affected by capital structure factors. Additionally, it investigated the impact of a few firm-specific variables on the performance, including liquidity, total assets, sales revenue, sales growth, and age. Random effect, fixed effect, pooled OLS, and Pearson correlation matrix models have been utilized in the study. For robustness check it employed two step system GMM.

**Results:** Liquidity and sales growth showed little to no correlation with performance and efficiency. Total asset positively affects performance and efficiency. Given the size's positive impact, it makes sense that increased sales revenue can boost the performance of the company. The age of the company has a significant detrimental effect on profitability but a limited beneficial impact on efficiency. Eventually, the study comes to a conclusion that the capital structure substantially hinders the performance of Bangladesh's pharmaceutical industry according to all of our findings.

**Originality**: Numerous research studies have investigated the association between company performance and capital structure, but the outcome is not yet conclusive. Prior studies focused only on profitability metrics. The current study also fulfils this gap by uniquely focusing on the efficiency metric (inventory turnover). Furthermore, the present study focused on the Bangladeshi pharmaceutical sector, which is a rapidly growing and also inventory-intensive. Therefore, this study's dual methodology covered a gap in the literature through empirically examining the way capital structure affects the financial health of pharmaceutical firms in Bangladesh.

**Keywords:** *Firm Performance, Capital Structure, Emerging Economy, Profitability, Bangladesh.*

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## 1. Introduction

The capital structure outlines how an organization raises money for its investments, utilizing a mix of debt, venture capital, and mixed financial products. Therefore, the arrangement or, more precisely, the "structure" of the funding of a company's balance sheet is recognized as the capital structure. The choice of the capital layout of a business is one of the most important ones. From a technical standpoint, an appropriate balance between debt to equity may have an impact on day-to-day operations, and potential growth may affect the company's assets. From a tactical perspective, capital structure may affect sources of funding, return on investment, lender expectations, and profit-making risk. The cost of capital (WACC) increased, and interest payments needed to be made, leading to a fall in cash flow and profit for the company, according to MM theory, when an organization chooses to take on additional debt. Thus, a firm's health and success are affected by an inadequate capital structure approach that increases the risk of default due to high debt and financing costs. Financial reports showed an enormous amount of superfluous external funding, which raised the cost of capital and eventually led to bankruptcy.

The theory of Modigliani-Miller addressed the financial decisions of companies, specifically the decision between debt and shares. According to their views, there is no ideal debt level for an organization's assets since the choice of the firm to issue debt or equity to cover a specific amount of investment has no influence on its worth. As a result, it falls into the category of unexpected economic "neutrality" or "indifference" theorems, which demonstrate the meaninglessness of a decision that would initially appear to be critical, such as the amount of debt a company has. Following this, the trade-off, pricing order, and market timing theories are created. In the academic work on corporate finance, the funding structure and the way it affects company success are key topics. Despite the many studies on the topics at hand, reaching an agreement on debt financing and development finance has been challenging. A causal model is one way to formulate the concept of capital structure determinants. Typically, we regard capital structure determinants as latent variables or non-directly observable variables, implying that no single accounting indicator can accurately represent every characteristic.

To optimize returns for stakeholders while taking on an appropriate amount of risk, an organization's capital structure shows how debt and equity can be used to finance its operations (Dada and Ghazali, 2016). Managers use profitability as a common metric to

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assess their performance, demonstrating their ability to generate maximum returns on available assets over time. The capacity of a corporation to generate profits greater than the expenses incurred in funding its primary activities to secure its long-term existence is known as profitability. It indicates that the profitability of an organization is defined by its ability to generate revenue through activities, investments, and financing, with the goal of boosting wealth and value for owners. The issue of capital structure arises from finding out the amount of money that comes from each source to generate the best return with the least risk (Akintoye, 2016; Dada & Ghazali, 2016; Gambo et al., 2016). The specific relationship between capital structure and performance is still uncertain.

The capital structure significantly affects the operational efficiency of a business. Several existing studies have identified the association between capital structure and company performance; a few demonstrated a substantial positive impact, while others have found a major negative impact. In general, these studies' outcomes are not conclusive. Some research focused only on short-term debt to equity, while other research focused on long-term debt to equity as a capital structure statistic. Most of the study also used only the traditional profitability metrics like ROA or ROE. As an inventory-intensive industry, the pharmaceutical companies should be viewed equally from an efficiency perspective. In addition, the efficiency metric used in this study, alongside ROA, provides a wider approach. This dual approach is rarely applied in capital structure analysis, specifically in the Bangladeshi context. Hence, it provides a more sector-relevant analysis in the field of study. By analyzing these issues, the current study will provide new empirical evidence in the capital structure analysis, and it will offer practical insights for the financial policymakers in the emerging economies.

The paper has been divided into five sections. The literature is reviewed in Section 2. The methodology is laid out in Section 3. The outcomes of the data analysis are shown in Section 4. The major findings are compiled and summarized in Section 5.

## 2. Literature Review

### *2.1 Capital Structure Theories*

Apart from being his most important contribution to finance theory, the Modigliani-Miller theorem is also one of the most significant advances in the betterment of the financial economy over the last 50 years. The link between capital structure and firm value has

been a major but controversial focus in finance. According to this relationship theory, there will either be no statistically significant association or a positive or negative relationship (Modigliani and Miller, 1958, 1963, 1977), Graham (2000), Myers (1977), and Myers and Majluf (1984). In their theory titled "The Cost of Capital, Corporation Finance, and Investment Theory (1958), Nobel Prize winners Franco Modigliani and Merton Miller presented what may be the most significant theory for capital structure. This theory explains how the capital structure affects a company's value. A positive influence can be shown by certain research, while a negative impact cannot be shown by others. Additional empirical evidence shows that leverage and cost efficiency have a negative relationship.

According to the trade-off concept of leverage, the best capital structure is selected by balancing the benefits of borrowing, such as beneficial business tax treatment, against the risks related to rising interest rates and bankruptcy. The company's ability to pay off debt is represented by the debt-to-equity ratio, which is determined using the company's capital. This will have an impact on investor confidence in the business and eventually affect the value of the business. Companies must weigh the pros and cons of liability to optimize the firm's value, according to the trade-off theory of Modigliani and Miller (1963). Kim (1978), Kraus (1973), and Litzenberger (1973) all note that the tax benefit is the source of debt advantages, whereas direct and indirect bankruptcy expenses result in the cost of obligations. Companies typically choose a capital structure that is best suited to optimize the firm's value in line with the trade-off hypothesis. As a result, they will make compromises between the cost of debt and the reduced tax benefit. Therefore, after deducting financial distress charges, the value of the company that used debt was equivalent to the value of the company that didn't use a borrowing tax shield (Kim, 1978).

### *2.2 Capital Structure and Firm Performance*

Financial leverage has shown a significant detrimental impact on the performance (Danso et. al, 2020). Furthermore, the authors point out that smaller companies are less impacted by financial leverage than bigger ones are. The researchers concluded by illustrating that the 2007–2008 financial crisis possessed no appreciable effect on the link between financial leverage and company success. Debt-to-equity ratios significantly and negatively affect the profitability of foreign direct investment in the Indian pharmaceutical industry (Vepa, 2025). The study also added that the success of these firms may largely depend on the financing pattern they choose. Capital structure has both

statistically significant and nonsignificant influences on performance metrics (Oyedokun, Olatuji, & Sanyaolu, 2018). Additionally, it stated that to maximize business performance and corporate value, production companies should use a balanced capital structure approach. Firm size has a significant negative impact on firm value, whereas capital structure has an enormously beneficial influence. Although company size has a strong positive impact on profitability, efficiency has no meaningful effect on firm value (M, 2019).

In German-listed companies, capital structure and financial performance are positively correlated (Abdullah & Tursoy, 2019). Specifically, they discovered that for the years 1993– 2016, a 1% rise in the total debt ratio causes an increase in ROA and ROE of roughly 3.6% and 32.4%, respectively. A reasonable explanation for the positive correlation demonstrated between capital structure and firm performance could be the tax shield effects and the reduced expenses associated with issuing debt in comparison to equity. They did discover that capital structure has a detrimental effect on stock prices. Debt has an impact on positive value creation below a desired profitability level. The company would be in financial jeopardy if profitability went beyond this ideal range (Khémiri & Noubbigh, 2018). They also added that the Pecking order theory and the trade-off theory are both supported by some of the findings. It turns out that neither hypothesis is superior to the other in this instance.

According to research conducted in Malaysia, Singapore, and Thailand (Phooi M'ng1, Rahman, & Sannacy, 2017), the capital structure is significantly and negatively impacted by profitability. It also added firm size, which has a significant positive impact on all of these countries' capital structures. Based on their findings, Thailand benefits greatly from the tangibility of its assets compared to the capital structures of Malaysia and Singapore. When compared to total assets, depreciation indicates that the capital structure is negatively impacted in each of the three countries. Financial success, growth, and firm size are all related in a positive way (Mardones & Cuneo, 2019). However, there are mixed results regarding short- and long-term financial leverage, as well as corporate liquidity. Research indicates that the first significant shareholder has an excellent effect on financial performance in Chilean businesses. A study in Vietnam, Pham (2020), concluded that there is an inverse association between self-financing and the financial performance of the listed pharmaceutical enterprises.

When a firm grows larger, the evidence of an adverse effect on performance fades away when it reaches its anticipated threshold level. For small businesses, the negative impact of borrowing on performance is especially apparent and severe (Ibhagui & Olokoyo, 2017). They added that alongside the debt ratios used, this outcome stays true. The findings also reveal that leverage has a favorable impact on Tobin's Q for listed firms in Nigeria, which is consistent with previous research. Finally, their discovery provides proof that the favorable relationship's intensity varies with company size, with small-sized businesses typically experiencing a stronger link. High debt ratio lowers the performance of the BSE 500 listed pharma firms in India (Mathur et al., 2021As a developing market, Malaysian businesses show an adverse correlation between capital structure and business performance, which is reinforced by data exhibiting a U-shaped relationship (Salam & Shourkashti, 2019). The global financial crisis has an impact on multiple sectors, particularly manufacturing and investment. Various developed and developing countries suffered from the global financial crisis of 2007. The results of the research additionally indicate that, in Malaysia, the world financial disruption that occurred between 2007 and 2009 had a substantial impact on the connection between capital structure and firm performance.

The capital structure's impact on a company's success differs based on the situation and particular conditions. The modern banking sector separates itself by new models, opinions on current and potential attempts, and innovative problem-solving methods. The primary objective of the capital structure is to lower financing costs and increase firm value. The capital structure model and its impact on corporate performance have been challenging topics in accounting and finance. Bank performance is inversely affected by the capital structure (Siddik, Kabiraj, & Joghee, 2017). The findings of this empirical study are more crucial to emerging economies like Bangladesh because they emphasize the significance of bank management to be consolidated and for policymakers to implement measures that reduce the need for debt when attempting to reach the optimum level of capital structure. Capital structure theories generally confirm a link between debt and company value, although it has been interpreted in several ways and has had different results. While some research found an adverse relationship between capital structure and business performance, several found a positive link.

The impact of capital structure on innovation is substantial, although its effect on company performance is only indirect. For business growth and innovation, capital

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structure is crucial (Vargas, Palacios, & Garcia, 2022). An organization's competitiveness, business development, and market expansion are all susceptible to change in the short and medium phases of the development of innovative processes or products resulting from investing in innovation. As innovation is found to have a massive, complete mediating function in this relationship, SMEs that wish to improve business performance need to innovate significantly. According to a study by Dakua (2018), it was found that profitability and debt ratio have a significant relationship, as predicted and proven by other studies. The association with the predictors, including asset formation, size, and non-debt tax shield, are statistically significant. While debt ratio and asset structure have a detrimental connection, profitability and liquidity have a positive link.

In low-credit-risk SMEs, the debt ratio has a negative link with company performance, but not in high-credit-risk ones (Li, Niskanen, & Niskanen, 2019). SME credit risk appears to impact the connection between capital structure and business performance. Financial success and leverage can favorably impact each other. Non-financial businesses in Germany take out additional loans in order to avoid high taxes and take advantage of tax breaks. The leverage ratio is boosted by stock price, whereas capital structure could potentially harm market performance (Abdullah & Tursoy, 2021). Financial performance has an inverse relationship with the debt-to-equity ratio (Ullah et al., 2020). For German-listed enterprises, empirical models show a favorable connection between financial leverage and financial performance. It added a negative correlation between capital structure and stock price. Furthermore, both ROA and SP can positively impact the capital structure. The study also reveals a consistent relationship between capital structure and both metrics of firm performance. The empirical data show that non-financial companies in Germany are highly leveraged, with debt financing representing an average of 62% of total assets.

Research on Nigerian banks indicates that there is a detrimental and minimal correlation between the debt-to-equity ratio and return on equity, an advantageous and smaller relationship between the long-term debt ratio and return on equity, and an important but beneficial connection between the total debt ratio and return on equity (Johnny and Ayunku, 2019). Nassar (2016) evaluated how capital structure influenced Borsa Istanbul's economic growth from 2005 to 2012 using multivariate regression analysis. The debt ratio served as a stand-in for capital structure in the analysis, in conjunction with return on equity, return on assets, and income per share as parameters for company performance.

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The outcomes show that capital composition and business success have a negative association. The components that were indirectly impacted by company leverage on the financial results of an organization were its borrowing rate, liquidity, potential for development, asset structure, and non-debt tax shield. Any company requires a substantial amount of capital to sustain itself; where will this funding come from? Estimating the factors influencing the capital structure is necessary because they have a direct impact on the business's success. Therefore, to measure the impact of capital structure on firm performance, we develop our hypotheses as follows;

*H1: Capital structure has a significant impact on firm profitability.*

*H2: Capital structure has a significant impact on firm efficiency.*

## 3. Methodology

### *3.1 Sample and Data*

To measure firm performance, we consider two financial aspects of the selected industry. First, we measure profitability using the return on assets (ROA) ratio, similar to studies like Dakua (2018) and Abdullah and Tursoy (2019). Kim (2023) suggested that inventory turnover can serve as a proxy for measuring efficiency. Breivik, Larsen, Thyholdt, and Myrland (2023) concluded that there is a link between efficiency and inventory turnover. Hence, we deployed inventory turnover (InvTR) as a proxy to measure efficiency. Finally, through these two metrics, we try to reveal the significant impact of capital structure on firm performance.

***Table 1: Variables with their Specifications and Expected Impact***

| Variables | Legend | Measurement | Expected Impact |
|---|---|---|---|
| ***Dependent variables:*** | | | |
| Return on Asset | ROA | Net Income/ Total Assets | |
| Inventory Turnover | *InvTR* | COGS/Average Inventory | |
| ***Independent variables:*** | | | |
| Debt to total equity | *DE* | Total Debt/ Total Equity | - |
| Debt to total assets | *DA* | Total Debt/ Total Assets | - |
| Liquidity | *LQDY* | Current Asset/ Current Liability | + |
| Total assets | *TA* | Natural Log of Total Assets owned by the company | + |
| Revenue | *SIZE* | Natural Log of Total sales of the company | + |
| Sales Growth | *SG* | (Current revenue- Previous revenue)/ Previous revenue | + |

| | | | |
|---|---|---|---|
| Age of the firm | *AGE* | Difference between observation and establishment year | + |

The study used both Debt to Equity (DE) and Debt to Asset (DA) because both of them capture different dimensions of capital structure. DE mainly highlights the balance between debt and equity, while DA indicates the portion of external versus internal funds. Tegar and Andriani (2024) and Ima et al. (2024) used both DE and DA as measures for leverage. The study also incorporated some firm-specific variables like liquidity, total assets, size, sales growth, and age to capture the key financial performance of the selected industry. The sample for this investigation came from 10 DSE-listed Bangladeshi Pharmaceutical companies. The pharmaceutical company is used as a sample due to its high capital intensity and critical role in the economy. Moreover, the dependency of this industry on both domestic and international financing is beyond description, making it more relevant for capital structure analysis. We have used the company's audited financial statements (2018-2024) to enhance the validity and dependability of the results and conclusions.

### *3.2 Models and Method*

For data reliability, we conduct a unit root test and, multicollinearity test. Further, for measuring the direction and the level of relationship among the variables, we conduct multiple regression on our panel data. Pooled ordinary least squares, Random effect model, and Fixed effect model are frequently used to analyze panel data (Chadha and Sharma 2015, Dawar 2014). When the residuals of the control and independent variables are autonomous, it is useful to use the Pooled OLS Regression. Firm-specific effects are commonly observed in a non-experimental study. As the Random Effect model and Fixed Effect model deal with firm-specific error components, we have also used the Random Effect and Fixed Effect models, which will generate better conclusions than the Pooled OLS Regression. To identify the better one, we also undertake the BPLM test and the Hausman test. Finally, for robust findings and to deal with unobserved heterogeneity and potential endogeneity, the study employs a two-step system, the Generalized Method of Moments (GMM). Our model is based on the ideas of Wahba (2014) and Le and Phan (2017), who proposed a linear relation between capital structure and company performance. Whereas,

$$\text{Firm Performance} = \beta * \text{Leverage} + \beta * \text{Variables}$$

Based on the linear equation, using STATA software, our study used the following models to evaluate the relationship between capital structure and firm performance:

$$ROA = \alpha + \beta1*DE + \beta2*LQDY + \beta3*TA + \beta4*SIZE + \beta5*SG + \beta6*AGE + \mu i \quad (1)$$

$$ROA = \alpha + \beta1*DA + \beta2*LQDY + \beta3*TA + \beta4*SIZE + \beta5*SG + \beta6*AGE + \mu i \quad (2)$$

$$InvTR = \alpha + \beta1*DE + \beta2*LQDY + \beta3*TA + \beta4*SIZE + \beta5*SG + \beta6*AGE + \mu i \quad (3)$$

$$InvTR = \alpha + \beta1*DA + \beta2*LQDY + \beta3*TA + \beta4*SIZE + \beta5*SG + \beta6*AGE + \mu i \quad (4)$$

## 4. Results and Discussion

### *4.1 Descriptive Statistics*

Table 2 contains a summary of all the variables' descriptive statistics. Table 2 shows that the sample pharmaceutical industry's average ROA is 2.76%. The tested company earned a return of 2.76% of total assets, with the highest value at 10.59% and the lowest at -7.53%. The standard deviation is 3.15%, which illustrates the variability involved. We found a mean value of 1.7073 and a standard deviation of 1.1069 for the other dependent variable, InvTR, which indicates that there is a reasonable variation within the tested organization. We found mean values of 3.2212 and 0.6588 for the main variables of interest, DE and DA, respectively, and standard deviations of 2.6669 and 0.2162 for both variables. These results indicate that these companies have a significant amount of debt and a deviation from the mean value. In case of liquidity, we found that the firm-specific control variables have a mean value of 2.1235, a maximum value of 10.5050, a minimum value of 0.6269, and a standard deviation of 1.8550.

***Table 2: Descriptive Statistics***

| *Variable* | *Observations* | *Mean* | *Std. Dev* | *Min* | *Max* | *Skewness* | *Kurtosis* |
|---|---|---|---|---|---|---|---|
| *ROA* | 70 | 0.0276 | 0.0315 | -0.0753 | 0.1059 | -0.5953 | 3.0129 |
| *InvTR* | 70 | 1.7073 | 1.1069 | 0.3113 | 4.1775 | 0.6458 | -0.6324 |
| *DE* | 70 | 3.2212 | 2.6669 | 0.4779 | 9.9303 | 0.9542 | -0.1039 |
| *DA* | 70 | 0.6588 | 0.2162 | 0.3113 | 1.1926 | 0.0340 | -0.4998 |
| *LQDY* | 70 | 1.8861 | 2.1235 | 0.6269 | 10.5050 | 2.1979 | 9.8738 |
| *TA* | 70 | 9.4859 | 1.2062 | 7.3727 | 7.3727 | -0.2148 | -1.5334 |
| *SIZE* | 70 | 8.8272 | 1.3020 | 6.9037 | 11.3665 | 0.5210 | -0.7947 |
| *SG* | 70 | 0.2032 | 0.4751 | -0.5941 | 1.9943 | 1.5011 | 4.6946 |
| *AGE* | 70 | 36.500 | 21.670 | 11.000 | 71.000 | 0.4682 | -1.5334 |

*Source: Author's Own Calculation*

We found the pharmaceutical industry's average total assets to be 9.4859 million, with a standard deviation of 1.2062. In addition, we found that sales revenue ranges from a minimum of 6.9037 million to a maximum of 11.3665 million, with an average of 8.8272

million. The average sales growth in the Bangladeshi Pharmaceuticals industry sample was 0.2032. It confirms a moderate level of variation of 0.4751, indicating companies in Bangladesh have less risk when growing. The last variable, age, showed an average value of 36.5, indicating an average year of establishment for those companies. The table also revealed that all skewness value ranges (-3 and +3), while kurtosis (-10 and +10). Therefore, the dataset exhibits a normal distribution.

In the Levin-Lin-Chu Unit Root Test (Table 3), the alternative hypothesis states that the data is stationary, while the null hypothesis states that the data is not stationary.

***Table 3: Levin-Lin-Chu Unit Root Test***

| Variables | Test Statistic | P value | Stationary |
|---|---|---|---|
| *ROA* | -1.1687 | 0.0013 | i(0) |
| *InvTR* | -3.3603 | 0.0004 | i(0) |
| *DE* | -3.2477 | 0.0006 | i(0) |
| *DA* | -4.5510 | 0.0000 | i(0) |
| *LQDY* | -1.1002 | 0.0000 | i(0) |
| *TA* | -2.5100 | 0.0060 | i(0) |
| *SIZE* | -4.5375 | 0.0000 | i(0) |
| *SG* | -4.7328 | 0.0000 | i(0) |
| *AGE* | -3.5765 | 0.0001 | i(0) |

*Source: Author's Own Calculation*

According to the selection rule, if the result of the test is more negative than the threshold value, the other theory will be recognized and the idea of a null will be dismissed. Table 3 demonstrates that the test statistic becomes more negative at level i(0) form for all variables. Our variables are therefore stationary.

### *4.2 Multicollinearity Test*

Multicollinearity may be a problem in this study because we used panel data from seven pharmaceutical companies with nine variables.

**Table 4: Correlation Matrix**

| | ***ROA*** | ***InvTR*** | ***DE*** | ***DA*** | ***LQDY*** | ***TA*** | ***SIZE*** | ***SG*** | ***AGE*** |
|---|---|---|---|---|---|---|---|---|---|
| ***ROA*** | 1 | | | | | | | | |
| ***InvTR*** | 0.452 | 1 | | | | | | | |
| ***DE*** | -0.550 | -0.445 | 1 | | | | | | |
| ***DA*** | -0.513 | -0.247 | 0.556 | 1 | | | | | |
| ***LQDY*** | 0.231 | 0.263 | -0.352 | -0.320 | 1 | | | | |
| ***TA*** | 0.073 | 0.458 | 0.068 | 0.262 | 0.109 | 1 | | | |
| ***SIZE*** | 0.222 | 0.581 | -0.102 | 0.160 | 0.191 | 0.515 | 1 | | |
| ***SG*** | 0.260 | 0.113 | -0.010 | 0.167 | 0.086 | 0.295 | 0.349 | 1 | |
| ***AGE*** | -0.088 | 0.271 | -0.181 | -0.042 | 0.233 | -0.151 | 0.104 | -0.194 | 1 |

*Source: Author's Own Calculation*

We first examined the correlation coefficients among the variables, represented by a correlation matrix (Table 3), to identify whether the predictors are collinear. Wooldridge (2015) concluded that if the correlation coefficient is higher than 0.7, multicollinearity is present. According to the results, we did not find any values greater than 0.7. Besides, the data indicates that the highest degree of relationship between SIZE and InvTr is 0.5811. SG and DE have the lowest degree of relationship (-0.0100). Table 3 presents our findings, which reveal a weak relationship among the variables and confirm that there are no multicollinearity issues in our proposed model.

### *4.3 Regression Analysis*

#### *4.3.1 Effect of Capital Structure on Return on Assets*

Through this multiple regression (Tables 5 and 6), we tried to identify the effect of capital structure on firm performance with some other firm-specific control variables. Our regression model for ROA explains about 47.84% of the variations in ROA (1) and 51.00% of the variations in ROA (2). We have used pooled OLS regression, random effect, as well as fixed effect regression models for better output and justification.

***Table 5: Impact of Debt to Equity on ROA (1)***

| ***Variables*** | ***Pooled OLS*** | ***Random Effect*** | ***Fixed Effect*** |
|---|---|---|---|
| *DE* | -0.0049***<br>(0.006) | -0.0049***<br>(0.004) | -0.0022*<br>(0.068) |
| *LQDY* | 0.0011<br>(0.575) | 0.0011<br>(0.571) | -0.0015<br>(0.460) |
| *TA* | 0.0260**<br>(0.030) | 0.260**<br>(0.024) | -0.0170<br>(0.385) |
| *SIZE* | 0.0265**<br>(0.021) | 0.0265**<br>(0.016) | 0.0323***<br>(0.005) |
| *SG* | 0.0051<br>(0.590) | 0.0051<br>(0.586) | 0.0080<br>(0.349) |
| *AGE* | -0.0006**<br>(0.017) | -0.0006**<br>(0.012) | -0.0070***<br>(0.006) |
| *α* | 0.0764**<br>(0.037) | 0.0764**<br>(0.030) | 0.1683<br>(0.151) |

*R Square=0.4784, F value=10.35*
*F Significance=0.000, VIF=3.46*

*BPLM= 0.0430*

*Hausman Test = 0.0553*

*P-values in brackets; ***, **, * = 1%, 5%, 10% significance*

"In both pooled OLS regression models, the F-value indicates a significant correlation between at least one independent variable and profitability. The model's overall significance is excellent. The findings show that capital structure factors, specifically DE and DA, significantly and negatively affected ROA. Stated differently, our data indicates that in every scenario, a higher DE and a higher DA correlate to a lower profitability of the selected company. Out of the control variables, LQDY indicated an insignificant favorable link with the company's profitability. The firm's TA has a significant positive impact on profitability. The considerable positive impact of SIZE suggests that a rise in sales revenue will have a positive impact on the earnings potential of the company. SG showed both negative and positive but insignificant impact. However, AGE harms the company's profitability.

The random effect model also confirms that capital structure has a significant and negative impact on the earnings potential of the Bangladeshi Pharmaceuticals industry. Therefore, we conclude that the capital structure negatively impacts the pharmaceutical industry's performance in Bangladesh.

***Table 6: Impact of Debt to Assets on ROA (2)***

| ***Variables*** | ***Pooled OLS*** | ***Random Effect*** | ***Fixed Effect*** |
|---|---|---|---|
| *DA* | -0.0693*** | -0.0693*** (0.001) | -0.0136* |
| | (0.002) | | (0.071) |
| *LQDY* | 0.0004 | 0.0004 | -0.0016 |
| | (0.813) | (0.812) | (0.434) |
| *TA* | 0.0253** | 0.0253** (0.021) | -0.0163 |
| | (0.028) | | (0.447) |
| *SIZE* | 0.0282*** | 0.0282*** (0.006) | 0.0318*** |
| | (0.009) | | (0.010) |
| *SG* | 0.0097 | 0.0097 | 0.0087 |
| | (0.306) | (0.298) | (0.330) |
| *AGE* | -0.0005** | -0.0005** (0.039) | -0.0072*** (0.004) |
| | (0.047) | | |
| *α* | 0.0806** | 0.0806** (0.018) | 0.1775 |
| | (0.024) | | (0.127) |
| *R Square=0.5100, F value=9.07* | | | |
| *F Significance=0.000, VIF=4.32* | | | |
| | | *BPLM= 0.0392* | |
| | | | *Hausman Test =0.0672* |

*P-values in brackets; ***, **, * = 1%, 5%, 10% significance*

Our findings are similar with those of Danso et al. (2020), Ibhagui & Olokoyo (2017), Siddik, Kabiraj, & Joghee (2017), and Nassar (2016), who discovered that the capital structure determinants significantly hinder the functioning of the company. Although our all-regression output in both scenarios provides the same conclusions, the BPLM test

suggested that the random effect regression output is superior to the pooled OLS regression model. The Hausman test also confirms the appropriateness of the random effect model.

### *4.3.2 Effect of Capital Structure on Inventory Turnover*

This regression model for InvTR (Table 7, 8) shows approximately 71.82% of the variations in InvTr (3) and 61.42% in InvTr (4). Like the previous findings, this one also implies that the F-values are showing a significant association between minimum one of the independent variables and firm efficiency. F significance indicates a very high level of overall significance for the model. The findings also signifies that capital structure factors (DE and DA) significantly and negatively affected InvTR. We can say differently in every case: a higher DE as well as DA leads to a lower efficiency of the selected company.

***Table 7: Impact of Debt to Equity on InvTR (3)***

| ***Variables*** | ***Pooled OLS*** | ***Random Effect*** | ***Fixed Effect*** |
|---|---|---|---|
| *DE* | 0.0909** | 0.0909** | -0.0089* |
| | (0.046) | (0.039) | (0.092) |
| *LQDY* | 0.0150 | 0.0150 | -0.0434 |
| | (0.774) | (0.772) | (0.416) |
| *TA* | 0.9591*** | 0.9591*** | -0.6589 |
| | (0.003) | (0.001) | (0.183) |
| *SIZE* | 1.4423*** | 1.4423*** | 1.3991*** |
| | (0.000) | (0.000) | (0.000) |
| *SG* | -0.4752* | -0.4752* | -0.3025 |
| | (0.059) | (0.051) | (0.165) |
| *AGE* | -0.0076 | -0.0076 | -0.1246** |
| | (0.246) | (0.238) | (0.045) |
| *α* | -1.2871 | -1.2871 | 0.3335 |
| | (0.166) | (0.158) | (0.908) |
| *R Square=0.7182, F value=14.86* | | | |
| *F Significance=0.000, VIF= 2.46* | | | |
| | *BPLM= 0.0321* | | |
| | | *Hausman Test = 0.0219* | |

*P-values in brackets; ***, **, * = 1%, 5%, 10% significance*

Now, in line with the previous analysis, we can conclude that the capital structure has a significant negative impact on the efficiency of the pharmaceutical industry in Bangladesh. The firm-specific control variables, such as LQDY, have an insignificant negative impact on efficiency, while TA has a significant positive impact on firm efficiency. SIZE has a significant positive impact on the company's efficiency, similar to the earlier one. SG is showing a significant negative impact on efficiency. AGE is

showing an insignificant positive impact. The capital structure of the Bangladeshi Pharmaceuticals industry has a notable and adverse effect on its performance, as confirmed by the random effect model.

***Table 8: Impact of Debt to Assets on InvTR (4)***

| *Variables* | *Pooled OLS* | *Random Effect* | *Fixed Effect* |
|---|---|---|---|
| *DA* | -1.1389** | -1.1389** | -0.2285** |
| | (0.045) | (0.038) | (0.045) |
| *LQDY* | 0.0078 | 0.0078 | -0.0426 |
| | (0.884) | (0.883) | (0.423) |
| *TA* | 0.9739*** | 0.9739*** | -0.6216 |
| | (0.002) | (0.001) | (0.249) |
| *SIZE* | 1.4950*** | 1.4950*** | 1.3786*** |
| | (0.000) | (0.000) | (0.000) |
| *SG* | -0.4061 | -0.4061* | -0.2915 |
| | (0.113) | (0.104) | (0.194) |
| *AGE* | -0.0061 | -0.0061 | -0.1254** |
| | (0.367) | (0.361) | (0.40) |
| *α* | -1.211 | -1.211 | 0.3061 |
| | (0.192) | (0.183) | (0.914) |
| *R Square=0.6142, F value=17.26* | | | |
| *F Significance=0.000, VIF= 3.46* | | | |
| | *BPLM= 0.0491* | | |
| | | *Hausman Test = 0.0261* | |

*P-values in brackets; ***, **, * = 1%, 5%, 10% significance*

In this instance, the BPLM test further suggests that random effect regression techniques surpass the pooled OLS regression method. But according to the Hausman test, the fixed effect model exceeds the random effect model.

### *4.4 Robustness Check*

To check the robustness and for valid inference, we deployed a two-step system GMM (Table 9). The models also address the endogeneity concerns. From the findings we can reaffirm our earlier findings that are almost consistent with our earlier pooled OLS, random effect, and fixed effect models. The DE and DA ratios have a consistent negative impact on ROA and InvTR.

***Table 9: Two-Step System GMM Estimation***

| *Variables* | **(1)** | **(2)** | **(3)** | **(4)** |
|---|---|---|---|---|
| *DE* | -0.00035*** | | -0.0150* | |
| | (0.009) | | (0.045) | |
| *DA* | | -0.0521*** | | -0.1852** |
| | | (0.004) | | (0.041) |

| | | | | |
|---|---|---|---|---|
| *LQDY* | 0.0009 | 0.0006 | -0.0214 | -0.0185 |
| | (0.668) | (0.730) | (0,318) | (0.361) |
| *TA* | 0.0185** | 0.0173** | -0.4402 | -0.3951 |
| | (0.045) | (0.049) | (0.143) | (0.169) |
| *SIZE* | 0.0301*** | 0.0290*** | 1.3526*** | 1.3094*** |
| | (0.002) | (0.003) | (0.000) | (0.000) |
| *SG* | 0.0075 | 0.0102 | -0.3051 | -0.2703 |
| | (0.285) | (0.202) | (0.151) | (0.183) |
| *AGE* | -0.0008** | -0.0007** | -0.1184** | -0.1205** |
| | (0.018) | (0.021) | (0.038) | (0.041) |
| *α* | 0.0925** | 0.0974** | 0.2715 | 0.2486 |
| | (0.027) | (0.023) | (0.502) | (0.551) |
| *AR (1)* | -2.52 | -2.45 | -2.59 | -2.62 |
| | (0.012) | (0.014) | (0.010) | (0.009) |
| *AR (2)* | -1.01 | -1.06 | -1.12 | -1.09 |
| | (0.311) | (0.288) | (0.263) | (0.276) |
| *Hansen Test* | 18.23 | 17.54 | 16.98 | 17.82 |
| | (0.418) | (0.405) | (0.361) | (0.389) |

*P-values in brackets; ***, **, * = 1%, 5%, 10% significance*

In this model and analysis, the firm-level characteristics are controlled, such as liquidity, size, sales growth, and age, which helps to identify the true effect of capital structure on firm profitability and efficiency. The diagnostic test also confirms the instrument validity that there is no serial correlation.

## 5. Conclusion

The effect of capital structure choices on the performance of Bangladesh's pharmaceutical sector was examined through experiments in this study. The results suggest that the capital structure indicators DE and DA have significant adverse effects on ROA, being consistent with previous studies. Additionally, we found that DA and DE significantly reduced InvTR. Our literature supports all of our models' results. Two of our control variables, LQDY and SG, showed little to no association with the company's profitability and efficiency. The company's TA positively affects profitability and efficiency. The positive impact of SIZE implies that an increase in sales revenue will increase the company's profitability as well as efficiency. The AGE of the firm negatively affects the company's profitability, which is significant, but positively affects the efficiency in an insignificant manner. There may be a deviation between our expected impact and actual impact due to firm-specific factors, lack of proper utilization of the firm’s assets, market volatility, different industry dynamics, and outdated financial practices in the older firms.

It may also be due to the inappropriate and untimely reflection of growth in return. From the results of our multiple regression, we can now accept our alternative hypothesis. The robustness check using the two-step system GMM is also in line with our baseline regression model. These findings strengthen our inference and ensure reliability and a robust conclusion. Thus, we can conclude that the capital structure has a significant negative impact on the pharmaceutical industry's performance in Bangladesh.

Our findings have several implications for policymakers, firm managers, and investors. Policy makers can use these insights for designing their financial guidelines. Additionally, it will help to improve their firm-level financial performance through balancing incentives for inventory and supply chain, such as soft loans or tax breaks. For managers, the capital structure decision should not be based solely on profitability metrics rather it should also focus on efficiency, especially for the capital-intensive firms. Investors can benefit from additional analysis of the firm's efficiency, as inventory turnover provides a deeper understanding of the financial health of the industry. Newer firms should be supported with growth firms as they are performing better than older ones. Overall, the study offers a deeper understanding of financial decision-making for the emerging economies.

Even though we found that the capital structure had a significant negative impact on the performance of the pharmaceutical companies in our sample, our study remains hampered by a lack of a systematic and comprehensive database for all pharmaceutical companies in Bangladesh. To confirm our findings, we propose conducting a further study using data from a larger sample over a longer period with more companies. Future studies might investigate the moderating influence of particular macroeconomic factors on the connection between capital structure and firm performance via more diversified variables and data, as well as more sophisticated analysis, in order to further minimize the bias triggered by the small sample and skipped variable.

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