

## **Impact of Firm's Leverage on Financial Performance: Evidence from the Pharmaceuticals Industry of Bangladesh**

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### **Abstract:**

**Purpose:** *The objective of this study is to study the connection between leverage and the financial performance of DSE-listed pharmaceutical firms in Bangladesh.*

**Design/methodology/approach:** *The data of six firms for the period 2001 to 2020 was analyzed using panel econometric analysis techniques, namely the feasible generalized least square (FGLS) regression model.*

**Findings:** *The empirical findings show that long-term debt (LTD) has a significant negative impact on both indicators of the firm's financial performance—return on capital employed (ROCE) and return on equity (ROE). The control variables GROWTH and AGE are positively related to ROCE and ROE; however, the firm's SIZE is negatively connected to the firm's financial performance.*

**Practical implications:** *These findings suggest that the degree of leverage significantly impacts the firm's financial performance. As a consequence, while constructing the capital structure, corporate managers should carefully control the debt level—both short- and long-term.*

**Originality/value:** *This is the original work done by the researchers which adds value to existing knowledge in corporate finance.*

**Research Limitations:** *This analysis was conducted using only secondary data and a sample of six DSE-listed companies over twenty years.*

**Keywords:** Corporate leverage, capital structure, financial performance

### **INTRODUCTION**

The financing decision has been considered one of the most important corporate managerial decisions to ensure sustaining profitability in the competitive business environment. Every business firm, either small or large requires finances to make investments and to operate its business activities, in particular, large business firms require funds on a large scale to expand their operations and activities and they mostly depend on both short and long term sources of funds. Every company's objective is to create a profit and increase its owner's wealth, and in order to do so, it must raise funds to finance its operations and investments in such a manner that is consistent with the firm's ultimate goal of wealth maximization of the owners (Adenugba et al., 2016). Firms

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can fund their investment from a variety of internal and external sources including reserves kept in the business, retained earnings, issuing shares, and bonds, and taking other loans from financial institutions.

The choice of sources of funds—the combination of debts well as equity is so crucial as the cost of funds and the risks are directly related to it (Adenugba et al., 2016). In general, financial managers seek the best capital structure—the perfect combination of debt capital and equity capital that increases shareholder value with the least amount of risk (Rahman, Sarker, and Uddin, 2019). Any adolescent capital structure choice may result in a higher cost of capital that reduces the value of the business firm, whilst a successful decision of capital structure may have differing results (Hasan *et al.*, 2014). Thus, identifying the optimal level of capital structure that positively affects the firms' performance is essential (Ahmed, Awais, and Kashif, 2018). A manager's choice to design a debt-intensive or equity-intensive organization to fund the company's assets constitutes capital structure formulation (Abdullah and Tursoy, 2021). In the past, it has been noted that many financial executives spend their capital using a blend of debt and equity. The organizations that do not wish to borrow money to fund their assets, depending on an all-equity financing strategy, might escape the fixed-cost burden, but they could lose the growth edge. When the firm's external funding is unfavorable, it prefers secured debts over risky ones, and firms issue common stock as the last option (Abor, 2005). In light of the cost of capital having a straight influence on profitability, ultimately, on organization's value, every business must pay particular attention to the most significant concerns of financial leverage in the capital structure (Ahmad et al., 2015).

There is no reason to anticipate a universal debt-equity choice theory to exist. Nonetheless, a variety of useful conditional theories exist for selecting debt-equity combinations for commercial enterprises. Beneath the assumption of a capital market which is perfect, the Modigliani and Miller capital structure irrelevance hypothesis, often known as MM theory, states that the value is independent of the choices of the source of funds and does not depend on it (Modigliani and Miller, 1958). Though, later, they reviewed the MM assumptions admitting the corporate taxes and settled that the decisions regarding capital structure are relevant to the firm value as debt has tax-deductibility advantages (Modigliani and Miller, 1963). According to the trade-off philosophy, firms pursue debt-based fund levels which strike an equilibrium between the tax benefits of rising debt and the potential costs of financial risks, and it predicts that tax-paying businesses would borrow minimally (Seifert and Gonenc, 2008). Myers (1984) introduced the pecking order hypothesis, which that holds when inside financing is insufficient to support the investment requirement and financing from outsiders is in the best interest of the equity holders, the firm will derive and then issue stocks (Sheikh and Wang, 2011). Conferring to the hypothesis of free cash flow, when a operating cashflow increases significantly its possibilities for investing, perilously high liability levels will definitely raise the company's value despite the risk of an economic collapse (Myers, 2001). The free cash flow theory is envisioned for settled corporations with a predisposition to overinvest (Rau, 2017).

None of the capital structure theories are devoid of critique from various perspectives. However, the majority of businesses preferred equity funding. Since the market's emergence, financing with equity has been incapable to meet the desires of businesses seeking higher sums of money, the scale of debt financing is growing due to the flexibility in the tenure with the other advantages. By

way of a consequence of financial leverage, the quantity of borrowed capital in the firm's assets will offer extra advantages and risks to the business, influencing its value and performance (Chen, 2020). Therefore, it is very necessary to comprehend how the use of leverage distress profitability under the different economic and industrial structures.

### ***REVIEW RELATED LITERATURE***

Academics and scholars from all around the world have focused their attention on the use of loans as a capital structure since it stands for one of the most significant choices a company can make. A significant number of studies could be found regarding this area of financial decision. This section offers a quick summary of the literature about the link flanked by leverage and profitability. The empirical review of the related studies comprises different views about the use of leverage in capital structure.

Using STD, LTD, and total debt (TD) as independent variables and return on equity (ROE), return on assets (ROA), Tobin's Q, and EPS as explained variables, (Salim and Yadav, 2012) shown a strong inverse connection between total debt and business success. The research outcome of this study depicts that on ROA both LTD, and STD have a significantly adverse impact, whereas, Tobin's Q has a considerable positive association with LTD and STD.

Considering the profitability indicators such as the margin of net profit (NPM) and the margin of operating profit(OPM) as the explained variables and debt ratio (DR) as the explanatory variable, and considering five control variables— the size of the firm, asset turnover, and the capital intensity, Arowoshegbe and Idialu (2013) conducted a study on the sample of sixty active non-financial enterprises over a fifteen-year period of 1996 to 2010. With the help of the OLS regression model, they discovered that the debt ratio (DR) of Nigerian enterprises had a negative impact on their profitability. Again, OPM, current ratio, and age have a non-significant positive association. This study's findings corroborate the capital structure option recommended by the pecking order hypothesis, which favors retained profits as the primary source of capital, trailed by debt and finally fresh stock issuance.

Negatively affecting the firm's profitability include excessive reliance on sources of short-term financing as contrasted to long-term debts and underutilization of fixed assets. Using two models—pooled OLS and panel data analysis model over 155 Sri Lankan listed firms Manawaduge et al. (2011) have figured out that developing countries' financial performance is negatively affected when they are using current liabilities instead of long-term liabilities. Evgeny (2015) found that the leverage had a detrimental result on ROE and ROA, and operating margin. Abor (2005) examined 22 Ghanaian firms, over a period of five years using profitability ratios— EBIT to equity as the response variable, the short-term debt to total capital ratio, the long-term debt to total capital ratio, and the total debt to total capital ratio as the explanatory variables, and firm size and sales growth as the control variables. Through the use of OLS regression analysis, the inverse relationship was found between LTD and profitability, however, STD and TD are positively related to profitability. Other studies have revealed a link between debt and a company's profitability that is unfavorable, assessed by ROA and ROE (Pouraghajan *et al.*, 2012; Ahmed, Awais, and Kashif, 2018).

From 2007 to 2016, Singh and Bansal (2016) conducted research on 58 listed fast-growing consumer goods businesses. To calculate financial performance, this study has taken ROA and economic value addition, while to calculate firms' valuation, enterprise value and Tobin's Q method are used. With the panel data econometrics model, the conclusions of this study indicate that leverage has a substantial adverse effect on both performance and value, comparable to Ahmad et al. (2015). While Diego García-Gómez et al. (2020) found suggesting an adverse connection among profitability and leverage, this accords with the pecking order philosophy.

In contrast, many researchers found the level of leverage as a blessing as it enhances a firm's profitability. The firms with high profitability retain more of their earnings to avoid external borrowings which keeps the leverage level very low. Also, it becomes too easy to obtain external debt financing for firms with high profitability than lower ones (Fu-sheng and Nan-hui, 2014; Grau and Reig, 2021). Guo et al. (2020) have shown that the usage of debt-based financing may increase profitability by successfully utilizing free cash flow that the management would have wasted otherwise. Dalai (2018) exposed a reciprocal association between debts and profitability, as both STDR and TDR have favorable effects on profitability measures—ROA and ROE, by analyzing the panel data of 1,503 registered manufacturing firms in China from 2006 to 2017 with an OLS regression model. Adenugba et al. (2016) have found a mixed association between a business's value as well as performance. Like other studies, this study also agrees that including high level of borrowed capital in the debt-equity mixed may result in negative firm performance if the return is low compared to the cost of debt. However, it is essential to note that debt interest is tax deductible and it may lower loan repayments. Again, financial leverage can also help in maximizing return. Using the statistical method of OLS, they discovered a substantial positive association among enterprises' value and leverage. In contrast to prior studies, Rahman et al. (2020) found significant negative association of financial leverage and firms' value as they have studied 22 DSE listed textile firms using statistical techniques viz., OLS, fixed effect, and GMM.

Some researchers have found mixed results on the influences of a firm's leverage on performance. Iqbal and Usman (2018) revealed that the leverage had a negative dint on ROE, but a positive influence on ROA. In addition, the study's findings indicate that a high-interest rate and increased debt have a detrimental influence on profitability since they diminish the value of its stock. Hasan et al. (2014) found that short-term debts and EPS are positively linked which is statistically significant, while long-term debts are significantly and negatively correlated to it. Chen (2020) revealed that a firm's leverage is positively interrelated to performance by using OLS and 2SLS methods. While, Al-Tally (2014) In the absence of major economic downturns, he discovered that lower debt levels are likely to lead to improved profitability and returns on both assets and return on equity over time.

Even, there is also some evidence that shows corporate leverage as the variable that doesn't affect firms' performance significantly. Hasan et al. (2014) led research on 36 listed Bangladeshi firms from 2007 to 2012, utilizing ROE, EPS, ROA, and Tobin's Q as the response variables and STD, LTD, and TD as exogenous variables. Among other parameters, they reported an insignificant connotation amid capital structure and ROE and Tobin's Q.

Chesang (2017) has tried to figure out the consequence of leverage on NSE listed agricultural firms' profitability—ROCE, debt-to-equity, the CR, and the asset size as the explanatory metrics

and ROA, EBT, and total assets as the explained metrics. However, the debt-equity ratios and the CR did have a substantial influence on profitability, whereas the ratio of long-term debt-to-capital-employed and the size of the company did not. It has been recommended that resources be mobilized for fixed assets to increase the capacity of borrowing the long-term loan and ensure that the liquidity is kept to a bare minimum since this would help strengthen the firm's profitability.

The capital structure may also be impacted by various firm-specific aspects, and management must develop an appropriate capital structure to increase the firm's value while lessening cost of capital. Significant positive relationships have been found between firm performance—ROA and ROE—and entity-specific factors like firm size, turnover of asset, age, asset tangibility, and growth potential (Pouraghajan *et al.*, 2012). While Singh and Bansal (2016) found that the variables like spending R&D, sales growth, firm size, and WACC meaningfully affect the performance and value. Alom (2013) examined 44 DSE-listed companies from 2004 to 2011 in light of this circumstance. This research seeks to investigate the impacts of firm-specific factors e.g., the market-to-book value (MTB), liquidity, the nature of the collateral, dividend policy, the firm's size, profitability, and the industry classification on leverage by using the panel data model. This research outcome depicts that the connotation of leverage and the MTB is significantly positive whereas profitability, liquidity, and collateral have a significant adverse effect on leverage. This study didn't find any significant impact of independent variables like dividend payment and size upon leverage. While A. Chowdhury and Paul Chowdhury (2010) discovered that the ratio of long-term leverage is the most powerful independent variable that affects firm value, but also that enterprises may increase this value by adding debt to their capital structure. Abor (2005) concluded that firm expansion and company size positively affect businesses' profitability. Hasan *et al.* (2014) revealed a hostile linking between the firm's size and ROA.

To examine the link between leverage and the firm's performance, we have formulated the following hypotheses based on the available research in the field. Here, we have inserted only the null hypothesis.

*H<sub>01</sub>: The short-term debt has positive significant effects on the firm's financial performance.*

*H<sub>02</sub>: The long-term debt has positive significant effects on the firm's financial performance.*

*H<sub>03</sub>: The firm-specific characteristics (growth, size, and age) have significant negative effects on the firm's financial performance.*

## **OBJECTIVES**

To that end, this study will analyze the financial results of the pharmaceutical industry in Bangladesh as a function of the companies' leverage levels. To achieve the overall objective, the general objective has been categorized into two sub-objectives, and they are:

1. To assess the effect of the short-term leverage on the firm's financial performance
2. To measure the influence of long-term leverage on the firm's financial performance

## **DATA AND METHODS**

This study is carried out based on the Dhaka Stock Exchange (DSE) listed pharmaceutical firms in Bangladesh. The secondary data of six publicly traded companies spanning twenty years, from

2001 to 2020, included a panel set of 120 observations. The firms which are newly listed and with missing data have been excluded from this paper. The data are collected from audited annual reports downloaded from the DSE library and the websites of sample firms.

**Panel Regression Model:**

The panel data econometric analysis has been employed as the data consists of observations from a number of firms in time series forms. We began by estimating a pooled OLS model that treats all firms equally and controls the effects of time and industry on individual firms. However, owing to unobserved variability, the pooled model estimate might be distorted (as it omitted variables bias). Explanatory variables and error terms are presumed to be uncorrelated in pooled regression models. Estimates are skewed if indeed the explanatory metrics have a correlation with the error term (endogeneity) (Manawaduge *et al.*, 2011). We overcome these restrictions by estimating a regression analysis with FE and FE model, where the error term is split into such entity-specific errors and an individual error, which individually and together account for the presence of firm-specific traits. As a result, we may regulate the intangible consequences of certain entity-specific factors inside the panel structure. In the fixed effects model, the “entity-specific error term” is supposed to remain constant throughout time, but in the RE model, it is a random variable. Finally, in this work, we have employed the fixed effect regression estimate based on the findings of the Hausman specification test.

But, the fixed effect regressions for our data suffer from the problem of heteroscedasticity in both of our models, while the “cross-sectional dependence (CD)” is evident in one of the models which is the major issue to estimate the regression results. Due to the presence of heteroscedasticity and CD in our panel data, we have used the feasible generalized least square (FGLS) estimate.

The variables for this study have been selected based on the previous literature on this relevant field of corporate finance. As dependent variables, we have used ROCE and ROE, which have embodied the firm’s financial performance in several earlier studies (Morck, Shleifer, and Vishny, 1988; Thomsen, Torben, and Kvist, 2006; Lemmon, Roberts, and Zender, 2008; Salim and Yadav, 2012; Murugesu, 2013; Zeitun and Tian, 2014; Shaker Sultan and Hassan Mohammad Adam, 2015; Rahman, Sarker and Uddin, 2019). As independent variables, we have used in this study are STD, and LTD.

**Model Specification**

Through the use of the FGLS regression model, which may be characterized by the two multiple regression equations below. In our equation, we have used ROCE and ROE as the dependent variables, while STD and LTD as the independent variables and firm-specific characteristics—firm’s growth, size, and age are used as the control variables.

$$ROCE_{it} = \alpha_0 + \beta_1 STD_{it} + \beta_2 LTD_{it} + \beta_3 GROWTH_{it} + \beta_3 SIZE_{it} + \beta_3 AGE_{it} + \varepsilon_{it} \dots\dots\dots (1)$$

$$ROE = \alpha_0 + \beta_1 STD_{it} + \beta_2 LTD_{it} + \beta_3 GROWTH_{it} + \beta_3 SIZE_{it} + \beta_3 AGE_{it} + \varepsilon_{it} \dots\dots\dots (2)$$

Where,  $\alpha$  is the constant term,  $\beta$  is the coefficient,  $i$  is the number of firms which ranges for this study ranges from 1 to 6,  $t$  is the period ranging from 2001 to 2020, and  $\varepsilon$  is the error term.

**Diagnostic Tests Results:** To be sure about the results of the regression are free from errors and unbiased, the results should undergo some basic pre-and-post estimation diagnostic tests. In the case of panel data, the panel unit root, autocorrelation, multicellularity, and heteroscedasticity tests are fundamental and necessary for determining the accuracy of the findings.

**Panel Unit Root:** The panel unit root tests have been done through the use of “the Fisher-type unit root based on the augmented Dickey-Fuller test (Fisher-ADF)” and “the Levin-Lin-Chu (LCC) test”. The fisher-ADF hypothesizes the null as—all panels have a unit root, whereas the LLC hypothesizes as—panels contain a unit root. As shown by our findings (Table A-1), the test statistics of almost all variables are statistically significant at 1 percent ( $p < 0.01$ ), and the variables in this research do not exhibit unit root problems.

**Multicollinearity:** The multicellularity between the independent variables could be ascertained using several ways and they are not mutually exclusive. Table 3 revealed that the correlation constants for all of the variables are less than 0.80, which indicates that they do not exhibit multicollinearity (Gujarati, 2003; Cooper and Pamela, 2014). The non-appearance of multicollinearity is also evident through the values of the “variance inflation factor (VIF)” and the values of tolerance. The VIF values are less than 10.0 and the tolerance values are more than 0.10, indicating the nonappearance of problems like multicollinearity (Gujarati, 2003; A. Lind, Marchal, and Wathen, 2012; Mwangi, 2016). According to Table 3, the variables are free from multicollinearity since their VIFs are less than 5.00 and their tolerance values are more than 0.10.

**Autocorrelation:** Using the “Durbin-Watson (DW) statistic” and the “Breusch-Godfrey LM test statistic”, the autocorrelation of the panel data was evaluated. The DW test statistic between 1.5 to 2.5 could be considered an indicator of being free from the problem of autocorrelation in social science research (Olokoyo, 2012). The Breusch-Godfrey LM test hypothesizes that the null as—“there is no serial correlation”. In our case, from the results presented in Table A-2, we can say that model 1 has a DW statistic of 2.14 and model 2 of 1.54. The p-values of the Breusch-Godfrey LM test are greater than 0.05 for both of the models, which suggests not rejecting the null hypotheses. Therefore, both regression models are moderately free of the autocorrelation issue.

**Hausman Specification:** In recent years, many researchers using the Hausman specification test (Hausman, 1978) in dynamic panel analysis to identify the model with the strongest interpretability power between the FE and the RE model. As we have found in Tables A-3 and A-4, the p-values of the Hausman Chi-square for model 1 with ROCE and for model 2 with ROE of 0.0059 and 0.0015 respectively, we cannot accept our null hypotheses. The Hausman specification’s null hypothesis is that “the random effect model is the more appropriate model for our data” (Greene, 2008), and hence, for both regression models, the FE model was adopted over the RE model to better explain the underlying link between leverage and financial performance.

**Heteroscedasticity:** In our case, we have used “the Modified Wald test” for heteroskedasticity in the FE model, which assumes the null hypothesis that “there is no heteroscedasticity”. As the test results show (see Table A-5) that the p-values of the Chi-square statistic for both models with ROCE and ROE are 0.000 ( $p < 0.01$ ), we cannot accept our null hypothesis signifies that the

heteroscedasticity is evident in the models and it a matter of major concern for the fixed effect regression results.

**Cross-sectional Dependency (CD):** The existence of CD in the panel data set has been tested through the use of the Pesaran CD test. The probability of Pesaran CD is less than 0.05 for model 1 with ROCE, while greater than 0.05 for model 2 with ROE (see Table A-6) indicates the incidence of CD in our initially selected FE model.

To mitigate the problematic heteroscedasticity and CD in our panel fixed effect regression model, we have employed the feasible generalized least square (FGLS) estimation, as suggested by many scholars (Verbeek, 2004; Wooldridge, 2012; Wamugo Mwangi, Stephen Makau and Kosimbei, 2014; Pham, Nguang and Nguyen, 2020; Panda, Nanda and Panda, 2021), which automatically takes care of both the problem found in our selected regression models.

## **EMPIRICAL RESULTS**

### **Summary of Descriptive Statistics**

Table 1 shows a compilation of all the variables' descriptive statistics. The profitability measures—ROCE and ROE revealed average values of 20.6 percent and 22.8 percent respectively and the standard deviation (SD) of 10.5 percent and 11.6 percent. The STD as a measure of operating leverage has a mean of 64.6 percent and an SD of 64.7 percent, while LTD has a mean value of 6.40 percent and a standard deviation of 9.50 percent, indicating that pharmaceutical companies are highly levered. This indicates that the pharmaceuticals firms are financed through debt financing of more than 70%. Table 1 also includes the values of firm-specific characteristics employed as control variables in this research. The mean growth rate (GROWTH), indicated by the growth of the sales of the sample firm over the study period, is 12.5 percent with an SD of 23.4 percent, a minimum of -74.2 percent maximum of 129.00 percent, which indicates that overall pharmaceuticals industry in Bangladesh enjoyed a vast range of mixed growth over the period of 2001 to 2022. In terms of SIZE, it shows a value of 21.89, with an SD of 1.94. Mean value of the AGE of the sample period since the inception of the firms is 35.67 years, with an SD of 10.227, a minimum of 18.00 years, with a maximum of 62.00 years which designates that the pharmaceuticals industry is one of the sectors that fostered in Bangladesh even before it got independence and the variables of the study come from both old and newly established firm.

Table 1: Summary of Descriptive Statistics

<i>Variable</i>	Mean	Std. Dev.	Min	Max
<i>ROCE</i>	0.206	0.105	-0.011	0.618
<i>ROE</i>	0.228	0.116	-0.013	0.719
<i>STD</i>	0.646	0.647	0.188	4.752
<i>LTD</i>	0.064	0.095	0.000	0.922
<i>GROWTH</i>	0.125	0.234	-0.742	1.290
<i>SIZE</i>	21.889	1.936	17.687	25.554
<i>AGE</i>	35.667	10.227	18.000	62.000

*Number of Observations, n = 120;*

*Number of Entities = 6*

Note: ROCE = EBIT/Total Captial; ROE = EBIT/Shareholders' Equity; STD = Current Liabilities/Total Assets; GROWTH = Sales<sub>t</sub> - Sales<sub>t-1</sub>/Sales<sub>t-1</sub>; SIZE = Natural logarithm of total assets; AGE = Number of years from the firm's incorporation to the sample year.

### ***Pairwise Correlations Matrix***

As revealed in Table 2, the matrix of correlation coefficients for all explanatory variables was used. According to the results, the indicator of profitability ROCE has a positive correlation with short-term leverage indicators STD (0.150) but is negatively correlated with the long-term leverage indicator LTD (-0.330). The other profitability measure ROE has also a positive correlation coefficient with STD (0.114), but a negative correlation with LDT (-0.220). Both the variables of firm-specific characteristics— firm's GROWTH and AGE are being shown as positively correlated with both profitability indicators ROCE (0.168 and 0.121) and ROE (0.222 and 0.093), but the variable SIZE is negatively correlated with both the dependent variables—ROCE and ROE. The coefficients of correlation of SIZE with ROCE and ROE are -0.185 and -0.151, respectively.

**Table 2: Pairwise Correlations Matrix, Values of VIF and Tolerance**

<i>Variables</i>	ROCE	ROE	STD	LTD	GROWTH	SIZE	AGE	VIF	Tolerance
<i>ROCE</i>	1.000								
<i>ROE</i>	0.981***	1.000							
<i>STD</i>	0.150	0.114	1.000					1.35	0.739261
<i>LTD</i>	-0.330***	-0.220	-0.124**	1.000				1.22	0.820618
<i>GROWTH</i>	0.168**	0.222	-0.024	0.014	1.000			1.00	0.996864
<i>SIZE</i>	-0.185**	-0.151	-0.475**	0.125**	0.048	1.000		2.51	0.397642
<i>AGE</i>	0.121	0.093***	-0.162**	-0.230**	0.009	0.641**	1.000	2.12	0.471016
<b><i>Mean VIF</i></b>								<b>1.64</b>	

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

Table 2 also shows the indicators of multicollinearity, the situation when two independent variables are highly correlated (0.80, or more) (Lewis-Beck, 1993; Gujarati, 2003). We find no evidence of multicollinearity since Table 2 shows that no pairwise correlation coefficients exceed 0.80 among the independent variables. Additionally, the settings of VIF and tolerance ensure the non-existence of multicollinearity. As shown in Table 2, all of the VIF values are less than 5.00, and the tolerance values are more than 0.10, indicating that our panel data lacks multicollinearity.

### ***FGLS Regression Results***

To find out the impacts of studied variables—STD, LTD, and control variables on the firm's financial performance. The FGLS regression model works similarly to the generalized least square regression technique except that it ponders an estimated matrix of variance-covariance as the true matrix is directly unidentified. Our hypotheses have been evaluated based on outcomes shown in Tables 3 and 4.

Table 3 states that the coefficient of the measure of short-term leverage (STD) has a statistically insignificant negative coefficient of -0.003 with ROCE. The other measure of long-term leverage (LTD) has also a negative coefficient of -0.241 which is significant at the 5 percent level. The table also reveals the association of the control variables with financial performance represented by ROCE. Table 3 shows positive coefficients between company GROWTH and AGE having regressors of 0.083 and 0.013, respectively; these values are both statistically significant at the 5%

level. With a -0.029 value, the SIZE of the business is negatively correlated with the return on capital employed (ROCE), which is significant at the 1 percent level ( $p < 0.01$ ).

Table 3: FGLS Regression Results with ROCE

<i>ROCE</i>	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
<i>STD</i>	-0.003	0.015	0.08	0.933	-0.029	0.031	
<i>LTD</i>	-0.241	0.099	-2.43	0.015	-0.436	-0.047	**
<i>GROWTH</i>	0.083	0.036	2.27	0.023	0.011	0.154	**
<i>SIZE</i>	-0.029	0.007	-2.74	0.006	-0.033	-0.005	***
<i>AGE</i>	0.013	0.001	2.51	0.012	0.001	0.005	**
<i>Constant</i>	0.521	0.130	3.99	0.000	0.265	0.776	***
Mean dependent var		0.206	SD dependent var			0.105	
Number of obs		120	Chi-square			31.119	
Prob > chi2		0.000	Akaike crit. (AIC)			-217.804	

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

From Table 4, we see the results FGLS regression summary with profitability indicator measured by ROE. As Table 4 shows that the STD also has a negative but statistically insignificant effect on ROE, with a coefficient of -0.001, whereas the LTD has a negative coefficient of -0.152 which is significant at 1 percent level with the p-value of 0.009 ( $p < 0.01$ ). The results of the association of control variables with ROE also reveal they near about the same as with ROCE. The GROWTH and AGE have a significant positive beta coefficient of 0.117 and 0.003 respectively with ROE. The coefficient of GROWTH is substantial at 1 percent level while AGE is significant at 5 percent level. The coefficient of the firm's SIZE with ROE indicates a negative association with a value of -0.019, which is significant at the 5 percent with a p-value of 0.016 ( $p < 0.05$ ).

Table 4: FGLS Regression Results with ROE

<i>ROE</i>	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
<i>STD</i>	-0.001	0.018	-0.05	0.958	-0.035	0.033	
<i>LTD</i>	-0.152	0.113	-1.32	0.009	-0.372	0.073	***
<i>GROWTH</i>	0.117	0.042	2.81	0.005	0.035	0.199	***
<i>SIZE</i>	-0.019	0.008	-2.41	0.016	-0.035	-0.004	**
<i>AGE</i>	0.003	0.001	2.19	0.029	0.000	0.006	**
<i>Constant</i>	0.536	0.149	3.59	0.000	0.244	0.829	***
Mean dependent var		0.228	SD dependent var			0.116	
Number of obs		120	Chi-square			21.567	
Prob > chi2		0.000	Akaike crit. (AIC)			-185.318	

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

### **Discussion on Findings**

From the result presented in Tables 3 and Table 4, we see that the negative beta coefficients of STD of -0.003 with ROCE and -0.001 with ROE respectively with the p-value of 0.933 and 0.958, indicating a negative but statistically insignificant connection between the STD and the firm's performance represented by ROCE and ROE. Therefore, we cannot accept our null hypothesis 1 ( $H_{01}$ ), which assumed that "the short-term debt has positive significant effects on the firms' financial performances", indicating that the use of STD may not have any meaningful effects on the financial performance, which is unswerving with the research findings of Abor (2005), Ahmed Sheikh and Wang (2013), Gill et al. (2011), Salim and Yadav (2012), Twairesh (2014). But, this contradicts the results found by some of the researchers, such as Goyal (2013), Mwangi (2016).

The LTD has beta coefficients of -0.241 and -0.152 with ROCE and ROE respectively which is significant at 5 percent level and 1 percent level as Table 3 and Table 4 reveals the p-values of 0.015 ( $p < 0.05$ ) and 0.009 ( $p < 0.01$ ) respectively, which indicates that we also cannot accept our null hypothesis 2 ( $H_{02}$ ), which hypothesized that “the long-term debt has positive significant effects on the firms’ financial performances”. The results designate that the higher use of the LTD could lead to a lessening in the profitability of the firm. These findings are congruent with those reported by other studies earlier, such as Abor (2005), Sheikh and Wang (2013), Gill et al. (2011), Goyal (2013), Twairesh (2014), Kipasha and Moshi (2014), Nga and Nguyen (2020), Opoku-Asante et al. (2022), Salim and Yadav (2012), but contradict with Mwangi (2016), Guo et al. (2020).

We have assumed hypothesis  $H_{03}$  as “the firm-specific characteristics (growth, size, and age) have significant negative effects on the firm's financial performances”. Tables 3 and Table 4 show a positive association between growth and profitability; the higher the rate of growth, the greater the profitability, and vice versa. The beta coefficients of 0.083 and 0.117 with the ROCE and ROE are significant at the 5% and 1% levels, respectively, indicating a positive relationship between the rate of growth and profitability. This result is confirmed by many of the prior research Gill et al. (2011), Ahmed Sheikh and Wang (2013), Abor (2005), Dawar (2014), Shubita and Alsawalhah (2012), Dalci (2018), Zeitun and Tian (2007), nonetheless, it contradicts the outcomes of many studies (Gill, Biger and Mathur, 2011). The firm’s AGE has the same beta coefficients of 0.003 with ROCE and ROE respectively those are significant at the 5 percent level, which indicates that the business experiences in terms of years matter for the financial performances of the DSE-listed pharmaceutical firms—profitability of the firm may increase as they get older. This inference is also supported by the results of some scholarly research (Muritala, 2012; Pouraghajan *et al.*, 2012; Dawar, 2014). But in the case of other control variables SIZE, which produces the negative beta coefficients, with both dependent variables—ROCE and ROE, of -0.029 and -0.019, that are significant at 1 percent level with ROCE with the p-value of 0.006 ( $p < 0.01$ ) and 5 percent level with ROE with the p-value is 0.016 ( $p < 0.05$ ), which indicate that the profitability of the pharmaceuticals firms in Bangladesh reduce as they get big in terms of size of their assets. These outcomes are also reinforced by the conclusions of Gill *et al.* (2010), Twaires (2014), but these counter the outcomes found by Samo and Murad (2019), Hirdinis (2019), Shubita and Alsawalhah (2012). Consequently,  $H_{03}$  is partially supported by the results of our regression results. Concisely, we can state that the size of a company has a substantial and negative effect on its financial performance, whereas the firm's growth and age have a considerable and positive effect.

## **CONCLUSION**

This study set out to analyze how pharmaceutical companies listed on DSE interact with one another and how their financial performance compares. Using a panel quantitative analysis method called the FGLS regression model on data from 2001 to 2020, we find that both measures of leverage, STD and LTD are inversely associated with financial performance—ROCE and ROE, with the impact of LTD being statistically significant. The firm's GROWTH and AGE are positively correlated with ROCE and ROE; however, the firm's SIZE is negatively correlated with the financial performance of pharmaceutical firms in Bangladesh. Depending on the findings of this study, it can be said that the profitability of pharmaceutical enterprises improves with the

firm's growth and length of time in the industry, although the profitability may decrease as the firms get larger in terms of the size of their assets. This study's empirical outcomes suggest that leverage has fundamental implications for a company's financial sustainability. Therefore, the debt level—especially the long-term debts should be cautiously adjusted by the corporate managers while assembling the firm's capital structure as they have an enormous potential effect on financial performance. Moreover, investors should have proper attention to the leverage level and the associated risks of the firms while making investment decisions.

Since the pharmaceutical industry in Bangladesh is one of the utmost significant and prominent, the results found in this study have a possibility to influence the financial decisions of the new sector and existing firms to restructure the financial structure—the portion of the short-term and long-term capital in their capital structure to make them more profitable. As the research reveals a negative association between the quantity of debt and the profitability level, investors should proceed with caution when selecting whether to invest in highly leveraged companies. It is also suggested to take more care about the financial risks of relatively large firms as the firm's size exerts a significant negative association with the firm's profitability.

This analysis was conducted using only secondary data and a sample of six DSE-listed companies. Further study can be initiated including more sample firms and a broader selection of the measures of both leverage and financial performances of the pharmaceuticals industry in Bangladesh. Comparison analysis may also be conducted comparing local and international firms to examine the link between leverage and a company's financial performance.

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## APPENDICES

**Table A-1: Results Summary of Unit Root Test**

“Fisher-type unit-root test based on augmented Dickey-Fuller (Fisher-ADF)”			“Levin-Lin-Chu (LLC) unit-root test”	
Variables	Statistic	p-value	Statistic	p-value
ROCE	27.3169	0.0070	-3.0486	0.0011
ROE	2.8256	0.0024	-2.9984	0.0014
STDR	1.9745	0.0097	-1.6933	0.0141
LTDR	20.1561	0.0000	-21.2514	0.0000
GROWTH	21.2661	0.0000	-8.3112	0.0000
SIZE	-1.6056	0.0198	-1.3764	0.0844
AGE	-2.44	0.0185	-3.6874	0.0074

Number of panels = 6, Number of periods = 20  
ADF and LLC regressions: 0 lags

**Table A-2: Results of Autocorrelation Tests**

Model (Dependent Variable)	DW Test Statistic (6, 120)	Breusch-Godfrey LM Test	
		Chi-squared	p-value
Model 1 (ROCE)	2.14	2.432	14.654
Model 2 (ROE)	1.54	1.985	8.645

**Table A-3: The Hausman Specification Test for Model 1 with ROCE**

	— Coefficients —			sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random	(b-B) Difference	
STDR	-0.0169920	0.0012791	-0.0182710	0.0041453
LTDR	-0.1983069	-0.2412698	0.0429629	---
GROWTH	0.1066251	0.0826931	0.0239320	---
SIZE	-0.0657570	-0.0191293	-0.0466278	0.0230735
AGE	0.0135086	0.0030443	0.0104642	0.0035846

$$\begin{aligned} \text{chi2}(5) &= (\text{b-B})'[(\text{V}_b-\text{V}_B)^{-1}](\text{b-B}) \\ &= 16.34 \\ \text{Prob}>\text{chi2} &= 0.0059 \end{aligned}$$

**Table A-4: The Hausman Specification Test for Model 2 with ROE**

	— Coefficients —			Sqrt (diag(V <sub>b</sub> -V <sub>B</sub> )) S.E.
	(b) fixed	(B) random	(b-B) Difference	
STDR	-0.025613	-0.0009156	-0.0246974	0.0037434
LTDR	-0.0898707	-0.1497308	0.0598601	---
GROWTH	0.1417231	0.1170492	0.0246739	---
SIZE	-0.0796098	-0.0192534	-0.0603565	0.0260586
AGE	0.0162888	0.0030367	0.0132521	0.0040471

$$\begin{aligned} \text{chi2}(5) &= (\mathbf{b}-\mathbf{B})'[(\mathbf{V}_b-\mathbf{V}_B)^{-1}](\mathbf{b}-\mathbf{B}) \\ &= 19.65 \\ \text{Prob}>\text{chi2} &= 0.0015 \end{aligned}$$

**Table A-5: Results Modified Wald test for Heteroskedasticity**

ROCE		ROE	
chi2 (6)	Prob > chi2	chi2 (6)	Prob > chi2
932.74	0.0000	594.99	0.0000

**Table A-6: Results of the Pesaran Cross-sectional Dependence (CD)**

Model 1 with ROCE		Model 2 with ROE	
Pesaran's test of CD	2.082	Pesaran's test of CD	1.542
Probability	0.0373	Probability	0.1230

**Table A-7: List of Sample Firms**

<ul style="list-style-type: none"> <li>• ACI Pharmaceuticals Limited</li> <li>• Ambee Pharmaceuticals Limited</li> <li>• Beximco Pharmaceuticals Limited</li> </ul>	<ul style="list-style-type: none"> <li>• GlaxoSmithKline Bangladesh Limited</li> <li>• The IBN SINA Pharmaceutical Industry Limited</li> <li>• Square Pharmaceuticals Limited</li> </ul>
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