



## Impact of Capital Structure on Firm Performance: Evidence from the Pharmaceuticals & Chemicals Sector in Bangladesh

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### Abstract

This study investigates the impact of the capital structure on firm performance for Pharmaceuticals & Chemical companies in Bangladesh. To conduct this study, a sample of 22 Pharmaceuticals & Chemicals Companies listed in DSE during the sample period of 2013 to 2020 has been used. Eight (8) years of panel data were analyzed using a panel corrected standard error multiple regression model. In this study, firm's performance is measured by ROA (return on asset), ROE (return on equity), and EPS (earnings per share). The ratio of long-term debt ratio, short-term debt ratio, total debt ratio, total debt to equity ratio have been used as a proxy of capital structure. Also, three control variables (liquidity, firm size, firm age) have been considered for this study. Results of the regression output show that short-term debt ratio and long-term debt ratio are statistically significant with firm's performance and their relationship is negative. Total debt ratio and debt to to-equity ratio are insignificant when measured by earnings per share. The three models used in this study produced statistically significant results. The study found that the external fund (debt) has a negative impact on the performance, meaning that external fund (debt) is negatively correlated with the performance for Pharmaceuticals & Chemicals Companies in Bangladesh. The findings of this study also support the Peaking Order Theory of capital structure.

**Keywords:** Capital structure, Firm Performance, ROA (return on asset), ROE (return on equity), EPS (earnings per share).

### 1. Introduction

To ensure sound financial management and profitability, capital structure is one of the most important indicators of any firm and denotes to the way, that a company finances its assets by combining liabilities and equity. The capital structure of a company refers to the company's funding sources, which include equity both (common and preferred equity) and debt (short term and long term) which is used for the purpose of investment (Mujahid & Akhtar, 2014). Capital structure are the processes and mechanisms in place to ensure that the

organization is directed and managed in a manner that maximizes long-term shareholder value by holding managers accountable and improving organizational performance (Kajananthan et al., 2010).

In other words, managers utilize various debt ratios, as a performance-enhancing strategy of the firm (Gleason et al., 2000). Employing this approach, companies in general, try to accomplish an optimal debt ratio in order to raise the firm value and lower the cost of capital and risk. In other words, optimum capital structure may ensure sound profitability without incurring higher cost. Moderate level of leverage is preferable for the firm but, after this level of leverage, it becomes riskier for the firm and incurs higher costs as well. As a result, investors are less interested to invest in that particular company. So, it is important for companies in an industry like Pharmaceuticals & Chemicals to determine the optimum capital structure which will ensure firms sound profitability with moderate level of cost and higher firm value and retain investor confidence.

This paper will contribute to the relevant capital structure literature in several ways. There have been several studies on capital structure determination but insignificant studies have been carried out in the in the Pharmaceuticals And Chemicals industry. This will contribute to the literature and also enable managers and owners of the Pharmaceuticals & Chemicals Companies, to understand the effect of capital structure on corporate performance. The Pharmaceuticals and Chemicals industry is one of the strongest industries for any country and Bangladesh is of no exception. In light of the Covid 19 pandemic this industry has flourished more than any other. It is of interest to know how this industry has managed their funds to, maintain a sound profitability.

The objective of this paper is to determine whether there is any significant relationship between corporate performance and capital structure. In order to accomplish this connection, this study is, based on 8 years of panel dataset from 22 pharmaceuticals and chemicals industry in Bangladesh during the sample period 2013 to 2020. Furthermore, this study attempted to link the theoretical impact of the capital structure and corporate success.

The rest of the paper is organized as follows: Section 2- theoretical analysis and literatures review, Section

3- hypothesis development, Section 4- methodology, Section 5- empirical findings and Section 6- conclusions.

## 2. Theoretical Background and Literature Review

To ascertain the relationship and theoretical implication between capital structure and firm performance, several studies have been reviewed and found mix result of leverage and impact of firm performance. Some studies found positive where some found negative and some found no relationship as well. Literature review covers a definition analysis, of capital structure, firm performance, theoretical literature review and an empirical literature review, both nationally and internationally

### 2.1 Definition Analysis

#### 2.1.1 Capital structure

The capital structure of a company refers to the company's funding sources, which include equity both (common and preferred equity) and debt (short term and long term) which is used for the purpose of investment (Mujahid & Akhtar, 2014). The capital structure of a company is made up of its total equity and debt for which firms may issue various securities but for the purpose of the reduction of cost of capital the perfect mix of fund determination is crucial decision (Riaz, 2015). The financing structure of a company refers to the method of financing it uses, which is typically a combination of loans and equity capital (M. Siddik et al., 2017). According to (Jegers, 2018) the capital structure tries to clarify how companies finance real investment with a blend of securities and funding source. (Chowdhury & Chowdhury 2010) said that the capital structure is comprised of the balance sheet elements, which consist of owners' equity, non-current obligations and original investment. According to Modigliani and Miller, capital structure refers to the method by which a company funds its asset by using a mixture of debt, equity, or hybrid securities (Umer, 2013). Capital structure refers to the structure, processes and mechanisms in place to ensure that the organization is directed and managed in a manner that maximizes long-term shareholder value by holding managers accountable and improving organizational performance (Kajananthan et al., 2010). But now a days a company's capital structure covers short-

range of debt as well in the form of working capital requirements which was not considered traditionally (Mujahid & Akhtar, 2014).

### 2.1.2 Firm performance

Firm performance has become common topic in strategic management studies and it is commonly used as a dependent variable now a days (Taouab, 2019). There are several ways to measure the firm performance. Firms' performance can be examined from two different perspective (Jegers, 2018) Those are:

- i. financial perspective
- ii. Organizational perspective

Most commonly, maximum firms use to measure firm performance in previous studies are return on asset, return on equity, Earnings per share, Tobin's Q. Out of this ROA and ROE is the most preferable to measure the firm's profitability and EPS measure firm performance.

### 2.2. Theoretical literature review

Over the years, several theories on this topic have been established by researchers and different academic scholars. These theories include; the Theory of Modigliani & Miller (1958) which proposed that the cost of obtaining capital is not linked to the type of funds that a company uses and there isn't any existence of an optimal capital structure, hence the capital structure of a firm is not relevant or has no influence on the value of a firm. However, amendments were done by Modigliani & Miller (1963) on their earlier model of capital structure irrelevance theory in relation to their acceptance that corporate tax and the tax deductibility of interest payment exist (Al-Nasrawi & Thabit, 2020). (Cited by Sovaniski, Tim). Since Modigliani and Miller's (1958) work on the irrelevance of capital structure to business value, theoretical and empirical investigations on the determinants of corporate financing decisions in practice have been established. This research has typically adhered to standard finance theory, which includes the trade-off theory, the pecking-order theory, and more recently, the market timing theory. But no strict theory has been developed yet to determine the exact optimal capital structure (Frank and Goyal, 2004). So, it concerns managers in identifying some factors influencing capital structure decision by which they can benefit to make an optimal mix of debt and equity to maximize firm's

value. Moreover, these factors vary across countries and firm's characteristics i.e., liquidity, market to book, collateral, dividend payment, profitability size assets etc. (Khairul Alom)

The Trade-Off Theory argues that a firm's optimal capital structure results from a tradeoff between tax advantages of debt and bankruptcy costs of debts (Miller, 1977). According to the pecking-order theory, formalized by Myers and Majluf (1984) and Myers (1984), there is a hierarchy in manager financing choices. External financing transaction costs, especially those associated with adverse selection, result in managers having a preference for internal financing, and then new debt and finally new equity financing. According to the market timing theory, managers will issue stock when the firm's market value relative to book value is high and debt when debt market circumstances are seen to be substantially more favorable. (See Myers, 1984; Graham and Harvey, 2001; Hovakimian, Opler and Titman, 2001). Cited by Khairul Alom

According to **Pecking Order Theory**, Myers & Majluf (1984) noted that internal finance is preferred over external finance by firms since information asymmetry creates a problem between the firm's agent and the owner. Hence, less debt capital will be used by firms that are considered to be profitable and generate better earnings as compared to those that don't generate high earnings (Thabit & Solaimanzadah, 2018). According to (Stephen A. Ross, Randolph W. Westerfield, Jeffrey Jaffe, 2009), The principle of pecking order exists in two real world rules:

- Use internal financing
- Issue safest security first.

This theory also argue that internal resources will often be preferred over loans, and using internal funds will minimize enterprises' dependence on third parties, increasing financial control and eliminating potential leaks of information (Nguyen & Nguyen, 2020).

Another main branch of capital structure theories based on the agency cost of debt and equity. The Agency Theory founded by Jensen and Meckling in 1976 deals with the agency cost. According to agency cost theory an optimum capital structure can be achieved by lowering the cost associated with the disagreement between management & shareholders, management & creditors etc. (Musah, 2018). In consistent with this (Borman, 2019) Debt finance was

suggested in agency theory as a means of encouraging firm management to concentrate on the organization's general goals rather than their own. Furthermore, increased leverage in the light of low agency costs is likely to improve productivity and thereby lead to improving firm profitability. Jensen and Meckling (196) argued that at low levels of leverage, increase in debt can reduce total agency cost. However, beyond some point, as result of liquidation and bankruptcy costs, agency cost of debt is subject to increase. Thus, increased use of debt results in an attendant reduction in agency cost which in turn may raise the efficiency of the firm and thereby lead to an improvement in firm performance (AKOMEAH et al., 2018). Myers and Majluf imply that the ideal structure for capital can be accomplished by minimizing agency expense by raising corporate shareholdings or taking on more borrowing to control managers' propensity to take on more debt (Hossain, 2016).

The Signaling Hypothesis which is developed Ross. According to Ross (1977), managers are aware of the distribution of corporate profits, but individuals seeking to invest in the firm are not. (Ross, 1977:23); (Hossain, 2016) argued in the Signaling Theory, based on asymmetric knowledge, Managers have a greater understanding of the firm's inside information than investors, and managers' leverage decisions send a signal to the market because debt financing is perceived by investors as a signal of high future cash flows and high future performance of the firm. If management decide to enhance leverage in the capital structure, investors may conclude that a firm has higher future cash flows and a responsibility to fulfill contractual obligations. These will demonstrate management's high level of confidence in the firm's future prospects (AKOMEAH et al., 2018). Investors see management's approach of issuing fresh equity as an indication that management is unsure about the firm's future expectations. As a result, the hypothesis proposes that company performance and debt use are positively connected (AKOMEAH et al., 2018).

## 2.3 Empirical literature review

### 2.3.1 National/Domestic Literature Review

(Hasan et al., 2014) draw a conclusion that a significant positive relation between EPS and short-term debt and significant opposite relation with long

term debt and found negative relation between ROA and capital structure and no noticeable relationship between capital structure and profitability calculated by ROE and Tobin's Q based on the 36 listed company in DSE during the period 2007 to 2012 pooled panel data analysis. They also found positive relation between short term debt ratio and EPS. On the other hand (RAHMAN et al., 2020) found strong inverse relationship between profitability & leverage by using pooled OLS method of 22 listed company under textile industry in DSE where they measured profitability by ROA and ROE. They also conclude that maximum textile firms in Bangladesh generate funds externally rather than internally as they don't have enough source that are internally generated.

In consistent with this, (Hossain, 2016) found that ROA is negatively related to the capital structure variable whereas he found opposite result in case of ROE by analyzing 81 manufacturing companies listed in DSE during 2002 to 2004. He also found that long term debt has less impact on profitability than short term debt. Another study done on 22 listed banks in Bangladesh during 2005 to 2014 where pooled data is analyzed and found negative relation of capital structure and performance which is calculated by taking ROA, ROE, EPS as a proxy (Siddik et al., 2017). An analysis of the choice of capital structure found negative impact of liquidity, collateral, profitability on leverage by using fixed effect model on a 44 firms during 2004 to 2011 (Alom, 2013).

On the other hand, an evidence from the manufacturing sector listed in DSE and CSE in Bangladesh found an interesting result which is the relationship between debt financing and company value is strongly positive, when it is stratified by industry and for this there should be a perfect level of debt combination (Chowdhury & Chowdhury, 2010). According to (Khatoon & Hossain, 2017), A positive relationship exists between corporate performance and short-term debt and cash flow whereas, there is inverse relation of tangibility, long term finance, and liquidity with performance based on panel data of 5 cement companies listed in DSE during 1999 to 2011. On the contrary, of this result a study done on the IT sector found no significant relationship of the capital structure factors leverage, tangibility, cash ratio short term debt to asset ratio with performance by using OLS (ordinary

least square) multiple regression model for the period of 2007 to 2015 (Ullah et al., 2018). But they found significant result growth and size.

(Safiuddin et al., 2015) investigate in different context of capital structure, they differentiate capital structure and performance between Banks and NBFIs and found that significant difference in firm performance of higher levered and lower levered firm and also conclude strong relation between firm investment and financing decisions by analyzing 40 financial and non-financial firms during 2008 to 2012.

### 2.3.2 International Literature Review

An investigation that happened in Pakistan on the impact of debt structure on corporate performance revealed that favorable relationship exist between shareholders' wealth and corporate performance (measured by ROA, ROE, EPS) by analyzing 155 textile companies during 2006 to 2011 (Mujahid & Akhtar, 2014). In consistent with these findings (YOUNUS et al., 2014) revealed positive relation but weak positive relation with the capital structure and firm performance based on the listed sugar companies from KSE (Karachi Stock Exchange) Pakistan during 2006 to 2011. Another analysis also had taken place in Pakistan chemical industry by considering short term debt ratio, total debt ratio as a leverage and found opposite result of the previous analysis done in different sector. They discovered a strong inverse relationship between profitability and leverage (Riaz, 2015). While, a study investigate on the Nigerian companies during 2000 to 2010 found negative result between leverage and company output by using fixed effect regression model (Ogebe et al., 2013). Same result found by analyzing some selected cement company of India based on five financial years, they suggest that the higher the leverage the lower firms profitability (Singh & Singh, 2016). Similar to this, a study conducted in Ethiopia on some selected commercial banks during 2011 to 2015 revealed that capital structure proxy and its impact on profitability measure by ROA are negatively related with each other and the relationship is significant (Umer, 2013).

According to (Musah, 2018), an inquiry done in Ghana based on the commercial bank during 2010 to 2015 revealed little bit mix result that is structure of

capital determined by short term debt and long term debt ratio negatively related to firm performance but opposite result found when they measured capital structure by using total debt ratio. Statistically significant negative result found between leverage and profitability, where leverage is measured by short term debt and long term debt and profitability is measured by ROA and ROE on secondary information of manufacturing company Istanbul by analyzing during 2003 to 2013 (Uygulama, 2016). A study analyzed the effect on corporate success of the capital structure from different context, it differentiates the analysis between the state owned and non-state-owned enterprise listed in Vietnam stock exchange during 2013 to 2018. For the purpose of this analysis, they have used Generalized least square method, where ROA, ROE, EPS are considered to measure the firm efficiency and quick debt ratio, long-term debt ratio, total liabilities to total asset ratios are considered as a substitute of capital structure. They found statistically significant negative relation exist between performance and capital structure and they also found that state-owned enterprise shows strong effect than non-state-owned firm on capital structure (Nguyen & Nguyen, 2020). According to (Singapurwoko & El-Wahid, 2011) industry factors have also impact on determining the company's profitability. From 2003 to 2009, they studied non-financial companies listed on the Indonesia stock index., based on the different industries highest and lowest ROE (Return on equity) and they found that, data which are not categorized into different industries have positive effect to debt, size, operational decision while macroeconomic factors are insignificant.

So, from all of these findings it can be said that there exists mix result between capital structure and firm performance nationally and internationally. Finally, we can draw a conclusion that capital structure effect on firm performance differ industry to industry. After all of this review it is found that there is no prior study in our country particularly on the pharmaceuticals & chemicals industry in recent time period. Whereas, during this pandemic period this industry is in boom position which inspires us a lot to work on this industry. This will add value to the literature and help the management to determine the best mix of

fund, and make them able to know whether internally or externally generated fund is better choice for the pharmaceuticals & chemicals company in Bangladesh.

**Table-I: Summary of Literature Review**

Author	Country	Sample	Methodology	Variable and findings
(Siddik et al., 2017)	Bangladesh	22 Bank (2005-2014)	Pooled ordinary least square	Capital structure inversely related to performance
(RAHMAN et al., 2020)	Bangladesh	22 Textile (2011-2015)	Pooled Ordinary Least Square. Fixed Effect, GLM Method.	Negative relationship among structure of capital and profitability
(Alom, 2013)	Bangladesh	44 firm (2004-2011)	Fixed effect model under OLS	Leverage has negative impact on profitability but positive impact on market book value ratio.
(Jayiddin Nur et al., 2017)	Malaysia	45 construction company (2010-2014)	Linear regression with R studio	Found mixed result with short term negative but with long term not significant.
(Singh & Singh, 2016)	India	10 cement companies from 2009-10 to 2013-14	Analyzed only correlation, descriptive statistics.	Debt and profitability have a negative correlation.
(YOUNUS et al., 2014)	Pakistan	33 sugar company 2006-2011	Panel corrected standard regression is used.	Found weak positive relation.
(Mujahid & Akhtar, 2014)	Pakistan	155 textiles company (2006-2011)	Analyzed regression	There seems to be a positive association with capital structure, firm success, and shareholder wealth.
(Khan, 2012)	Pakistan	36 engineering company (2003-2009)	Pooled ordinary least square	Both STDTA TDTA negatively related with ROA and GM but insignificant negative relation with ROE.
(Umer, 2013)	Ethiopia	Selected commercial bank (2011-2015)	Multiple regression analysis	Found inverse relationship between ROA and capital structure
(Khatoon & Hossain, 2017)	Bangladesh	5 cement company (1999-2011)	Panel data regression fixed effect model.	Study reveals that cash flow and Short-term debt has a favorable relationship with the efficiency indicator.
(Ullah et al., 2018)	Bangladesh	All the IT companies (2007-2015)	OLS multiple regression analysis	Found insignificant relation between leverage, liquidity, tangibility with profitability.
(Pouraghajan et al., 2012)	Iran	400 firm years of 12 industries (2006-2010)	Multiple regression analysis	Found significant negative relation debt ratio and performance.
(Nguyen & Nguyen, 2020)	Vietnam	488 non-financial firms (2013-2018)	GLS method	Found negative relation between capital structure and performance.
(Fosu, 2013)	South Africa	257 firms (1998-2009)	OLS Method	Significant positive result found between leverage and firm performance.
(Siddiqui, 2012)	Bangladesh	24 NBFIs (2006-2008)	Cross sectional time series FGLS regression is applied.	Age, debt service ratio, operating leverage, growth, debt coverage has significant influence on leverage.

### 3. Hypothesis Development

After reviewing all the previous study, the following hypothesis can be stated to conduct this study.

Ho: There is no significant relation between capital structure and firm performance.

H1: There is a significant relation between capital structure and firm performance.

To test the hypothesis, in this study, the following relationship have been tested:

- Examine the relationship associated with STDR and corporate performance (calculated by ROA, ROE, EPS)
- Examine the relationship associated with LTDR and corporate performance (determined by ROA, ROE, EPS)
- Examine the relationship associated with TDR and corporate performance (calculated by ROA, ROE, EPS)
- Examine the relationship associated with DER ratio and corporate performance (determined by ROA, ROE, EPS)
- Examine the relationship associated with size of the firm and corporate performance (assessed by ROA, ROE, EPS)
- Examine the relationship associated with firm age and corporate performance (calculated by ROA, ROE, EPS)
- Examine the relationship associated with liquidity and corporate performance (defined by ROA, ROE, EPS)

### 4. Data and Methodology

#### 4.1 Data and Sample

There are almost 22 listed industries in Dhaka Stock Exchange. To conduct this study, mainly one industry (Pharmaceuticals & Chemicals) is selected which is listed in Dhaka Stock Exchange. Rationale behind choosing this sector is that, no recent work explores this sector individually in Bangladesh to determine whether there is any relationship exist between firm performance and capital structure. There are 31 listed

Pharmaceuticals & Chemicals company in Dhaka Stock Exchange till 2021. At first, the whole industry is selected as a sample size. But, in the data collection time period, several problems faced to conduct the study. For example, companies web site was not working, some company did not disclose the previous year's annual report to some extent. There are also some other problems as well. For all of this reason, some company excluded from the sample size. Finally, 22 company selected as a sample out of 31 listed company of Pharmaceuticals & chemicals industry in Dhaka Stock Exchange Bangladesh. To conduct this study, sample size represents almost 71% of the population which is enough to draw a conclusion. From the available data of companies chosen, all the necessary data collected from 2013 to 2020 to conduct this study.

To identify the association between the structure of capital and productivity, every necessary data gathered from the secondary source as no primary data is required to conduct this study. All the necessary data found in secondary source like published annual report, web site of the individual company, and other secondary source. Some unavailable data is calculated by using their existing financial condition.

#### 4.2 Variables

Based on the previous discussion, the aim of this research is to look into the connection with corporate financial performance and debt portion. For this purpose, some necessary variables are selected in consistent with the previous study. To measure profitability ROA, ROE, EPS is used as a proxy of profitability in consistent with (Khatoon ,et. al, 2017); (Khan, 2012); (Umer, 2013); (Zeitun & Tian, 2007) (YOUNUS et al., 2014); (RAHMAN et al., 2020); (Nguyen & Nguyen, 2020); (Pouraghajan et al., 2012). To measure the capital structure short-term debt ratio, long-term debt ratio, total debt ratio, debt to equity ratio is used as a proxy. Some control variable like firm size, liquidity, firm age is used which may have impact on the profitability of the firm.

**Table-2: Summary of The Variable Measurement**

Acronyms	Variable Name	Measurement-(Proxy)
<b>Dependent variable:</b>		
ROA	Return on asset	Net Income after tax / Total assets
ROE	Return on equity	Net Income after tax / Total equity
EPS	Earnings per share	Net income/weighted average share outstanding
<b>Independent variable:</b>		
TDR	Total debt ratio	Total liabilities/Total asset
DER	Debt to equity ratio	Total liabilities/Total equity
LTDR	Long term debt Ratio	Total long-term debts / Total assets= (LTD / TA)
STDR	Short-term debt ratio	Total Short-term debts/Total asset =(STD/TA)
<b>Control variable:</b>		
LQDT	Liquidity	Current Asset/Current liability
Age	Firm age	Firm age= Number of years of firm incorporation date to the sample period
SIZE	Firm size	(Size) = ln (Total Asset)

### 4.3 Model

To analyze the relationship of the structure of capital and corporate performance basic ordinary-least-square model is described in the following:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it}$$

Here,

$i = 1 \dots 2 \dots 3 \dots N$  and  $t = 1 \dots 2 \dots 3 \dots N$

$Y_{it}$  = Dependent variable (firm performance) at ith observation of t time period

$\alpha$  = constant term

$\beta$  = coefficient of the independent variable

$X_{it}$  = Independent variable (firm performance) at ith observation of t time period

$\varepsilon_{it}$  = error term

This is the basic model of the panel data analysis. For the purpose of this study, panel corrected standard error regression model is used. This model is appropriate for the panel data. Many previous studies used pooled ordinary least square, fixed effects model, generalized method of moments etc. but in this study, panel corrected standard error model of regression is used to correct autocorrelation and heteroscedasticity automatically. As we know, there are lots of statistical software but in this study “STATA-14 SE” is used to analyze the data properly.

First of all, Descriptive statistics is shown above in which calculation is done directly by using STATA-14 SE. Then correlation matrix along with the linear regression assumption is also checked. Linearity and normality of the model is also checked and found normal model for this study. The most popular test for the purpose of reliability and variability (heteroscedasticity & multicollinearity) is done to complete the analysis of this study. According to (Imtiaz et al., 2016), panel corrected standard error regression method correct any kind of heteroscedasticity and autocorrelation automatically that is present in the model. So, in this study panel corrected standard model is adopted to analyze the panel data which removes all the autocorrelation and heteroscedasticity problem.

According to (Siddik et al., 2017); (Hasan et al., 2014); (Ullah et al., 2018) the following model is determined with some modification:



$$\text{Model-1: ROA}_{it} = \alpha + \beta_1(\text{STDR}) + \beta_2(\text{LTDR}) + \beta_3(\text{TDR}) + \beta_4(\text{DER}) + \beta_5(\text{size}) + \beta_6(\text{LQDT}) + \beta_7 \text{Age} + \varepsilon_i$$

$$\text{Model-2: ROE}_{it} = \alpha + \beta_1(\text{STDR}) + \beta_2(\text{LTDR}) + \beta_3(\text{TDR}) + \beta_4(\text{DER}) + \beta_5(\text{size}) + \beta_6(\text{LQDT}) + \beta_7 \text{Age} + \varepsilon_i$$

$$\text{Model-3: EPS}_{it} = \alpha + \beta_1(\text{STDR}) + \beta_2(\text{LTDR}) + \beta_3(\text{TDR}) + \beta_4(\text{DER}) + \beta_5(\text{size}) + \beta_6(\text{LQDT}) + \beta_7 \text{Age} + \varepsilon_i$$

## 5. Result Analysis

### 5.1 Descriptive statistics

The study explores the effects between a firm's structure of capital and efficiency of pharmaceuticals & chemicals sector indexed in DSE during 2013 to 2020 panel data of 8 years. For the purpose of analysis, all the dependent and independent variables are analyzed. In the descriptive statistics where mean, standard deviation, maximum, minimum is summarized based on 176 observations. The following table-3 presents the descriptive statistics of this study. From the following table one noticeable observation is that the mean of all the variable is positive. Mean of the ROE, ROA, EPS is 0.183, 0.07, 9.263 which shows lower performance of the company under this sector. If we talk about the mean of STDR, LTDR, TDR shows 13.7%, 5.07%, 43.9% respectively. One interesting observation here is that the company of pharmaceutical & chemicals sector use more short-term debt than the long-term debt which indicates for a business, this is a risky method of financing. That means most of the pharmaceuticals and chemicals company in Bangladesh prefer short-term debt rather than long-term debt.

**Table-3: Descriptive Statistics**

Variable	Obs	Mean	Std.Dev.	Min	Max
ROE	176	.183	.557	-1.4	6.587
ROA	176	.07	.132	-.817	.528
EPS	176	9.263	15.357	-9.24	88.23
LTDR	176	.057	.083	0	.473
STDR	176	.137	.134	0	.56
TDR	176	.439	.252	.015	1.863
DER	176	1.26	2.184	-11.675	14.267
LIQR	176	2.662	4.498	.366	28.312
firmsize	176	21.84	1.599	17.763	25.032
Age	176	20.864	12.541	4	44

### 5.2 Pearson Correlation Analysis

For measuring the degree to which two variables are linearly related correlation matrix is analyzed here. As we know that, correlation measure the relationship among the variable. In case of multiple regression analysis, there may be strong or weak correlation between the independent variable. If there is a high correlation between explanatory variable then it creates multicollinearity problem. Existence of multicollinearity problem decrease the validity of the model. The correlation matrix of Pearson is examined in this study to determine the extent of the relation between the variable that are shown in the following as well as multicollinearity is checked.

In this study, as 3 model is used for 3 different dependent variable that's why all the 3 dependent variables and all the independent variables correlation are analyzed through Pearson correlation matrix. It is seen from table-4, dependent variable ROA is inversely related to the short - range and long-range debt ratios, as well as the gross debt to total asset ratio, and control variable firm age which is similar to the previous study as well. whereas, relationship between ROA and debt to equity ratio, liquidity, firm size is positive. On the other hand, dependent variable as a measure of firm performance (ROE) is negatively correlated with long-term debt ratio, short-term debt ratio, debt to equity ratio and liquidity. ROE is positively correlated with size, firm age and total debt ratio. This is similar whenever dependent variable is earnings per share that means EPS is also negatively associated with short term and long-term debt ratio, and liquidity while positively associated with the remaining variable. Also, independent variables are correlated with each other but it's up to the moderate level.

From this correlation matrix multicollinearity problem exist or not can also be checked. Multicollinearity exists, according to Wooldridge (2015), when the correlation coefficient is greater than 0.70. So, from the above correlation matrix it is seen that there is no variable which correlation coefficient is more than 0.70. which indicates that no multicollinearity problem exists in the model of the study.

**Table-4: Pearson Correlation Matrix**

Variables	ROA	ROE	EPS	LTDR	STDR	TDR	DER	LIQR	SIZE	AGE
ROE	1.000									
ROA	0.055	1.000								
EPS	0.251	0.589	1.000							
LTDR	-0.009	-0.304	-0.212	1.000						
STDR	-0.082	-0.121	-0.072	0.019	1.000					
TDR	0.211	-0.296	0.039	0.382	0.429	1.000				
DER	-0.325	0.076	0.023	0.086	0.351	0.531	1.000			
LIQR	-0.034	0.141	-0.078	-0.175	-0.308	-0.479	-0.179	1.000		
SIZE	0.022	0.212	0.339	-0.065	-0.030	-0.259	-0.156	0.093	1.000	
Age	0.038	-0.031	0.311	-0.149	0.230	0.249	0.120	-0.238	0.044	1.00

### 5.3 Multicollinearity Test

For more reliability another test of multicollinearity is done which is shown in the following. Here variance inflation factor is used to check the multicollinearity problem. This test is done to check whether explanatory variables are highly correlated with each other or not. There is a moderate level up to which multicollinearity issue is not considered as a problem. If variance inflation factor is below 10, then it is said that there is no multicollinearity problem between the explanatory variables. Basically, to ensure the validity and reliability of the regression model multicollinearity is checked as well as some other test is done in this study. From Table-5 it is seen that mean of variance inflation factor (VIF) is only 1.46 and all the variables VIF is below 10. And tolerance factor 1/VIF is also less than 1. So, from this test it is clearly indicated that regression model has no multicollinearity issues in this study.

**Table-5: Variance Inflation Factor**

	VIF	1/VIF
TDR	2.425	.412
DER	1.481	.675
LIQR	1.362	.734
STDR	1.338	.747
LTDR	1.326	.754
Age	1.204	.831
firmsize	1.102	.908
Mean VIF	1.462	-

### 5.4 Empirical Findings

#### Short-Term Debt Ratio

In this study, three models are applied to determine the relationship between capital structure and firm performance. Results from regression output are presented in the following table. Table-6 shows regression output of model one in which dependent variable ROA is used as a measure of performance. Regression output of model-1 shows statistically insignificant relationship between ROA and short-term debt ratio. Although it is insignificant but negatively related with each other.

On the other hand, whenever performance is measured by ROE and EPS in that case performance is statistically significant and shows negative relationship with short-term debt ratio. In model-1, p value of the short-term debt ratio is 0.111 which is greater than 0.05 at 5% significance level and also greater than 0.10 at 10% level of significance, that indicates insignificant relation. But in case of model-2 and model-3 p value is 0.017 and 0.000 respectively which leads to significance at 5% and 1% level respectively. Which indicates that short term debt ratio as a measure of capital structure has statistically significant negative relation with firm performance. This

finding is similar to the previous study (Siddik et al., 2017), (RAHMAN et al., 2020).

### **Long-Term Debt Ratio**

Long-term debt ratio shows the strongest result that in every model where performance measured with different proxy has statistically significant negative relation. P value of long-term debt ratio for all the model is less than 0.01 that means long term debt ratio is significant at 1% of significance level. In case of model-1, we can explain that 1-unit changes in long-term debt ratio leads to decrease ROA by -0.3282 unit. On the other hand, in case of model-2 and model-3, 1-unit changes in long-term debt ratio will decrease ROE & EPS by -1.6029 and -46.02 unit respectively.

From these findings it can be said that the higher the performance of the pharmaceuticals & chemicals company in Bangladesh tends to go for lower long-term debt. So, null hypothesis of this study is not accepted in case of long-term debt ratio. This result is also supported by (RAHMAN et al., 2020), (Siddik et al., 2017), (Hasan et al., 2014).

### **Total Debt Ratio**

In this study, total debt ratio is measured by dividing total liabilities with total asset. From table-6, it is found that there is statistically significant relationship exists between capital structure and firm performance. In case of model-1, this relationship is negative at 1% of significance level where p value is 0.006 which is less than 0.01. According to this model, 1-unit changes in total debt ratio will change ROA by -0.1649 unit. This result is consistent with (Siddik et al., 2017), (Khatoon et al., 2017).

On the other hand, statistically, significant result is found in case of model-2 and model-3 where firm performance is measured by ROE and EPS respectively. But in this case, relationship is positive. Relationship is significant at 1% in case of model-2 while in case of model-3 it is significant at 5%. In other words, 1-unit changes in total debt ratio will change ROE by 1.77 unit while 1-unit changes in total debt ratio will change Earnings per share by 14.32 unit. Similar result is found in (Siddik et al., 2017) when performance is measured by earnings per share. From this result it can be concluded that the higher the performance the lower the firm is interested to take debt if the we aside the findings of total debt ratio with ROE.

### **Debt-To-Equity Ratio**

Debt to equity ratio is measured here by dividing total liabilities with total equity. To examine the relationship between capital structure and firm performance debt to equity ratio is also analyzed here. From the above table it is seen that there is statistically significant interaction between firm performance measured by ROA & ROE with debt-to-equity ratio. The relationship is significant at 1% Whereas this relationship is insignificant in case of model-3 where performance is measured by Earnings per share. Although this relationship is insignificant in model-3 but relationship is positive. This result is in line with the result of (Sharif & Muhammad, 2019), (Khatoon et al., 2017).

### **Liquidity**

To control the effect on explanatory variable liquidity is used in this study as a control variable. From the above table it is clear that liquidity has an effect on the structure of capital. In this study, it is also found that liquidity has a statistically significant relationship with capital structure when performance is measured by ROE and EPS. Earnings per share is negatively related with liquidity. This is significant at 10% level of significance where p value is 0.079 which is less than 0.10 and not significant at 5% level of significance.

Regression coefficient of liquidity with EPS is -0.19. That means the higher the liquidity the lower the performance which is measured by earnings per share. This finding is similar to the (Siddik et al., 2017), (Nguyen & Nguyen, 2020). Although insignificant relation is found with ROA but we can say that, there is significant relation between performance as 2 model out of 3 model used in this study found significant impact in pharmaceuticals and chemicals company Bangladesh.

### **Firm Size**

Firm size can be measured through different way like natural logarithm of sales or natural logarithm of total asset of the firm. In this study firm size is measured through natural logarithm of total asset. From tables-6 firm size shows strong relationship in every model. All the three model shows statistically significant relationship with firm size. The relationship is significant at 1% level because p value is less than 0.01 in all the three model and the relationship shows positive relationship with firm performance.

In model-1 where performance is measured by ROA, 1-unit changes in firm size will increase performance (ROA) by 0.013 unit. We can say that the relationship is weak positive. While in line with the model-1, model-2 explains that 1-unit changes in firm size will increase performance measured by ROE by 0.035 unit. The relationship is also weak positive. In case of earnings per share 1-unit changes in firm size increase firm performance (EPS) by 3.60 unit. All the three models are showing positive relation of firm performance with firm size. This result is complies with (Siddik et al., 2017), (Hasan et al., 2014), (Nguyen & Nguyen, 2020). This indicates that firm size has positive impact on firm performance means that the higher the firm size the higher the performance. So, to some extent it can be said that larger firm earns more profit than the smaller firm.

### Firm Age

Company age is also a major variable to assess how capital structures affect corporate efficiency as a control variable. Out of three models of this study two models shows statistically significant result with the firm age and one model shows insignificant result. In Model-2 where ROE measure the performance revealed that firm age is statistically negatively correlated with the firm performance. Which indicates that performance of the firm has not increased that much if we compare it to the age of the firm.

Lots of reasons may exists behind this, it may be existence of the higher competition in the business world among the corporate firms. Regression coefficient of firm age in model-2 explains that 1-unit changes in firm age will change return on equity (ROE) by -0.00279 unit. Result is significant at 10% level. This result also complies the findings of (RAHMAN et al., 2020). But in case model-3 where performance is measured by EPS, shows opposite result. It also shows statistically significant result but relationship is positive. On the other hand, Relationship with ROA and firm age revealed insignificant results.

R-Square of a model indicates goodness of fit of the regression model that is used in the study. Normally, range of this scale is 0 to 100%. All the three model shows that, p value of the overall model is 0.0000 which is less than 0.01 at 1% level indicates overall significance of the model. Each model contains

22 number of groups along with 8 observation per group. R-square of the regression shows that 22.20%, 38.47%, 28.53% of the variance of explained variable ROA, ROE, EPS is explained by the fitted regression equation respectively.

**Table-6 Empirical findings**

VARIABLES	Model-1 ROA	Model-2 ROE	Model-3 EPS
STDR	-0.0947 (0.0594)	-0.598** (0.250)	-27.29*** (6.490)
LTDR	-0.328*** (0.114)	-1.603*** (0.327)	-46.02*** (12.32)
TDR	-0.165*** (0.0595)	1.778*** (0.393)	14.33** (5.925)
DER	0.0191 *** (0.00624)	-0.162*** (0.0424)	0.161 (0.470)
LIQR	-0.00113 (0.00171)	0.0158*** (0.00571)	-0.192* (0.109)
firmsize	0.0138*** (0.00383)	0.0357*** (0.0133)	3.603*** (0.384)
Age	-0.000169 (0.000516)	-0.00279* (0.00167)	0.291 *** (0.0609)
Constant	-0.144 (0.0910)	-0.985*** (0.333)	-75.12*** (9.955)
Observations	176	176	176
R-squared	0.222	0.385	0.285
NumberofID	22	22	22

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 6. Conclusion


Developing country like Bangladesh has evolved into an emerging market with lots of potentials. To contribute in economy and grab the investors' attention, it is very important for the managers and owners to know which capital structure is best for the corporation. Recently, pharmaceuticals and chemicals company are in boom situation during this pandemic period. So, to ensure the best output and to operate the activities of the company effectively and efficiently it is necessary to determine the best mix of capital structure. Among all other decisions determination of debt financing decision is one of the most crucial decisions for a firm because it determines which financing source is best for the company (external or internal) at minimum cost of the fund. The focus of this thesis was to establish whether or not the capital

structure of pharmaceuticals & chemicals companies has a major effect on company results.

This study tried to explore the impact of capital structure on firm performance of pharmaceuticals & chemicals company indexed in (DSE) during 2013 to 2020. To do these 8 years of panel data are gathered from the annual report and web sites of the company. In this study, to measure the firm performance Return on asset (ROA), Return on Equity (ROE), Earnings per share (EPS) are used as dependent variable in three different model and as a proxy of capital structure short-term debt ratio, long-term debt ratio, total debt ratio, debt to equity ratio. Also, this study used control variables like liquidity, firm size, firm age. To analyze the 8 years of panel data panel corrected standard error technique is applied to the regression model by using statistical software STATA-14 SE. The findings of this study reveals that there is a significant negative relation between capital structure measured by (short-term debt ratio, long-term debt ratio) and firm performance which indicates that the higher the performance the lower the firms are interested to use debt. This finding is supported by the pecking order theory of capital structure. Where pecking order theory suggests to use internal finance first. Result is similar to some previous study as well. Total debt to total asset ratio also shows significant relationship with firm performance.

Finally, it can be said that this research adds to the body of knowledge theoretically and practically. Managers and owners of the pharmaceuticals & chemicals company may beneficial to take decision related to external finance. This study will be a value adding factor for the future researchers as a tool of information gathering and can be a resource tool for others as well.

It is true that every study has some limitations so, this study has also some valid limitations as well. First of all, this study findings are based on 22 pharmaceuticals & chemicals company listed in Dhaka Stock Exchange (DSE). Although, all the listed companies are selected for the sample but due to several reasons like unavailability of annual report, complexity in entering website etc. as it was not possible to collect any kind of primary data this analysis relies entirely on

secondary information. In this case, Company whose 1 or 2 years of annual report is unavailable, necessary data of that types of company is calculated based on the company's condition. Although this is very insignificant portion of the sample year. Secondly, one of the scopes for the further researcher to work on all the industry listed in DSE. Because this study includes only one industry. 

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