DIU Journal of Business and Entrepreneurship Volume 13, No. 02, 2020
https://doi.org/10.36481/diujbe.v013i2.gm3fwe74

An Assessment of Financial Leverage for Listed Pharmaceutical Firms of Bangladesh

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Abstract: *Purpose: This study tries to explore the imperative factors of financial leverage (FL) for the listed pharmaceutical firms in the Dhaka Stock Exchange (DSE) in Bangladesh. Research methodology: To complete the objectives, the study has collected data from 20 listed pharmaceutical firms of DSE for six years (2013 - 2018). Profitability, liquidity, size, growth, and tangibility are considered as the exogenous variable to explain the endogenous variable financial leverage (FL). The statistical techniques Pooled ordinary least square and fixed effect regression models have been used to analyze the panel data set. Result: The research results find that liquidity, profitability, and firm size are statistically significant factors for the listed pharmaceutical firms. The researchers observed that the most accomplished FL theories in pharmaceutical firms are trade-off and pecking order theory. Conclusion: Finally, the result of the study advocates that the concerned financial management of pharmaceutical companies of Bangladesh should pay more attention to increase their profit, asset size and maintain liquidity before taking external debt as finance and hence can keep contributing to progress the firm's performance as well as the development of countries in the forthcoming future.*

Keywords: Financial Leverage (FL), Trade-off theory, Agency theory, Signaling Theory, Pecking order theory, Tangibility, Profitability. Firm Size, Liquidity, Growth

1. Introduction

Financial leverage (FL) is an essential investment decision taken by a company's management, which plays an important role to achieve marked earnings and boost the wealth of the company. It helps companies to set a threshold for the growth of business operations and suggests boundaries on business expansion to protect lower returns on additional investment than the cost of debt. Literature exposed that the FL decision is the most confusing issue in corporate finance (Brounen & Eichholtz, 2001). The first leverage theory was given by Modigliani & Miller (1958) known as “Capital Structure Irrelevance theory”. This theory considered that FL has no contribution to improve the firm’s performance in a perfect and competitive market. The theory assumed some

impractical considerations as well as information symmetry and ensures the credibility of disclosed information (Hamada, 1969; Hatfield, Cheng, & Davidson, 1994). These impractical assumptions make criticisms to MM model and led him to develop MM model including benefits of tax in perfectly efficient markets. Thus using higher debt will increase the firm's value by the amount of debt tax-shield (Modigliani & Miller, 1963). But higher tax benefit increases the risk or cost of bankruptcy for the firm. Then "Trade-off theory" mitigates these two conflicting factors of tax benefit and bankruptcy risk by implementing a moderate level of leverage instead of 100% debt financing. Later on, Jensen and Meckling (1976) explained the optimal leverage structure with the "Theory of agency cost". In his theory, he argues that to get the excessive benefit, managers may invest in risky projects by exploiting the excessive free cash flow and shareholders choose to use debt and thus occur the problem of agency cost of debt and cost of equity. Another important leverage theory is the "Pecking order theory", developed by Myers & Mafluf (1984) and supported by several empirical evidence (Fama & French, 2002; Rajan & Zingales, 1995; Titman &Wessels, 1988). This theory states that if the internal funds are unsuccessful to support the investment requirements then the debt is issued and when debt is not useful anymore, then equity is issued as an ending alternative.

Again in his "Free Cash Flow Theory" Jensen (1986) spoke out that a firm may mishandle them in hand surplus free cash flows by paying more dividends or taking more debt and try to reduce the ill investment or ill-advised projects taken by the managers. In "Market Timing Theory" about financial leverage Malcom, Jeremy and Jeffrey (2002) suggest that a firm has a tendency to issue new securities in the market when the stock price is up, and at the low value they will repurchase the stocks. Finally in "Signaling theory", Ross (1977) concluded that raising signal is important for firms and high-quality firms use more debt as a signal of bright prospects.

The above theoretical review reveals that the determination of FL is a very vital and crucial choice for the firms. From various empirical studies, it was found that high-growth industries tend to do less external financing. And industries that are interested in large investments in intangible assets like the building construction industry, tend to do more external financing by issuing debt. A large number of empirical researches have been conducted over the years about (FL) decisions. Brounen, Jong and Koedijk (2006) surveyed 313 Chief Financial Officers(CFOs) to know the FL decision of their firm and tried to compare previous findings from the US firm's results with the UK, Netherlands, Germany, and France firms results. But the result was that the behavior was not determined by information asymmetry. The static trade-off theory gave importance to the target debt ratio mostly by emphasizing tax effects and bankruptcy costs. From this study, they found fewer disparities across countries. And they did not find any major effect of agency problems in FL choice. Another study was conducted by Frank

& Goyal (2007) to solve the leverage puzzle. According to this study, the static trade-off theory is used when firms' earnings increase, the firm should reduce the dependence on equity and issue more debt to shield the earnings from taxation and agency costs.

The above discussion discovered that FL choice decision is crucial and varies for different countries as well as different sectors. The different theory postulates that FL has mixed results on firm's profitability, tangibility, growth, liquidity, and firm size. Empirical evidence also found different factors exposed mixed results for different industry. These issues motivate the researcher to figure out the significant factors and most used theory of FL for the pharmaceutical sector of Bangladesh. Thus the objective of this study is to figure out the significant key leverage factors that affect the decision of FL of the pharmaceutical sector, and also try to identify the nature of the relationship between FL and different considered control variables in the listed pharmaceutical companies of Bangladesh. The research would collect evidence from the listed pharmaceutical companies of DSE in Bangladesh. To measure the FL of the pharmaceutical sector, pooled and panel regression have been used to improve the literature.

2. Literature Review

To select the appropriate choice of FL, various theories have been developed and several empirical research was conducted over the years. Brounen, Jong and Koedijk (2006) argued that firms have a target debt-to-equity ratio based on the influence of tax and the cost of financial distress. Researches considered that profitability, tangibility, growth, firm size, liquidity, solvency, borrowing capacity, etc are the key factors of FL.

Titman and Wessel (1988) acknowledge the descriptive power of optimal leverage ratio and increase the experimental job on FL in three ways. Using factor analysis technique the study tried to find out the empirical implications of different types of debt instruments, such as short-term debt, long-term debt, and convertible debt.

Applying the Multiple Indicators and Multiple Causes (MIMIC) model for the period of (1988–2003) Titman and Wessels (1988) found in another study that long-term debt is the most important proxy of FL. The research also showed that growth is the most important determinant of FL choice, whereas profitability, volatility, non-debt tax shields, collateral value, and uniqueness are also in the line of involvement.

Rajan and Zingles (1995) found that the determinants of FL are parallel across G-7 countries and the US. The study identified that firm size is not an important determinant for FL. Booth et al. (2001) identified in their study that the determinants of FL act similarly for all countries having different economic conditions.

Abdullah (2005) conducted a study to identify the major responsible factors of FL and debt maturity. Using 56 listed companies over the period (1995-2000) the study found that the proxy variable total debt has a significant positive relation to growth opportunities and significant negative relation to liquidity and asset structure.

Abor (2005) conducted a study on all listed firms from the Ghana Stock Exchange for the five years from 1998-2002. That study revealed that the proxy variable short-term debt ratio has a positive and the long-term debt ratio has a negative relation with the profitability of the firm.

To test the determinants of FL, Buferna et al. (2005) conducted a study taking profitability, growth, size, tangibility as independent variables. The research observed that the trade-off theory and agency cost theory are the two most practiced FL theories affecting Libyan companies.

Chowdhury (2004) used the agency cost theory to identify the differences of FL theories of Bangladesh and Japanese firms. Research showed that institutional differences are the reasons behind the different agency structures of these two countries, i.e the code of corporate governance in Japan is stronger than in Bangladesh. Thus to reduce the agency costs of debt and agency costs of equity the study suggests improving the corporate governance in Bangladesh.

Ahmed et al. (2012) deliberate the effect of FL on firms' profitability. The research considered a total of 358 observations of 58 Malaysian firms covering the consumer and industrial sector during the period of (2005-2010). And found positive relation of long-term debt to the firm's profitability.

Jacinta, Mahfuzur and Selvam (2018) conducted a study to find out the significant factors of FL taking evidence from listed firms in Malaysia, Singapore, and Thailand. The study found that the control variable profitability and FL has a significant inverse relationship between FL for Malaysia and Singapore but insignificant for Thailand. But another control variable firm size has a direct relationship for all these three countries.
Lima (2009) used operating leverage, growth rate, tangibility, agency cost of equity, bankruptcy risk, and debt service capacity as explanatory variables to find out the significant factors of FL of pharmaceutical firms. The study revealed that all the explanatory variables are significant.

Hossain (2016) tried to find out the relationship between FL and managerial ownership on a firm's performance using 81 Manufacturing firms under 10 industries in the Dhaka stock exchange for the period (2002-2014). Applying the Panel Corrected Standard Error (PCSE) regression model the study found an inverse relationship between FL and

ROA and observed a direct relationship with ROE of the firms. Furthermore, the study found Short term debt as an influenced factor with firm performance compared to Long term debt. The research also found that managerial ownership has a direct relation with firms' profitability in compliance with the Agency cost theory.

Applying pooled ordinary least square analysis Siddik et al. (2017) examined the impacts of FL on the firm's performance (ROE, ROA, EPS) of 22 Bangladeshi banks for the period (2005–2014) and observed an inverse relationship between FL and bank performance. Imtiaz et al. (2016) tried to identify the determinants of FL using 8 listed Pharmaceutical firms of Bangladesh and observed Pecking-order theory and the trade-off theory are the most dominant FL theories in Bangladesh.

To find out the determinants of FL of selected Bangladeshi listed companies Sayeed (2011) conducted a study and found that agency costs and non-debt tax shields (depreciation) had a negative relation to FL, and tax rate, firm size, the collateral value of assets had a direct relation to FL. Abdullah (2015) showed in his research that the manufacturing industry has a 17% contribution to the gross domestic product of Bangladesh.

The pharmaceutical industry is one of the most leading and developed manufacturing companies in Bangladesh. Reviewing FL-related literature it has been seen that many research have been conducted to figured out the leverage factor, but a few research has been conducted actually on the pharmaceutical sector captivating only a small number of companies. Moreover, the majority of the studies did not apply an appropriate advanced econometric model, and no study has yet been conducted throughout (2013-2018) to identify the key factors of FL of the pharmaceutical sector. Thus the large sample size and advanced econometric methods would find out the key factor of FL, and have enlightened this research and would be able to keep excellent contribution to the literature.

3. Methodology of the Study

3.1 Data Collection Technique

Pharmaceutical sector facilitates the economic development of the country by producing and exporting its goods and services. This study tries to assess the key factors of the FL of listed pharmaceutical firms in Bangladesh. The research has purposively chosen Dhaka Stock Exchange (DSE) to collect the essential secondary data of the pharmaceutical companies. The research found it difficult to include all 32 listed pharmaceutical firms, as all firms do not have long-term debt and the data of other control variables used in the research. Finally, among 32 listed pharmaceutical firms, the study has been able to collect data from 20 listed firms over the six-year period (2013- 2018) and forms a panel data set of 120 observations. The required secondary information has been

collected from secondary sources such as the internet, the respective websites, company audited annual reports, and industry reports.

3.1.2 Model Specification

The study used the following multiple regression model to find out the significant determinants of the pharmaceutical sectors.

$$DRit = \beta_0 + \beta_i X_{it} + \varepsilon_{it} \quad (PooledModel)(1)$$

$$DRit = \beta_i + \beta_i X_{it} + \varepsilon_{it} \quad (Fixed\ EffectModel)\ (2)$$

$$DRit = \beta_0 + \beta_i X_{it} + (\varepsilon_{it+ut}) \quad (Random\ Effect\ Model)\ (3)$$

Where, i= Total number of observation, t = time variable, β_0= intercept term, βi = coefficient of regression, *Xit* = control variables of firm *i* at time *t*, *DRit* = Total debt to total asset ratio.

The study used two proxy variables to measure the profitability of the firm (ROA with ROE) and increase the robustness of the study. The study used the following two different econometric models.

$$\boldsymbol{DR}_{i,t} = \beta_0 + \beta_1 TANG_{i,t} + \beta_2 SIZE_{i,t} + \beta_5 ROA_{i,t} + \beta_7 LIQ_{i,t} + GROWTH_{i,t-1} + \varepsilon_{i,t}$$

$$\boldsymbol{DR}_{i,t} = \beta_0 + \beta_1 TANG_{i,t} + \beta_2 SIZE_{i,t} + \beta_5 ROE_{i,t} + \beta_7 LIQ_{i,t} + \beta_9 GROWTH_{i,t-1} + \varepsilon_{i,t}$$

This model was modified to accommodate or control for the change in profitability ($PROF_{t-1}$).

Here ,
DR = Debt ratio
TANG = Tangibility
GROWTH = Growth
Ln(SIZE) = Logarithm of Firm Asset size
PROF = Profitability (ROA or ROE)
LIQ = Liquidity

To determine the significant factors pooled regression analysis applied at the very beginning fulfilling the necessary assumption of multiple regression analysis. But pooled method can't take out the serial correlation problem. Thus to test the fixed effect or random effect panel analysis has been performed.

3.2 Explanation of the Control Variable and Hypothesis development

This research is about finding the determinants of FL and understanding the related theories of FL of pharmaceutical industries in Bangladesh. To identify the important factors of FL, this study considered long term debt ratio (Titman & Wessels, 1988; Ahmed et al., 2012; Yusuf et al., 2015) of different firms as proxy variables of the controlled variable and used profitability, tangibility, size, growth, and liquidity as control variables.

3.2.1 Profitability

Profitability is the ability to use a firm's resources to generate revenues over its expenses. Thus a high profitable firm has a large amount of retained earnings and more able to meet debt obligations than a less profitable firm (Bie & Haan, 2007). Theories of FL suggests two different directions of profitability with FL. According to the trade-off theory, a more profitable firm should have more leverage than a less profitable firm, whereas the pecking order theory suggests an inverse relationship between profitability and leverage. But most of the empirical studies found negative results between profitability and FL that support pecking order theory. Hence the hypothesis about FL and profitability is,

H1: There is no significant relationship between FL and profitability (ROA & ROE)

3.2.2 Tangibility

Jensen and Meckling (1976) argued in trade-off theory that if the tangible asset of a firm is sufficiently high, then they can be used as collateral, and agency cost of leverage can be reduced and can tolerate a higher level of leverage. The higher tangible asset can be used as collateral to get a loan (Rajan & Zingales, 1995). Further, according to Frank and Goyal (2009), it is simple for outsiders to value property, plant, and equipment than other intangible assets like Goodwill. So, tangible asset helps to reduce distress cost of the company. Thus according to the trade-off theory, the more tangible asset of the company, the more it tends to take a loan by using those assets as collateral to get interest expense tax benefit. Thus, there is a positive relationship between the leverage and the tangibility of assets. Again Myers (1977) argued in pecking order theory, the relationship between them is negative. Since asset tangibility has lower information asymmetry so it is better to fund from equity than debt.

In some empirical studies theoretical relationships report a positive linkage (Rajan & Zingales, 1995; Wald, 1999). On the other hand, some studies found a negative relationship (Booth et al., 2001; Mazur, 2007; Titman & Wessels, 1988). The hypothesis of FL and tangibility,

H2: There is no significant relationship between FL and TANG

3.2.3 Growth

A growth firm has a large volume of ability to manage external finance for its future investment. Growth means that the firm increases its sales over the year. Increased sales are the sign that the firm is becoming larger and its fields of operation to asset size have increased. And to support that enhanced facilities the internal fund of the firm may not

be enough. That's why pecking order theory posits a positive relationship between growth and leverage. The author argues that other things equal, because of agency conflicts between shareholders and debt holders, the debt supported by firms that heavily rely on VG (growth opportunities) are less than those that rely on VA (an asset in place). Therefore, from an agency theory perspective, growth and leverage should be inversely related. However, pecking-order theory predicts that growth is positively related to leverage because only internal financing may not be adequate for high-growth firms. The hypothesis regarding growth and FL,]

H3: There is no significant relationship between FL and GROWTH

3.2.4 Liquidity

If a firm holds a good amount of liquidity ratio (current ratio, quick ratio, operating cash flow ratio, Acid test ratio), it represents the high ability to pay off its debtor's to current debt obligations by its internal financing and reduce external financing. This study has taken a quick ratio as a measure of liquidity. The firm's liquidity indicates that it is capable of meeting its short-term obligations. So trade-off theory suggests using more debt for more liquidate firms. But there is a lack of empirical evidence to support the positive relation. Moreover, Jensen (1986) argues that leverage prevents agency problems especially for firms having high liquidity but low growth rate. Firms with higher liquidity should use their internally generated cash rather than borrowing debt. On the other hand, pecking order theory suggests using the internal liquid asset of the firm and states the inverse relationship between a firm's liquidity and FL.

H4: There is no significant relationship between FL and Liquidity

3.2.5 Firm Size

A large size firm has less risk less than small size firms as they are mostly diversified. And they can lower costs at the time of bankruptcy. Larger firms disclose sufficient information to stakeholders than others (Rajan & Zingles, 1995). Firm size is measured by the number of total assets, is believed that as the firm size increases the ability of the firm to get loans also increases at a lower cost. That's why trade-off theory states a positive relationship between firm size and leverage as the firm can enjoy the debt-tax shield benefit by bearing less cost. On the contrary, the pecking order theory assumes the larger firms are also more capable of producing larger profits. So, the firms have enough internal funds to oppose debt.

In his empirical study, Smith and Warner (1977) reported that larger firms have lower bankruptcy costs and are more likely to issue more debt. Besides, larger firms are highly diversified, have larger economies of scale, their cash flows are less volatile and they

can easily access capital markets. Considering all, they are more tolerant of a higher leverage ratio, which means that there should be a positive linkage between size and debt ratio. On the other hand, it is argued that larger firms have less asymmetric information because they tend to provide more information to the market (Rajan & Zingales, 1995). In this sense, large firms should borrow less because they can issue informational sensitive securities like equity without giving a bad signal. Thus, pecking order theory predicts that as size increases leverage ratio decreases. Following these two theories, the empirical results are also mixed. So the hypothesis of FL,

H5: There is no significant relationship between FL and FIRM SIZE

Table 1: Explanation of the Controlled and Control Variables

Operational Variables	**Proxy Variables & Symbols**	**Empirical researchers**	**The theoretical relationship between controlled and control variables.**
Financial Leverage	Long term debts / Total assets= (LTD / TA)	Titman & Wessels, 1988; Ahmed et al., 2012; Yusuf, et al., 2015	
Firm Size	ln (Total Asset) = lk2n (Size)	Koksal & Orman, 2015	Trade-off theory (+) Pecking order theory (-)
Growth	[Sales (t) - Sales (t-1)] / Sales (t-1) = GROWTH	Booth et al., 2001	Trade-off theory (-) Pecking order theory (+)
Profitability	Net Income / Total assets = (ROA) Net Income / Total equity = (ROE)	Hasan et al., 2014	Trade-off theory (+) Pecking order theory (-)
Tangibility	Net fixed assets / Total assets = (TANG)	Yusuf et al., 2015	Trade-off theory (+) Pecking order theory (-)
Liquidity	Current Asset / Current liability = (LIQ)	Mazur, 2007	Trade-off theory (+) Pecking order theory (-)

Source: Authors' Compilation.

4. Results of the Analysis

4.1 Descriptive Statistics

Table - 2 presents the descriptive statistics for proxies of controlled and control variables. This table shows the mean, standard deviation, minimum, maximum values of the controlled and control variables for the year 2013-2018. The summary statistics of different proxy variables show that on average pharmaceutical firms in Bangladesh use approximately 23% debt. Average profitability is around 8% when measured by ROA; and14% when measured by ROE. The average value of Tangibility, Growth, Liquidity and Firm size are respectively 56%, -0 .11636, 2.20, and 21% respectively.

Table 2: Summary Statistics of the Variables

Variable	Mean	Standard Deviation	Minimum value	Maximum value
TDTA	0.2277	0.2503	-0.3474	1.5012
TANG	0.5557	0.2617	0.0337	1.8043
GROWTH	-0.1163	0.0930	-0.1373	0.9990
LIQUIDITY	2.200	0.0335	-7.9400	2.3700
ROA	0.0779	0.1044	-0.1638	0.5692
ROE	0.1471	0.2340	-0.569	1.3510
FIRM SIZE	21.02	21.026	-0.1638	26.464

Source: Esitimated.

4.2 Results of Correlation

The study analyzes data by using regression analysis and tried to satisfy all assumptions of regression analysis. There are some assumptions that we can check before running the regression analysis, but one needs to check after running the regression model as they are involved with the error term. One of the important assumptions is multicollinearity, which arises when there exists a high correlation (0.80) between two explanatory variables (Gujarati, 2004). The study found a high correlation among profitability proxies (ROA, and ROE), and to avoid multicollinearity problems research used two different models. The following Table -3 presents the correlation between the control variables of the regression analysis with profitability proxy ROA. The table reveals that there exists a negative correlation between growth and tangibility (-0.0895).

Liquidity shows a positive relationship with growth and tangibility (0.0553 and 0.0178 respectively). Firm profitability has a negative relationship with tangibility, growth, and liquidity (-0.1520, -0.0325, and -0.0261 respectively). And Firm size shows the mixed relationship between tangibility, growth, liquidity, and ROA (-0.0596, 0.2992,0.04406 and -0.0582 respectively). The results show that there exists no muticollinearity between the control variable, as the relationship between the control variable is not high (<0.08) according to theory.

Table 3: Pairwise Correlation between independent variables

Variable	TANG	GROWTH	LIQUIDITY	ROA	SIZE
TANG	1.000				
GROWTH	-0.0895	1.000			
LIQUIDITY	0.0178	0.0553	1.000		
ROA	-0.1520	-0.0325	-0.0261	1.000	
FIRM SIZE	-0.0596	0.2992	0.04406	-0.0582	1.000

Source: Esitimated.

Formal statistical method variation inflation factor (vif) also used to detect multicollinearity problem and low vif (average below 1.50) value indicates poor correlation among the explanatory variables. Ramsey Reset test confirms the linearity of the variables. The normality of the error term had been checked by drawing a histogram of the error term and also checked by formal test statistic Shapiro-Wilk W test. Breush Pagan's test of heteroskedasticity failed to reject the null hypothesis, indicates no heteroskedasticity in the model. And finally, the numerical value of the Darbin Watson test statistic less than 2 (d value=1.14) declares no autocorrelation of the data set. Only the research failed to accept the null hypothesis of the omitted variable test. The rejection of the Ramsey omitted variable test signifies the model's explanatory variables are not sufficient enough to measure the FL value of the pharmaceutical sector of Bangladesh.

4.4 Regression Results

The study conducted a regression analysis to assess the significant factors of FL using two profitability factors of ROA & ROE. To check the correction of the individual-specific effect with the independent variables the research runs a fixed and random model. Finally applying the Hausman test the study chooses the appropriate model

between fixed and random effect estimation. The result of the Hausman test for both the regression models reject the null hypothesis and thus decided that there exists a correlation between alpha and independent variables and hence fixed effect is the appropriate one (Brooks, 2002).

Table 4: Test results (Hausman specification)

Regression Model	Chi-Square Statistics	Degrees of Freedom	P-value
(1)	**25.78**	**3**	**0.000***
(2)	**20.72**	**3**	**0.000***

Source: Esitimated.

The following Table - 4 represents the regression results of TDTA on tangibility, growth, profitability, liquidity, and firm size using Pooled OLS, Fixed Effect OLS (FE) to determine the significant factor of FL for the listed pharmaceuticals sector of DSE.

Table 5: Regression Results of different Models

Independent Variables	Pooled OLS (ROA)	Pooled OLS (ROE)	Fixed OLS (ROA)	Fixed OLS (ROE)
TANG	-0.0577	-0.069	0.0142	-0.0091
	(0.456)	(0.403)	(0.861)	(0.910)
GROWTH	1.1748	1.26* E-07	-2.5590	-0.470 E-09
	(0.450)	(0.476)	(.979)	(0.966)
LIQUIDITY	1.3747 **	1.35 E-11**	1.5745E-05	1.90 E-12
	(0.025)	(0.039)	(0.906)	(0.747)
ROA	-1.0724***	-0.3632***	-0.5012**	(-0.1473)
	(0.000)	(0.000)	(0.053)	(0.126)
SIZE	0.0194***	0.0185***	-0.0488***	-0.0472))***
	(0.004)	(0.010)	(0.000)	(0.000)
Constant	-0.035	-0.0395	1.2804	1.2407
	(0.811)	(0.802)	(0.000)	(0.000)
R^2	20%	20%		
Adjusted R^2	17%	17%		

, ** and * indicate significance at 1% , 5% and 10 % level respectively (Source:*** Esitimated).

Table 5: Multicollinearity Test

Variable	VIF
PROFITABILITY	1.04
TANGIBILITY	1.04
LIQUIDITY	1.05
GROWTH	1.11
SIZE	1.15

Source: Esitimated.

To increase the robustness of the study the researchers used two profitability measures (ROA and ROE) in two models. The regression results revealed that profitability, firm size, and liquidity are three significant determinants of FL in both models for the pharmaceutical sector in Bangladesh. The results show profitability as a significant (at 1%) inverse relation with FL in both models applying pooled and fixed OLS and fixed effect estimation, and Firm size (at 1%) has a direct significant relationship with FL in both models and applying fixed and OLS estimation. But another determinant liquidity shows a direct significant (at 5 %) relationship only in both models applying pooled OLS method.

A large amount of debt is charged as direct cost from profitability, and hence reduces the profitability rate. Thus the research observed pecking order theory with profitability and FL in the pharmaceutical sector of Bangladesh. It indicates the pharmaceutical firms try to manage their finances first and prefer issuing debt when external financing is required. Several empirical studies found similar results i.e, a downbeat relation of FL and profitability (Booth et al., 2001; Friend & Lang, 1988; Rajan & Zingales, 1995; Titman & Wessels, 1988; Tong & Green, 2005; Toy et al., 1974; Wald, 1999; Zou & Xiao, 2006).

Again, this study revealed firm size is another positive significant determinant of FL in the pharmaceutical sector of Bangladesh in all regression models. The study observed a trade-off theory regarding the firm size issue. Large firms can issue more debt as they have less asymmetric information, in comparison with the smaller firms. Several empirical domestic and foreign studies provide similar results with Firm size and FL (Booth et al., 2001; Deesomsak et al., 2004; Rajan & Zingales, 1995; Zou & Xiao, 2006). The

liquidity factor shows positive significant relation only in applying OLS and also matches with the trade-off theory.

The overall contribution of the explanatory variable explained by the multiple regression model is 20% measured by R square. Whereas the 17% value of adjusted R-square measures the contribution of a significant variable only and yields a more accurate value to estimate the R-square for the population. The low value of R square value justifies the rejection of the Ramsey omitted variable to test, which indicates that to explain the debt ratio of the pharmaceutical sector the model requires to include a more significant explanatory variable. The Y-intercept value is 0.02907 means the average debt ratio will be 0.02907 if the contribution of all control variables becomes zero. The table also reveals that the tangibility of the pharmaceutical sector contributes inversely and another control variable growth contributes positively to the debt ratio (FL) of this sector.

5. Conclusion

This study tried to determine the imperative factors of FL in the pharmaceutical companies of Bangladesh considering the six years from (2013-2018) and tried to find out the accomplished financial theories used in this arena. The study used long-term debt as debt ratio (Titman &Wessel, 1988) to calculate dependent variables and to find out the determinants of FL the research used profitability, liquidity, growth, tangibility, and firm size as explanatory variables. Profitability is measured by the proxy variable of firm performance ROA and ROE. The study used four different regression models based on these proxies and check whether the results are robust to change in the proxies of FL.

Applying pooled OLS the research finds out that profitability, liquidity, and firm size are the most dominating significant factors to determine the FLfor the listed pharmaceutical sectors of Bangladesh. Whereas the study observed profitability and Firm size are only significant variables to determine FL when the fixed effect model had been run. Moreover, Profitability is negatively related to FL, support pecking order theory (Siddik et al., 2017; Imtiaz et al., 2016; Anowar, 2016; Alom, 2013; Hossain, 2016) and the positive relation of firm size with FL support trade-off theory (Sayeed, 2011; Ahmed et al., 2012).

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Again, the study also observed that tangibility and growth are not statistically significant for the listed pharmaceutical companies of Bangladesh. Thus the study identifies overall FL decisions of the pharmaceutical sector of Bangladesh consistent with the hypothesis of pecking order theory and trade-off theory. As we know that one of the important objectives of financial managers is to capitalize on shareholders' assets by maximizing the value of the firm, the study provides important policy implications to them by choosing appropriate FL while taking external funds and giving more concentration

on firms profitability and asset size and thus contribute to the expansion of the firms. The rejection of Ramsey omitted variable to test and 17% value of adjusted R square indicates that further research should be done incorporating more variables such as non-debt tax shield, bankruptcy risk, corporate governance (specially Non-executive ownership, CEO/Duality, Ownership Structure, and Board Size, etc) to uncover the other important significant determinants of FL of the pharmaceutical companies of Bangladesh using more advanced econometric techniques and tools and be more precise to take the financial leverage decision to improve the future of the firm.

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