

# Effects of Capital Structure and Managerial Ownership on Profitability: Experience from Bangladesh

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Received: May 30, 2016

Accepted: June 16, 2016

Online Published: August 10, 2016

doi:10.5539/ijbm.v11n9p218

URL: <http://dx.doi.org/10.5539/ijbm.v11n9p218>

## Abstract

This paper aims at investigating the effects of capital structure and managerial ownership on the profitability of the Bangladeshi companies based on a strongly balanced panel data of 81 manufacturing companies listed under 10 industries in Dhaka Stock Exchange for 2002-2014. The results of Panel Corrected Standard Error (PCSE) regression model suggest that capital structure variables negatively affect ROA but positively affect ROE of the firms. Furthermore, Short term debt influences profitability of the firms more severely compared to Long term debt. On the contrary, managerial ownership positively affects profitability conforming to the Agency cost theory. It was also found that Bangladeshi firms followed aggressive financing strategies that led to an increase in their financial & bankruptcy risks to a great extent. That the financial managers should employ less leverage in the capital structure and minimize agency cost of equity in order to maximize the profitability of firms is the policy implication of this paper.

**Keywords:** capital structure, leverage, debt, profitability, ROA, ROE, Bangladesh

**JEL Classification:** C33, C55, G32

## 1. Introduction

The balance sheet, a fundamental indicator of financial strength of a firm, symbolizes two major issues of corporate finance i.e. 'Capital budgeting'-long term investment decisions and 'Capital structure'- sources of financing the total assets of the firm. The amalgamation of debt, preferred stock and common stock is acknowledged as capital structure. The choice of capital structure is fundamental for a firm because the operating cash flow is allocated between the creditors and shareholders which lead to agency conflict. Optimal capital structure assists a firm to prolong operational and financial performance, diversify risks, minimize cost of capital and eventually maximize the shareholders' wealth. Capital structure is, alternatively, represented by Leverage, the proportion of debt in the total capital of the firm. Theoretically, the more a firm finances its assets by debts, the more the firm must earn profit in order to pay interest that reduces the benefits of the shareholders as they are entitled to the residual income net of interest and preferred dividend. That's why capital structure choice has a vital influence on the profit maximization as well as wealth maximization goals of the firm.

In several developed and developing countries, many empirical researches have been done focusing on the influence of capital structure on the profitability and they produced mixed findings indicating that there is still debate regarding this topic. In Bangladesh, one of the Least Developed Countries (LDCs) in South Asia with a market-based economy growing at the rate of 6-7% per annum over the past few years, even though very few studies have been done in this arena, there is no concrete and uniform finding about the impact of capital structure on profitability.

Hence, in order to enrich the existing literature with larger panel data set and more exogenous variables included in the regression model allowing the findings to be generalized for the whole Bangladesh economy; this study aims at determining the influence of capital structure choice on the profitability of the Bangladeshi companies with a panel data set of 81 manufacturing companies, covering a 13 year period (2002-2014), listed under 10 industries in Dhaka Stock Exchange, the foremost stock exchange of Bangladesh. The rest of the paper is structured as follows: Section one represents the Capital structure theories and Section two discusses the literature review. Moreover, Methodology is presented in section three and section four demonstrates the analysis

of results and then the paper concludes with policy implications.

## **2. Theories of Capital Structure**

Several renowned theories of capital structure proposed by famous researchers in finance arena are critically explained below in a succinct form:

### *2.1 MM Theory*

Through an ice-breaking paper in 1958, Modigliani and Miller formally brought the implications of capital structure into light by arguing that in a perfect capital market, the market value of a firm remains constant irrespective of the capital structure choice, implying the irrelevance of capital structure. Incorporating corporate tax later in 1963, they argued that due to the interest tax shield on debt, the value of a levered firm will be higher than the value of an unlevered firm, indicating the relevance of capital structure. According to this theory, the firms should take as much as debt in their capital structure to get more tax advantage in order to maximize the firm value. But in reality that's not feasible because debt financing, on the other hand, increases the financial risks of the firms as the firms may not be constantly able to generate sufficient cash flows to meet excessive interest payments in due time and hence, eventually, it will lead to the financial distress situation.

### *2.2 Static Trade-off Theory*

Focusing on this issue, Scott (1977), proposed the Static Trade-off theory arguing that an optimal capital structure can be attained at the trade-off point between interest tax shield, the benefit got through not paying tax on the interests paid and financial distress cost, the cost for not being able to repay loans in due time, also known as bankruptcy cost. But this theory also doesn't indicate the specific proportion of debt and equity to achieve an optimal capital structure.

### *2.3 Agency Theory*

Another prominent theory, Agency Theory, established by Jensen and Meckling (1976), states that optimal capital structure can be accomplished through the minimization of the agency cost by increasing the ownership of the managers in the firm or taking more debt with a view to controlling the tendency of managers for excessive perk consumptions.

### *2.4 Free Cash Flow Theory*

In 1986, Jensen stated in the Free Cash Flow Theory that with excess free cash flows in hand, managers tend to invest in matured or ill-advised projects that diminish shareholders' wealth. He also suggested that this problem can be resolved by paying more dividends or taking more debt.

### *2.5 Pecking Order Theory*

On the contrary, The Pecking Order Theory, developed by Myers and Majluf (1984), states that there is no optimal capital structure and a hierarchy of preferences is followed by the managers for the issuance of new capital based on the cost of capital. They prefer retained earnings, due to its zero cost, as the first source of financing followed by debt financing and then equity financing, because cost of debt is less than that of equity.

### *2.6 Signaling Theory*

Ross (1977) based on asymmetric information, argued in the Signaling Theory that managers have better inside information about the firm compared to the investors and hence, leverage decisions taken by the managers give signal to the market because debt financing is treated by investors as a signal of high future cash flows and high future performance of the firm. On the contrary, if the firm issues equity in the market to raise funds, then the investors infer that the company's future investment opportunities are small and their share price is overvalued.

### *2.7 Market Timing Theory*

Recently a new theory of capital structure proposed by Baker and Wurgler (2002), Market timing theory, states that by timing the issue of securities, the managers can increase the wealth of the current shareholders. Henceforth, when the stock price is overvalued, the firms issue new securities in the market and on the contrary, repurchase stocks when the stock price is perceived to be undervalued.

## **3. Literature Review**

Several empirical researches regarding the influence of capital structure on profitability of the firms have been done in many developed and developing countries and those studies yielded divergent findings. The main culprits behind the controversial findings of the empirical literature are- firstly, different types of sample focused on different countries, sectors, companies & periods have been used in empirical studies. Secondly, different

measures of profitability (i.e. ROA, ROE, ROI, ROIC, EPS, Tobin's Q etc.) as well as different measures of capital structure (i.e. short term debt ratio, long term debt ratio, total debt ratio etc.) have been used by the researchers. Lastly, various econometric methodologies (Ordinary Least Square regression, Generalized Least Square regression, Weighted least squares, Fixed effect, Random effect, Method of simultaneous equations and Generalized Method of Moments etc.) have been applied by the researchers to derive the empirical relationship between capital structure and profitability.

Generally, two important theories deal with the influence of capital structure on the profitability of firms such as signaling theory and agency costs theory. Signaling theory states that due to asymmetric information, investors perceive the leverage decisions taken by the managers of the firm as a signal to the market about the future prospects of the firm and they can infer that if the firm goes for debt financing, the firm has a very good investment potential, thus, leading to increase in the profitability of the firm. Henceforth, capital structure should be positively related to profitability.

On the contrary, agency costs theory argues about two contradictory effects of capital structure on profitability such as- firstly, while considering the agency costs of equity between shareholders and managers, there should be a positive nexus between capital structure and profitability because by employing more debt financing in the capital structure, the tendency of the managers to abuse the free cash flows in consuming more perquisites can be reduced to a great extent which will lead to a reduction in the agency cost of equity and since the managers will invest the free cash flows in positive NPV projects, firms' profitability will also increase as a result. On the other hand, from the viewpoint of the agency costs of debt between shareholders and lenders, capital structure should have negative impact on profitability of the firms since the shareholders earnings is reduced by the amount of interests paid to the lenders before paying dividends to the common share holders.

However, previous empirical literatures are concisely reviewed in the following segment in terms of the nature of relationship between capital structure and profitability i.e. Positive, Negative, Mixed and No relationship. Also a summary of those studies is represented in Table 1.

### 3.1 Positive Relationship

In Bangladesh, Chowdhury and Chowdhury (2010) investigated the influence of capital structure on the firm value by analyzing 77 companies listed in DSE under four different industries such as pharmaceuticals and chemicals, fuel and power, engineering and food & allied industry from 1994 to 2003. Using cross sectional time series fixed effect regression model, they found that the capital structure has positive influence on the firm value.

Using GMM regression model, Samuels (2013) claimed that South African firms' capital structure have positive impact on profitability during the period 1998-2009. Such kind of positive relationship was also found by Shubita and Alsawalkah (2012), Ong and Teh (2011), Margaritis and Psillaki (2010), Dare and Sola (2010) and so on.

Table 1. Summary of several previous studies

Country	Authors	Period	Methodology	Relationship found
Bangladesh	Hasan et al. (2014)	2007-2012	Pooling panel data regression	Negative(ROA and Capital structure); No relation (ROE and Capital structure)
Bangladesh	Chowdhury & Chowdhury (2010)	1994-2003	Fixed Effect regression	Positive (capital structure and firm value)
India	Singh (2013)	2005-2012	Correlation & Regression	Negative (debt financing & net profit)
Pakistan	Fareed et al. (2014)	2006-2012	Correlation & Multiple Regression	Negative (ROE and Capital structure); Positive (ROA and Capital structure)
Pakistan	Bokhari & Khan (2013)	2005-2011	OLS regression model	Negative (capital structure and profitability)
France	Kebewar (2013)	1999-2006	Generalized Method of Moments (GMM)	Negative (capital structure and profitability)
U.S.	Rajan & Zingales (1995)	1981-1990	Correlation & Regression	Negative (profitability and debt level)
Nigeria	Chechet & Olayiwola (2014)	2000-2009	Fixed Effect & Random Effect model	Negative (debt ratio and profitability)
Nigeria	Yusuf et al. (2014)	2000-2011	OLS regression model	Positive (D/E ratio and ROA, ROE)
Iran	Mohammadzadeh et al. (2013)	2001-2010	Panel regression model	Negative (capital structure & net profit)
South Africa	Samuel (2013)	1998-2009	GMM regression model	Positive (financial leverage and firm

Malaysia	Ong & Teh (2011)	2005-2008	Panel Regression model	performance) Positive (capital structure and firm performance)
Sri Lanka	Prateepkanth (2011)	2005-2009	Multiple regression	Negative (debt level & financial performance)
Macedonia, Europe	Ferati & Ejupi (2012)	2002-2011	Multivariable regression	Negative (capital structure & ROE)
Egypt	Ebaid (2009)	1997-2005	OLS Multiple regression	No relation (capital structure and profitability)

Source: Author's compilation.

### 3.2 Negative Relationship

Kebewar (2013) used the Generalized Method of Moments (GMM) on 2325 unlisted French companies of trade sector during the period 1999-2006. He studied the behavior of these firms according to their size (VSEs, SMEs and LEs) and analyzed both the linear and the non-linear effect of debt on profitability by estimating a quadratic model. He found in the linear model that debt has a negative influence on profitability in all size classes of trade enterprises and surprisingly, this influence becomes larger in small and medium enterprises (SMEs). Also he found a concave relationship between debt and profitability in all size classes in the quadratic model, though it is significant only in case of SMEs. Lastly he concluded that the agency theory is applicable for these firms which was also supported by Berger and Bonaccorsi (2006) and Margaritis and Psillaki (2010).

In India, Singh (2013) analyzed whether the capital structure influence Indian business revenue firms and asset size firms and found a strong negative relation between capital structures and Return on Assets and Return on capital employed for the period 2005-2012. Bokhari and Khan (2013), using OLS regression model for Pakistani firms during 2005-2011, also concluded that capital structure inversely affect the profitability of the firms.

Negative relation was also supported by Chechet and Olayiwola (2014) in case of Nigerian firms by applying Fixed Effect & Random Effect model for the period of 2000-2009. Moreover, Mohammadzadeh et al. (2013), Ferati and Ejupi (2012), Prateepkanth (2011), Zeitun and Tian (2007), Goddard et al. (2005) and Rajan and Zingales (1995).

### 3.3 Mixed Relationship

In Bangladesh, Hossain and Hossain (2014), using Panel Corrected Standard Error Regression Model and Random Effects Tobit Regression Model on a large panel dataset including 74 manufacturing companies listed under 8 industries in DSE for the period of 2002-2011, found that there is an inverse relationship between profitability and capital structure. They also claimed that growth rate, debt service coverage ratio, non-debt tax shield, financial costs, free cash flow to firm, agency costs and dividend payout ratio have negative relationship with capital structure whereas managerial ownership, on the contrary, has positive relationship with capital structure. They concluded that pecking-order theory and static trade-off theory are the most dominant capital structure theories in Bangladesh.

In Bangladesh, Hasan et al. (2014) investigated the influence of capital structure on profitability of 36 firms during the period 2007-2012. Using Pooling panel data regression model based on four different measures of profitability i.e. EPS, ROA, ROE & Tobin's Q, they found that capital structure ratios (Short term, long term and total debt ratio) affect adversely the Return on assets whereas no relationship was found with Return on Equity. Unfortunately the  $R^2$  values of all of the regression models were very low due to not using control variables that significantly influence the profitability of the firms. They also argued that the Pecking order theory is consistent for Bangladeshi firms as they found inverse relationship between capital structure and ROA.

On the contrary, Fareed et al. (2014) analyzing the Pakistani firms during the period 2006-2012 claimed positive relationship between ROA and leverage whereas negative relationship between ROE and leverage by applying Correlation coefficient and Multiple regression analysis. Also Saedi and Mahmoodi (2011), Salim and Yadav (2012) found mixed relationship.

### 3.4 No Relationship

Ebaid (2009) analyzed the Egyptian firms during 1997-2005 by using OLS multiple regression model and claimed that the capital structure ratios don't affect the profitability. Such no relation was also supported by Philips and Sipahioglu (2004).

Therefore it is evident that the relationship between capital structure and profitability is different for even the same country and that can be attributed to the different sampling period & size as well as different

methodologies used.

#### 4. Methodology

##### 4.1 Sources of Data and Sample Size

This study used 13 years annual data (2002-2014) of 81 Bangladeshi manufacturing companies listed under 10 industries in Dhaka Stock Exchange (DSE) and the data were collected from the DSE library. The number of companies from each selected industry used in this study is shown in Table 2. No. of listed companies shown here under the selected industries in DSE are up to May, 2016. The companies whose data were not available from 2002 were not selected for this study.

Table 2. Number of companies from each selected industry

Sl. No.	Industry name	No. of listed companies	No. of selected companies	No. of years covered	No. of observations
1	Cement	7	4	13	52
2	Ceramic	5	3	13	39
3	Engineering	32	16	13	208
4	Food and Allied	18	10	13	130
5	Fuel and Power	19	4	13	52
6	Information Technology	7	3	13	39
7	Jute	3	2	13	26
8	Pharmaceuticals and Chemicals	27	15	13	195
9	Tannery	5	4	13	52
10	Textile	44	20	13	260
	<b>Total</b>	<b>167</b>	<b>81</b>		<b>1053</b>

##### 4.2 Measurements of the Variables

###### 4.2.1 Dependent Variables

Like most of the empirical studies i.e. Hasan et al. (2014), Singh (2013), Fareed et al. (2014), Kebewar (2013) etc., this study used two widely recognized indicators of profitability i.e. Return on Assets (ROA) and Return on Equity (ROE) as dependent variables as shown in Table 3.

Table 3. Dependent Variables

Sl. No.	Variable indicators	Full name of the variables	Measurement (Proxy)
1	ROA	Return on Assets	Earnings Before Interest & Tax / Total Assets
2	ROE	Return on Equity	Net Profit After Tax/ Total Stockholders' Equity

###### 4.2.2 Independent Variables

###### 4.2.2.1 Capital Structure Variables

To represent the capital structure of the firms, three types of variables namely- Short term debt ratio, Long term debt ratio and Total debt ratio have been used in this study. These are well- acknowledged proxies used for capital structure in almost all studies i.e. Hossain and Hossain (2014), Berger and Bonaccorsi (2006), Margaritis and Psillaki (2007), Fareed et al. (2014) Saeedi and Mahmoodi (2011), and Salim and Yadav (2012).

###### 4.2.2.2 Control Variables

Apart from the capital structure variables, several control variables have also been used in this study to determine the actual impact of capital structure on profitability after controlling the effects of other important variables as shown in Table 4. Here, managerial ownership variable has been used to see the effect of agency cost of equity on the firms' profitability. It is expected that managerial ownership will have positive impact on profitability because agency cost of equity can be reduced by increasing managerial ownership in the firms and thus profitability will also increase. Also operating leverage and bankruptcy cost variables have been used to determine the impact of business risk and financial risk on the profitability of the firms. They are also expected

to positively influence profitability due to the risk return trade-off i.e. the more risk, the more return. To control the industry effects, industry dummy variable has also been used. Since 10 industries were covered in this study, 9 industry dummy variables have been used (Hossain & Hossain, 2014).

Table 4. Independent variables

Sl. #	Variable Indicator	Full name of the variables	Measurement (Proxy)	Expected Relationship
<b>Capital Structure Variables</b>				
1	STDR	Short Term Debt Ratio	Total Short Term Debts / Total Assets	+/-
2	LTDR	Long Term Debt Ratio	Total Long Term Debts / Total Assets	+/-
3	TDR	Total Debt Ratio	Total Debts / Total Assets	+/-
<b>Control Variables</b>				
4	MO	Managerial Ownership	% shareholding of directors, sponsors and managers	+
5	BC	Bankruptcy Cost	Coefficient of Variation of EBIT	+/-
6	AGR	Asset Growth Rate	(Total Assets <sub>1</sub> - Total Assets <sub>0</sub> ) / Total Assets <sub>0</sub>	+/-
7	OL	Operating Leverage	(% change EBIT/ % change Net Sales)	+
8	SIZE	Size	Natural logarithm of Net Sales	-
9	AGE	Age	Natural logarithm of No. of Years of operation	+
10	SGR	Sales Growth Rate	(Net sales <sub>1</sub> - Net sales <sub>0</sub> ) / Net sales <sub>0</sub>	+
11	OER	Operating Expense Ratio	Total operating expenses / Net sales	-
12	CU	Capacity Utilization ratio	Net sales / Total Fixed assets	+
13	DUM_IND	Industry Dummy	“1” if the observation belongs to a particular industry and “0” otherwise	+/-

It is to be mentioned here that, in order to exclude the outliers in the data set, all variables have been winsored at 10% level except size and age. That means, the upper 10% values of each variable have been replaced by the value of the 90<sup>th</sup> percentile value and the lower 10% of each variable have been replaced by the value of the 10<sup>th</sup> percentile value (Kebewar, 2013).

4.3 Specification of the Model

Two multiple regression models have been used in this study, based on the two dependent variables, to estimate the impact of capital structure on the profitability of the firms. They are as follows:

**Model I-ROA:**

$$ROA = \alpha + \beta_1 TDR_{i,t} + \beta_2 STDR_{i,t} + \beta_3 LTDR_{i,t} + \beta_4 MO_{i,t} + \beta_5 BC_{i,t} + \beta_6 AGR_{i,t} + \beta_7 OL_{i,t} + \beta_8 SIZE_{i,t} + \beta_9 AGE_{i,t} + \beta_{10} SGR_{i,t} + \beta_{11} OER_{i,t} + \beta_{12} CU_{i,t} + \beta_{13} DUM\_IND_{i,t} + \epsilon_{i,t} \tag{1}$$

**Model II-ROE:**

$$ROE = \alpha + \beta_1 TDR_{i,t} + \beta_2 STDR_{i,t} + \beta_3 LTDR_{i,t} + \beta_4 MO_{i,t} + \beta_5 BC_{i,t} + \beta_6 AGR_{i,t} + \beta_7 OL_{i,t} + \beta_8 SIZE_{i,t} + \beta_9 AGE_{i,t} + \beta_{10} SGR_{i,t} + \beta_{11} OER_{i,t} + \beta_{12} CU_{i,t} + \beta_{13} DUM\_IND_{i,t} + \epsilon_{i,t} \tag{2}$$

Where, *i* refers to the individual companies and *t* refers to the time period.

4.4 Preliminary Tests

4.4.1 Panel Unit Root Test

To check the stationarity in the data series, Levin-Lin-Chu (LLC) test has been used considering two assumptions i.e. random walk with drift and random walk with drift around a stochastic trend. LLC test assumes a common unit root process (homogenous) so that Auto-Regressive parameter is identical across cross-sections (Levin, Lin, & Chu, 2002). The model is as follows:

$$\Delta Y_{it} = \rho_i Y_{i,t-1} + Z'_{it} \gamma_i + \sum_{j=1}^p \theta_{ij} \Delta Y_{i,t-j} + u_{it} \tag{3}$$

Where *i* = 1, 2, ..., N cross section series; *t* = 1, 2, ..., T time periods; *Y<sub>it</sub>* is the exogenous variable being tested;  $\rho_i$  is the autoregressive coefficients; *Z<sub>it</sub>*' = (1, *t*) so that the term *Z<sub>it</sub>*' $\gamma_i$  represents panel-specific means and linear time trends; and  $\epsilon_{it}$  is a stationary error term.

Table 5 shows the results of unit root test which reveals that all data series are stationary; that means the data set is perfect for running econometric models.

Table 5. Results of unit root tests

Levin, Lin & Chu Test						
<i>Null: Unit root (assumes common unit root process)</i>						
Variable	(With Individual Intercept)			(With Individual Intercept & Trend)		
	t-statistic	Probability	Process	t-statistic	Probability	Process
ROA	-9.56***	0.0000	S	-12.26***	0.0000	S
ROE	-71.16***	0.0000	S	-81.86***	0.0000	S
STDR	-8.45***	0.0000	S	-14.21***	0.0000	S
LTDR	-125.78***	0.0000	S	-146.18***	0.0000	S
TDR	-8.88***	0.0000	S	-13.04***	0.0000	S
MO	-6.60***	0.0000	S	-56.67***	0.0000	S
BC	-22.62***	0.0001	S	-35.98***	0.0000	S
AGR	-40.76***	0.0000	S	-32.79***	0.0000	S
OL	-30.88***	0.0021	S	-25.03***	0.0001	S
SIZE	-12.68***	0.0000	S	-65.13***	0.0000	S
AGE	-10.65***	0.0005	S	-20.87***	0.0000	S
SGR	-7.60***	0.0000	S	-57.67***	0.0000	S
OER	-35.76***	0.0000	S	-30.79***	0.0000	S
CU	-9.88***	0.0000	S	-15.04***	0.0000	S

Note. Here "S" means Stationary. Also \*, \*\*, \*\*\* represent 10%, 5% and 1% level of significance respectively. The lag length is automatically selected based on Schwartz Information Criterion (SIC).

#### 4.4.2 Multicollinearity, Heteroscedasticity & Autocorrelation Tests

Multicollinearity has been tested using Pearson Product-Moment Correlation Coefficient. The results (Table 6) indicate that there is no multicollinearity problem except TDR as it is strongly positively correlated with STDR and LTDR. So firstly regression has been run focusing on only TDR as a representative of capital structure and then again using both STDR and LTDR simultaneously as representatives of capital structure of the firms.

Table 6. The results of multicollinearity test

	TDR	STDR	LTDR	MO	SGR	OER	CU	AGR	BC	OL	SIZE	Age
TDR	1.00											
STDR	0.73*	1.00										
LTDR	0.48*	-0.15*	1.00									
MO	0.19*	0.13*	0.08*	1.00								
SGR	0.06*	0.05	0.01	0.01	1.00							
OER	0.28*	0.29*	0.07*	0.15*	-0.05	1.00						
CU	0.23*	0.29*	-0.08*	0.21*	0.12*	0.31*	1.00					
AGR	-0.02	-0.01	-0.06*	-0.04	0.25*	-0.19*	0.03	1.00				
BC	0.02	0.03	-0.01	-0.10*	0.02	0.03	-0.05	0.01	1.00			
OL	-0.03	-0.01	-0.03	-0.01	-0.01	-0.05	-0.02	0.01	0.05	1.00		
SIZE	-0.04	-0.09*	0.09*	-0.07*	-0.02	-0.01	-0.15*	0.07*	0.03	0.04	1.00	
Age	0.11*	0.13*	0.03	0.13*	0.06*	0.02	0.26*	0.05	0.06*	-0.02	0.08*	1.00

On the other hand, Breusch-Pagan test revealed that the data set faced the problem of heteroscedasticity. It was also found that there is first order autocorrelation problem by using Wooldridge test for autocorrelation in panel data. (The results are not shown here due to space restrictions.)

#### 4.5 Panel Corrected Standard Error (PCSE) Regression Model

Panel Corrected Standard Error (PCSE) model has been used to determine the impact of capital structure on the profitability of the firms. When the errors are not independent and identically distributed; rather the errors are

either heteroscedastic across panels or heteroscedastic and contemporaneously correlated across panels, with or without autocorrelation; PCSE is an alternative to the Feasible Generalized Least Squares (FGLS) for fitting the panel data models (Kmenta, 1997). The reason for using this model is that it provides the best estimates for the variables by automatically correcting the heteroscedasticity and autocorrelation problem. This model can be expressed panel by panel as:

$$\begin{bmatrix} y_1 \\ y_2 \\ \cdot \\ \cdot \\ y_n \end{bmatrix} = \begin{bmatrix} x_1 \\ x_2 \\ \cdot \\ \cdot \\ x_n \end{bmatrix} \beta + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \cdot \\ \cdot \\ \varepsilon_n \end{bmatrix} \quad (4)$$

## 5. Analysis of Results

### 5.1 Descriptive Statistics

It is evident from Table 7 that the manufacturing companies of Bangladesh earned a moderate average return on assets and return on equity (8.10% and 9.16% respectively) during the period 2002-2014. It is surprising that they financed about 57.06% of their total assets by total debt in which proportion of short term debt is more (42.91%) than that of long term debt (12.73%). It indicates that the companies are following aggressive financing strategies which are very risky for them. Some firms even don't have long term debt in their capital structure. About 44.79% shares of the firms are held by the managers, directors and promoters and the bankruptcy costs of these firms are very high (56.08%) as well as they have a very high degree of operating leverage which indicates high business risk. Their assets and sales grow at a moderate rate per year (8.70% and 11.05% respectively). This study includes both large and small size firms in terms of sales revenue and also high aged and low aged firms as well.

Table 7. Descriptive statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
ROA	.0810	.0570	.0103	.1894
ROE	.0916	.0905	-.0430	.2606
TDR	.5706	.2015	.2592	.8834
STDR	.4291	.1843	.1534	.7362
LTDR	.1273	.1329	0	.4014
MO	.4479	.1384	.1979	.6591
BC	.5608	.3577	.1466	1.263
OL	1.020	3.436	-5.491	7.446
AGR	.0870	.1271	-.0756	.3321
SGR	.1105	.1972	-.1833	.4735
OER	.8928	.0774	.7473	.9884
CU	2.886	2.820	.4878	9.266
SIZE (TK in million)	1440	284	0	29300
Age (years)	25.06	12.34	0	65

### 5.2 Results of Panel Corrected Standard Error (PCSE) Model

#### 5.2.1 Focusing on Total Debt Ratio

It is apparent from the Table 8 that Total Debt ratio has significant negative influence on the return on assets whereas positive influence on the return on equity. That means, the more a firm finances its assets by debt, the less the return on assets will be and vice versa. The negative relationship can be attributed to the agency cost of

debt between shareholders and creditors which conforms to the agency cost theory. This result can be illustrated in another way. As Bangladeshi firms are highly leveraged and so their financial risks and bankruptcy costs are very high which overweighs the interest tax benefit received from debt financing. Henceforth, the return on assets declines as leverage increases.

On the contrary, the positive relationship with return on equity results from the reason that, as the firm takes more debt financing, the required rate of return of the shareholders increases on the ground that debt financing increases the financial risks as well as the possibility of bankruptcy in future. These results are consistent with Hasan et al. (2014); Kebewar (2013); Mohammadzadeh et al. (2013); Ferati and Ejupi (2012); Prateepkanth (2011); Berger and Bonaccorsi (2006); Rajan and Zingales (1995). On the contrary, it is opposite to the results found by Samuels (2013); Ong and Teh (2011); Margaritis and Psillaki (2010).

Table 8. PCSE regression results of model-I & II

Variables	Model- I (ROA)		Model- II (ROE)	
	Coefficients	z- statistic	Coefficients	z- statistic
TDR	-.0190	-2.41**	.0270	1.74*
MO	.0241	2.24**	.0355	1.54
BC	.0033	0.88	.0020	0.17
OL	.0004	1.85*	.0002	0.53
AGR	-.0337	-5.63***	.0158	1.11
SGR	.0224	5.49***	.0233	2.85***
OER	-.5048	-27.68***	-.4357	-11.78***
CU	.0084	12.86***	.0124	10.70***
SIZE	-.0024	-1.93*	.0009	0.44
AGE	.0102	2.36**	.022	3.77***
DUM_CEM	.0376	3.42***	.0330	0.64
DUM_CER	.0079	1.18	-.0415	-1.00
DUM_ENG	.0112	1.43	-.0191	-0.51
DUM_FOOD	.0137	1.40	-.0071	-0.19
DUM_FUEL	-.0267	-1.58	-.0079	-0.17
DUM_IT	.0089	0.42	-.0025	-0.06
DUM_PHAR	.0308	3.14***	.0110	0.27
DUM_TAN	.0134	1.38	-.0364	-1.00
DUM_TEX	.0204	2.32**	-.0238	-0.60
_cons	.5060	14.57***	.3318	5.03***
R <sup>2</sup>	58.93%		22.13%	
Prob.>chi <sup>2</sup>	0.000		0.000	

Note. Here, \*, \*\* and \*\*\* represent 10%, 5% and 1% significance level respectively.

R<sup>2</sup> the measurement of goodness of fit, shows that the combined variation in the independent variables can explain about 58.93% and 22.13% of the variations in the dependent variable of Model- I & II respectively. It indicates that some other variables besides capital structure variables have influence on profitability. However, compared to the other studies done in case of Bangladesh (i.e. Chowdhury & Chowdhury, 2010; Hasan et al., 2014), this study has much better R<sup>2</sup> value. Also Prob. > chi<sup>2</sup> value shows that Model-I & II, as a whole, is significant at 1% level.

On the other hand, managerial ownership positively affects profitability as expected and that means Bangladeshi firms can manage the agency cost of equity and hence return on assets also increase. Bankruptcy cost and operating leverage have significant positive influence on return on assets whereas growth rate has negative influence on profitability of the firms. This imply that firms having high leverage and business risk invest and manage their funds in such an efficient way that yields maximum return sufficient to cover those risks. Also these positive relationships can be justified from the finance notion that there is a positive tradeoff between risk and return of a firm. The results also reveal that the small sized firms can earn more profitability compare to large sized firms and in addition, as the firms get experienced in their business operations over time, they can maximize their profitability through economies of scale and learning curve.

### 5.2.2 Decomposition of Total Debt Ratio into Short Term and Long Term Debt Ratio

Table- 9 reveals that interestingly, Short term debt ratio, compared to Long term debt ratio, significantly affects the return on assets of the firms more severely. This may be due to the fact that by using long term debt, the firms can go for long term investment projects that will yield more sustainable return in future. On the other hand, short term debt ratio positively affects return on equity of the firms significantly. So, it is evident that short term debt has more influence on profitability compared to long term debt. The results of other variables in both models are more or less the same as those found in case of total debt ratio focusing models shown in Table 8. That's why only the coefficients of short term and long term debt ratios are shown in Table 9.

Table 9. PCSE regression results of model- I & II (decomposed)

Variables	Model- I (ROA)		Model- II (ROE)	
	Coefficients	z- statistic	Coefficients	z- statistic
STDR	-.0161	-2.07**	.0540	2.80***
LTDR	-.0112	-1.03	-.0016	-0.06

Note. Here, \*, \*\* and \*\*\* represent 10%, 5% and 1% significance level respectively.

## 6. Conclusion & Policy Implications

This study aims at determining the influence of capital structure on the profitability, measured by Return on Assets and Return on Equity, of the listed manufacturing companies in Bangladesh by using a panel data set including 81 manufacturing companies listed under 10 industries in Dhaka Stock Exchange for 13 year time period (2002-2014). All series were found stationary at level in the unit root test. Since the data set faced the problem of heteroscedasticity and positive serial autocorrelation, Panel Corrected Standard Error (PCSE) regression model was used because it automatically solves the problem of heteroscedasticity and autocorrelation and provides the best estimates of the variables. It was found that capital structure negatively influence the return on assets whereas positively influence the return on equity of the firms. The negative relationship can be attributed to the agency cost of debt between shareholders and creditors which conforms to the agency cost theory. As Bangladeshi firms are highly leveraged and so their financial risks and bankruptcy costs are very high which overweighs the interest tax benefit received from debt financing. Henceforth, the return on assets declines as leverage increases. On the contrary, the positive relationship with return on equity results from the reason that, as the firm takes more debt financing, the required rate of return of the shareholders increases on the ground that debt financing increases the financial risks as well as the possibility of bankruptcy in future. Surprisingly short term debt ratio has more significant influence on profitability compare to long term debt ratio. This is due to the fact that Bangladeshi firms are more dependent on short term debt financing compared to long term debt. The results also show that Bangladeshi firms are highly leveraged and that's why their financial risks and bankruptcy costs are very high.

The policy implication of this paper is that the financial managers should use less leverage in the capital structure in order to lessen their dependency on debt financing which will contribute to minimizing financial risks and minimizing agency cost of debt and equity which will lead to maximizing profitability of the firms. This study can be extended further by incorporating some other important factors (*i.e.* managerial behavior, credit rating, market to book value, project's risk etc.) along with different methodologies (quadratic regression model *i.e.* Generalized Methods of Moments) to solve endogeneity problem.

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