Article

Impacts of Capital Structure on Performance of Banks in a Developing Economy: Evidence from Bangladesh

Md. Nur Alam Siddik [1,*], Sajal Kabiraj [2] and Shanmugan Joghee [3]

[1] Department of Finance and Banking, Begum Rokeya University, Rangpur 5400, Bangladesh
[2] International Business College, Dongbei University of Finance and Economics, Dalian 116000, China; skabiraj@dufe.edu.cn
[3] Department of Business Management, Skyline University College, Sharjah, UAE; jshanmugan@skylineunivesity.com
* Correspondence: nasiddik@brur.ac.bd; Tel.: +8801712684458

Abstract: Capital structure decision plays an imperative role in firm's performance. Recognizing the importance, there has been many studies inspected the rapport of capital structure with performance of firms and findings of those studies are inconclusive. In addition, there is relative deficiency of empirical studies examining the link of capital structure with performance of banks in Bangladesh. This paper attempted to fill this gap. Using panel data of 22 banks for the period of 2005-2014, this study empirically examined the impacts of capital structure on the performance of Bangladeshi banks assessed by return on equity, return on assets and earnings per share. Results from pooled ordinary least square analysis show that there are inverse impacts of capital structure on bank's performance. Empirical findings of this study is of greater significance for the developing countries like Bangladesh because it will call upon concentration of the bank management and policy makers to pursue such policies to reduce reliance on debt and to accomplish optimal level capital structure. This research also contributes to empirical literatures by reconfirming (or otherwise) findings of previous studies.

Keywords: capital structure; firm's performance; panel data; unit root analysis; Bangladesh

JEL classifications: C23; G30; G32

1. Introduction

Capital structure, which simply means the mode of finance, usually a blend of loan and equity capital, through which a firm is financed, has been the issue of interest to many researchers in which they aimed to observe the connection of capital structure with performance of firms. The decision of how a firm will be financed is imperative to both the managers of the firms and fund suppliers. This is because, first of all, if financing is done through employment of wrong mix of debt and equity, it may acutely influence the performance and even endurance of the firm. Secondly, in order to maximize the firm value, managers should undertake capital structure decision, which is a complex task, as because use of leverage varies from one firm to another. Therefore, what managers usually do is they try to achieve the best combination of debt and equity in their capital structure.

Recognizing the importance, there has been many studies which tried to inspect the affiliation of capital structure with performance of firms. In connection with this issue, Modigliani and Miller [1] primarily stated that under perfectly competitive capital market conditions, a firm's value is free from the influence of capital structure decisions. Rather they argued that firm value is determined solely by its basic earnings power. But shortly after that Modigliani and Miller [2] restated that with the charisma of tax advantage of debt, firm value can be increased by incorporating more debt into capital structure and thus firms' optimal capital structure should be made up of hundred percent of debt.

However, there is debate on whether these assumptions hold in the real world, and as such several theories for instance the static trade-off theory, pecking order theory and theory of agency cost have been emerged to explain the connection of capital structure decisions with firms' performance.

The dispute over the assumptions of Modigliani and Miller **[1]** results in static trade-off theory which states that with the incorporation of tax into the Modigliani and Miller **[1]** theorem an advantage for use of debt capital is practical that could be applied to protect earnings from high taxes. According to Brigham and Houston **[3]** firm's optimal capital structure, at which firm value will be increased and cost of capital will be decreased, is determine by the exchange of benefits of use of debt, known as tax savings and the costs of debt such as agency costs. Furthermore, trade-off theory states that firms having more physical assets should employ additional debt capital as because these physical assets could be applied as collateral. Besides, intangible asset's value is more prone to go down in case of financial suffering.

Myers **[4]** developed a capital structure theory, known as pecking order theory which believes in no optimal capital structure and summarizes that every firm has a preferred hierarchy for financing decisions and usually firms prefer more use of internal financing than that of financing from outside the organisation. However, financing from outside sources is required when all in-house funds are employed. According to Muritala **[5]**, in such a case, firms will prefer debt over equity

Considering debt as a necessary factor which creates differences in goals of shareholders with managers, Jensen and Meckling **[6]** developed agency cost theory which explains that cash flows of a firm rely on its ownership formation. Authors suggested that, there should be a better mixture of debt and equity capital to shrink total agency costs. In other words, prevailing agency cost will determine how much debt should be introduced into capital structure.

Following the above mentioned theories, a chunk of studies observed the impacts of capital structure on firms' performance even though their findings are mixed. These mixed evidences create an avenue for the researcher to explore and establish the influence of capital structure decision on firms' performance. Besides, in the context of developing country like Bangladesh, there exist few studies linking between the same. Even, none of those studies focused on the banking sector performance. For example, by using data of 2008-2011, Rouf **[7]** conducted a study on non-financial companies and observed a significant negative relation of capital structure with ROA and Return on Sales, ROS. Using data of manufacturing companies over the period of 2002-2011, Hossain and Hossain **[8]** investigated the antecedents of capital structure in Bangladesh. In a similar study which excludes performance of bank sector, Hasan et al. **[9]** studied whether Bangladeshi firms are affected by capital structure. Chowdhury and Chowdhury **[10]** studied the association of firm value with capital structure choice. Authors used data over a period of 1994-2003 for non-financial firms and thus ignored banking sector performance.

From above discussions it is evident that to date, there is no study focused on linking the issue of capital structure and performance of banks in Bangladesh. In this present research an endeavour has been taken to explore the link of capital structure decisions to banks' performance as banking sector is considered as the most sound and dominant sector in Bangladesh.

2. Literature Review

Concept of capital structure can be defined as the in proportion relation between a firm's debt capital and equity capital. Firms use capital structure usually to fund their business and expansion performance. This decision is vital for any firm as it has direct influence on the firm's risk and return. Scholars and researchers around the world has conceptualized capital structure in different context and thus in a different way. Besley and Brigham **[11]** conceptualized capital structure by the blend of long-term debt capital, preferred share capital and net worth which is being used as a method of permanent financing by any firm. Describing capital structure as method of long-term financing, Van Horne and Wachowicz **[12]** stated that it is the mix of a firm's preferred share capital, equity capital as well as debt capital. Therefore, it could be said that traditionally, capital structure has been

conceptualized as the mix of long-term debt capital and equity capital and thus ignored short-term debt capital. In present study, besides these components, we incorporate short-term debt capital as a component of capital structure.

2.1 Previous empirical studies

There exist a chunk of empirical studies which observed the association of capital structure decision with firms' performance. Some scholars observed positive impact, some observed negative while other researchers have found no impact.

Positive conclusions:

Using data of 17 banks over the period of 2009-2014, Nikoo [13] observed a significant positive association of capital structure choice on performance of sampled banks. Umar et al. [14] used data on 100 listed firms over the period of 2006-2009 and observed significant positive association of firm's performance with capital structure. Authors used ROA, EPS and net profit margin as proxies to measure performance and STDTA, LTDTA, TDTA as capital structure variables. Using exponential generalized least squares approach authors claimed that their findings support the trade-off theory. Salteh et al. [15] inspected influence of capital structure decision on profitability for 28 firms of the Tehran stock exchange. Using data of 2005-2009, authors observed positive impacts of capital structure variables, STDTA, LTDTA, TDTA, on performance proxies by ROE and Tobin's Q.

Arbabiyan and Safari [16], using data of 100 firms for 2001-2007, reported a significant positive link of STDTA, TDTA with ROE. However, authors observed an inverse association of LTDTA with ROE. The main drawback of this study is authors used only a single variable, ROE, to measure the performance. In a similar research, Abor [17] attempted to explore impacts of capital structure on performance of firms of the Ghana stock exchanges and found a significant positive impact of STDTA, TDTA on ROE. Also, author observed a negative association between LTDTA and ROE.

Negative Conclusions:

Contrary to the empirical findings of positive impacts, many researchers observed negative impacts. Using data over the period of 2008-2012, Ramadan and Ramadan [18] aimed to explore the impacts of capital structure variables, TDTA, LTDTA, STDTA, on performance of Jordanian firms. Using data of 72 companies over the period of 2005-2013, authors applied pooled OLS and observed significant negative effect of capital structure on ROA.

Employing multiple regression analysis, Abdel-Jalil [19] documented a significant inverse influence of debt ratio, proportion of debt to equity on rate of return generated from investment activities, ROI. Memon et al. [20] checked the relation of capital structure decision with performance of the Pakistani organisations, where author used ROA as a single measure of performance. Using log linear regression model on data of 141 Pakistani textile companies, for the period of 2004-2009, authors reported a significantly negative association between TDTA and ROA. Using ratio of debt to total asset as a single proxy of capital structure and ROA as a proxy to measure performance of firms, Muritala [5] examined the influence of use of leverage into capital structure on performance of Nigerian firms. Author gathered data on ten firms over the period of 2006-2010. Applying panel least square approach, author observed a negative influence of debt to total asset ratio on ROA. In another study, investigating data of 76 firms over 2001-2006, Soumadi and Hayajneh [21] reported a similar negative influence on ROE and Tobin's Q.

Arguing that a single measure is not enough to measure firm's performance, Salim and Yadav [22] employed EPS, ROA, ROE, and Tobin's Q as measures of performance. Authors used panel data of 237 Malaysian companies for 1995-2011 and observed a significant negative influence of TDTA, LTDTA, and STDTA on EPS, ROA, ROE, and Tobin's Q. In the context of an emerging market, Manawaduge et. al [23] scanned the influence of leverage on Srilankan firms' profitability. Using pooled panel data of 155 firms over the period of 2002-2008, authors observed an inverse influence of leverage on profitability of firms. In another study, Chakraborty [24] also found inverse relationship between leverage and performance of firms where performance was considered by relative amount of profit before interest and taxes.

No Relationship:

While some studies observed a link, either positive or negative, of capital structure decisions with performance, there are other studies reported no association between the same.

Al-Taani **[25]** inspected the association of capital structure choice with profitability of Jordanian companies. Applying data of 2005-2009, author found no statistically significant association between ROA and debt ratio. Ebaid **[26]** inspected the influence of capital structure decision on performance of firms. Using data of 64 firms listed in the Egyptian capital market for the period of 1997-2005, author conducted multiple regression analysis and observed a weak to no impact.

Findings in the context of Bangladesh

In the context of Bangladesh, Safiuddin et al. **[27]** applied descriptive statistics to trace the influence of financial structure on financial and non-financial firms operating in Bangladesh. Employing data of 40 firms for 2008-2012, authors concluded that leverage plays critical role in firms' performance. The major drawback of that study is it just used descriptive statistics rather than econometric model to explain the relationship.

In another study, using data of manufacturing companies over the period of 2002-2011, Hossain and Hossain **[8]** explored the antecedents of capital structure in Bangladesh. Using data of 74 manufacturing firm for the period of 2002-2011, authors conducted panel corrected standard regression model and observed negative relationship between most variables and then concluded that in Bangladesh, most firms follow pecking order theory and static trade-off theory. Using data of 2008-2011 for 106 manufacturing companies, Rouf **[7]** aimed to investigate the impacts of capital structure on non-financial companies' performance, where performance was measured by ROA, ROS and observed a significant negative influence. In a similar study which excludes performance of bank sector, Hasan et al. (2014) inspected the effects of capital structure choice on Bangladeshi firms' performance over the period of 2007-2012 where authors used ROA, ROE, EPS and Tobin's Q as measures of performance. Applying pooled OLS, authors observed negative impacts. Chowdhury and Chowdhury **[10]** checked the influence of capital structure on the goal of maximizing firms' value. Ignoring banking sector data, authors used data over a period of 1994-2003 for 77 non-financial firms and observed a positive influence.

It could be seen from the above explained empirical literatures that impacts of capital structure decision on the performance of firms provides mixed evidences and thus inconclusive. Therefore, it brings an open ground for the academicians, researchers, firms, regulators and supervisors to explore and establish empirically the impacts of capital structure choice on banks' performance. Furthermore, there are no empirical researches to explore the effects of capital structure decision on performance of Bangladeshi banks. Hence our main objective is to fill this gap with a systematic and comprehensive analysis of database of banks operating in a developing country, viz., Bangladesh.

3. Methodology

3.1 Data Sources and description

The issue of relation of capital structure with firms' performance has not given much attention in developing countries viz., Bangladesh. We chose bank sector of Bangladesh since this has the significant impact on the economy. To date, there are 30 banks listed in Dhaka Stock Exchange Ltd. In order to provide reliable, meaningful and most updated results we collect data for 10 years over the period of 2005-2014 and thus this study considered only banks that have audited financial statements of 2005 and onwards. As such, out of 30 banks, there are 22 banks which have financial statements information for the period of 2005-2014 and thus used in this study.

Therefore, we have compiled panel data of 22 banks from respective banks' audited annual reports over the period of 2005 and 2014 and thus, by nature, it is a cross sectional data for a range of years and also a time series data. Data on macroeconomic variables have been collected from the World Bank. Therefore, present study's data is a pooled data. Accordingly, the Pooled ordinary least square (OLS) technique was conducted in this research which is also used in similar studies such as Hasan et al. **[9]** and   Ramadan and Ramadan **[18].**

3.2 Variables selection

In this study, researchers took an endeavour to empirically examine the impacts of capital structure choice on performance of banks operating in Bangladesh. Thus dependent variable of the study is bank's performance. In order to measure bank's performance we use three proxy variables which have been used in most studies. A commonly used measure of bank's performance is ROA, which gives a picture about how effective the management of bank is in generating profits with its available assets. In their study **[7, 9, 18], [18],** have employed ROA as a proxy of performance.

Another good measure of bank performance is ROE (Hasan et al. **[9]**, Salim and Yadav **[22]**, Akeem et al. **[28],** Pouraghajan et al. **[29])** . ROE gives an explanation of how effectively shareholder's funds are being used by the management of the bank. Favouring ROE Hall and Weiss **[30]** argued that due to the existence of optimal borrowing level, ROA might vary among industries while ROE tend to equal and thus provides a better measurement. Since our study is based on the banking industry only, thus we use both the ROE and ROA to measure the banks' performance. To compute ROA and ROE, we use before-tax figures rather than after-tax figures because tax rates may vary across banks due to non-performance allied factors such as ownership structure.

Apart from ROA and ROE, various scholars around the world used another measure, EPS, as a proxy of bank performance. Onay and Ozsoz **[31]** argued that Government intervention might inflate ROE which may lead to inconsistent results. To avoid such inconsistent result, a third fundamental measure, EPS, was used to measure the performance of banks. Abu-Rub **[32]** argued that EPS is basic measurement of corporate performance and the more the EPS the better the performance is. Arguing same, we use EPS as a measure of bank performance. To get EPS, we divide net income by outstanding shares.

3.2.1 Independent variables

In this research, as the researcher aimed to investigate link between capital structure decision and performance of banks, so capital structure variables are the independent variable. While most studies used TDTA and LTDTA as measure of capital structure, in this research, to facilitate comprehensive effects of capital structure on banks' performance, we use STDTA along with TDTA and LTDTA as capital structure variables. We measure STDTA as the proportion of short-term debt to total asset, LTDTA as the proportion of long-term debt to total asset and TDTA as the proportion of total debt to total asset. In line with (Muritala **[5]**, Ramadan and Ramadan **[18]**, Abdel-Jalil **[19]**, Soumadi and Hayajneh **[21]**) for STDTA, LTDTA and TDTA, we expect a negative (-) impact on dependent variables.

3.2.2 Control variables

To isolate the effects of capital structure on banks' performance, a number of control variables are applied in this research. Two sets of control variables were expected, bank-specific variables and macroeconomic variables, to influence bank's performance and hereby controlled for.

Bank-specific control variables employed in this research are liquidity, LQDTY, size, SZ, and growth opportunities, GOP. Liquidity reflects a bank's capability to meet up the short- term debt obligations as they appear due. The inverse relation between liquidity and profitability is crucial to any organization. In other words, the more the liquid assets are, the lower the rate of return. We expect and assign a negative sign (-) to this variable. We measure liquidity by proportion of current asset to current liabilities of a bank. Size, SZ, signals the specific risk, although expected sign is ambiguous. According to modern financial intermediation theory, banks efficiency, derived from economies of scale is associated with bank size which could imply that larger banks may experience higher profits (Flamini et al. **[33]**). Jahan **[34]** and Rao and Lakew **[35]** observed a positive association between size and banks' profitability. Authors argued that due to economies of scale, large size banks were experiencing more profits as compared to small size banks, while in the context of Nigerian banking industry, Obamuyi **[36]** observed negative relationship. Thus, there are mix evidences on the association of size with profitability of banks. We expect a positive sign and compute SZ by taking the natural logarithm of total assets of banks.

A chunk of researches argued that firm's performance and growth opportunities are closely related. Soumadi and Hayajneh **[21],** and Salim and Yadav **[22]** observed a positive link between growth opportunities and performance of firms and thus concluded that a growth opportunity is a key determinant of performance of firms. Arguing the same, we expect a positive (+) sign. We compute growth opportunities by calculating the difference between present year's assets and preceding year's assets and then dividing the difference by assets of previous year.

Economic growth (RGDP) and inflation rate (INF) are also used in this research to control for the impacts of macroeconomic state of affairs over the period of 2005-2014. Athanasoglou et al. **[37]** argued that during economic slowdowns, bank's lending could reduce which in turn will lower the banks' profitability. On the other hand during economic booms, an economic condition where all sectors of an economy perform well, demand for loan could increase which may widen the interest margin of the bank. Trujillo-Ponce **[38]** observed a significant positive link connecting economic growth and profitability of the bank. Therefore, with an expectation of positive sign (+), we measure RGDP by GDP growth for the respective years of the country. Flamini et al. **[33]** discussed that whether inflation can affect firm's performance depends on anticipated inflation rate. Having an anticipated inflation implies that banks can adjust their interest rates in a manner so that their revenue will more than their cost and therefore achieve higher profits. Trujillo-Ponce **[38]** established an affirmative connection between inflation and ROA of banks whereas Sufian and Habibullah **[39]** observed inverse relation. We expect a positive sign with this variable and measure inflation by the current inflation rate for the respective years of the country. A summary of variables used in this study, their measurement and expected signs are provided in Table 1.

Table 1. Summary of variables used and their specification

Variable	Legend	Measurement	Expected sign
Dependent variables:			
Return on Asset	ROA	Net profit(Before taxes)/Total assets	+
Return on Equity	ROE	Net profit(Before	+
Earnings per share	EPS	Net income / number of shares outstanding	+
Independent variables:			
Short-term debt obligations to total asset	STDTA	Short-term debt / Total asset	-
Long-term debt obligations to total asset	LTDTA	Long-term debt / Total asset	-
Total debt obligations to total asset	TDTA	Total debt / Total asset	-
liquidity	LIQDTY	Current asset / Current liabilities	-
Size	SZ	Natural logarithm of total	+
Growth opportunities	GOP	(Assets of current year-Assets of previous year)/ Assets of previous year	+
Economic growth	RGDP	Natural logarithm of GDP	+
Inflation	INF	The annual inflation rate	+

3.3 Empirical model

Based on works of (Hasan et al. **[9]**, Salim and Yadav **[22]**), Onay and Ozsoz **[31]**), we adopt an empirical model, where bank performance is denoted by BP_{it}, measured by ROA, ROE and EPS for bank i in year t, as follows:

$$BP_{it} = \alpha_0 + \beta_i CS_{it} + \lambda_{it} X_{it} + \theta_t MACRO_t + \varepsilon_{it} \ldots\ldots\ldots\ldots(1)$$

In the above mentioned basic model, BP_{it} reflects the bank i's performance in year t (dependent variables). CS_{it} corresponds to the matrix of capital structure variables (independent variables). X_{it} represents the matrix of bank-specific variables for the bank i in period t. $MACRO_t$ is a matrix of macroeconomic state of affairs' variables which is measured by GDP growth rate and inflation rate of the country in year t. ε_{it} is a disturbance error term, autonomously and equally distributed as N(0, $\sigma2$) and α_0 corresponds to bank permanent consequence term which measures time-invariant effect exact to bank i.

Since we have considered three variables, namely ROA, ROE and EPS to measure bank performance, based on the expected relationships among variables provided in Table 1, equation (1) can be written as equation (2), (3) and (4) respectively for ROA, ROE, and EPS.

$$ROA_{it} = \alpha_0 + \beta_1 STDTA_{it} + \beta_2 LTDTA_{it} + \beta_3 TDTA_{it} + \lambda_1 LQDTY_{it} + \lambda_2 SZ_{it} + \lambda_3 GOP_{it} +$$
$$\theta_1 RGDP_t + \theta_2 INF_t + \varepsilon_{it} \ldots\ldots\ldots\ldots(2)$$

$$ROE_{it} = \alpha_0 + \beta_1 STDTA_{it} + \beta_2 LTDTA_{it} + \beta_3 TDTA_{it} + \lambda_1 LQDTY_{it} + \lambda_2 SZ_{it} + \lambda_3 GOP_{it} +$$
$$\theta_1 RGDP_t + \theta_2 INF_t + \varepsilon_{it} \ldots\ldots\ldots\ldots(3)$$

$$EPS_{it} = \alpha_0 + \beta_1 STDTA_{it} + \beta_2 LTDTA_{it} + \beta_3 TDTA_{it} + \lambda_1 LQDTY_{it} + \lambda_2 SZ_{it} + \lambda_3 GOP_{it} +$$
$$\theta_1 RGDP_t + \theta_2 INF_t + \varepsilon_{it} \ldots\ldots\ldots\ldots(4)$$

Where, β_1, β_2, β_3, represents the regression coefficient for the variables STDTA, LTDTA and TDTA respectively; λ_1, λ_2, and λ_3, represents the regression coefficient for the variables, bank specific variables, namely LQDTY, SZ, and GOP respectively and θ_1 and θ_2 represents the regression coefficient for the macro-variables, namely RGDP and INF respectively.

4. Empirical findings and their discussion

4.1 Descriptive statistics

Table 2 grants some insights about the variables considered. According to Table 2, the mean ROA of sample banking industry is 1.476628 % which means that sampled banks earned a return of 1.48 % of total assets with a highest value of 3.8 and lowest value of 0.21 where standard deviation, which reflects the variability involved in, is 0.6374654.For another dependent variable, ROE, we observed a mean ROE of 19.04% and standard deviation of 7.29% which reveals the existence of reasonable deviation among the tested banks. In case of EPS, we found an average EPS of 3.73 in conjunction with variability, measured by standard deviation, of 1.76%.

On other hand, for the main variables of interest, TDTA, LTDTA and STDTA we observed mean of .8704154, .7847493 and .1397861 respectively and a standard deviation of .08432, .0928 and .08887 respectively which imply that these companies operates with significant level of debt and also there is low deviation from the mean value. Among bank specific control variables, in case of liquidity, we assumed that firms with high liquidity will experience low profitability and vice–versa and we observed a mean of 11.721 with a maximum value of 31.12727 and minimum value of 3.094959 as well as a standard deviation of 4.420662, which reflects the deviation involved in. The average growth opportunity of the sample Bangladeshi banks we found is .2782329. It confirms a moderate level deviation of .1292053 which imply that in Bangladesh, firms have opportunity to grow with less risk. For other variables, such as Size, GDP and inflation we observed a moderate level of standard deviation over the period of 2005-2014.

Table 2. Descriptive statistics

Variable	Obs	Mean	Standard	Min	Max
ROA	220	1.476628	.6374654	.21	3.8
ROE	220	19.04206	7.292161	6.11	46.22

EPS	220	3.727909	1.762933	.32645	9.74
TDTA	220	.8704154	.0843272	.66809	.9801
LTDTA	220	.7847493	.0928381	.53057	.9001
STDTA	220	.1397861	.088877	.01147	.3831
SIZE	220	4.543462	.6903714	2.0381	6.425
LQDTY	220	11.1721	4.420662	3.0949	31.12
GOP	198	.2782329	.1292053	.03277	.8618
RGDP	220	6.195767	.5546968	5.0451	7.058
INF	220	6.757129	1.07456	4.5863	8.164

4.2 Multicollinearity test

Since we are using data of 22 banks on 11 variables over the period of 2005-2014, for such data multicollinearity might be an issue and as such we conduct VIF test to examine whether multicolinearity exist among independent variables. Nachane **[40]** suggested that VIF<10.0 is acceptable. According to Table 3, the highest variance inflation factor (VIF) is 2.48. So there is low level of multicollinreaity and as such multicollinearity is not an issue in this study.

Table 3. Values of variance inflation factors'

Variable	VIF	1/VIF
LTDTA	2.48	0.403233
STDTA	2.47	0.404269
GOP	1.44	0.694859
LQDTY	1.40	0.713799
SIZE	1.35	0.739888
RGDP	1.11	0.902967
TDTA	1.11	0.903474
INF	1.09	0.916670
Mean VIF	1.56	

4.3 Unit root test

The study uses cross-sectional time series data. So we first tested whether data and variables contain unit root so as to know whether the findings can hold in the long-run perspective. We conducted Levin-Lin-Chu (LLC) test of unit root. Findings suggest that all variables considered in this research were stationary at 1% level of significance. Thus, based on findings provided in Table 4, we conclude that there is no unit root in the data and variables and therefore the outcome of this study can hold in a long-run perspective.

Table 4. Results of Unit root test

	Statistic		
Variable	Unadjuste	Adjusted	p-value
ROA	-9.5136	-4.2743	0.0000***
ROE	-13.7408	-8.0695	0.0000***
EPS	-8.9422	-3.8334	0.0001***
TDTA	-9.3057	-4.5592	0.0000***
LTDTA	-8.8622	-5.4066	0.0000***
STDTA	-10.3620	-6.3146	0.0000***
SIZE	-10.5642	-6.1958	0.0000***
LQDTY	-10.6372	-5.7678	0.0000***
GOP	-9.7675	-5.9542	0.0000***
RGDP	-18.6330	-15.5186	0.0000***
INF	-12.2429	-3.1463	0.0000***

Note: *** indicates significant at 1%.

4.4 Dealing with possible Heteroskedasticity

Under the condition that error terms do not have constant variance, data set is subject to face the problem of heteroskedasticity and such situation might produce biased results. To overcome the

problem of probable heteroskedasticity, following the suggestion of Gujarati **[41]**, we employed heteroskedastic robust standard errors in estimating the coefficients of the regressors.

4.5 Test of Endogeneity

While we theorized that capital structure decisions have impact on performance of banks; some prior studies endogeneity between leverage and value of the firms (Adrian and Shin **[42]**, Berger and Di Patti **[43]**). As such, following the work of Wooldridge **[44]**, we employed instrumental variables method to test the endogeneity of leverage in determining performance of banks. On the ground that in deciding their own ratio, banks target their industry's average leverage ratio; we employed average sector leverage ratio, IA, as the instrument. For simplification purpose, to implement the instrument, we used average of total debt **rather than** classifying it **as** short-term debt and long-term debt.

At the first step of the test, similar to our initial model specified in equation 1, known as structural model, we estimate a reduced equation where the dependent variable is the probable endogenous variable which is TDTA and the main variable of interest in this model is the instrument while we control for all other **variables of specified** structural equation. Thus, **the form of** reduced equation is follows:

$$TDTA_{it} = \alpha_0 + \beta_i IA_{it} + \lambda_{it} X_{it} + \theta_t MACRO_t + \varepsilon_{it} \ldots\ldots\ldots(5)$$

To ensure the relevance of the instrument, one **key** condition is that **the instrument's coefficient,** β_i in equation (5), must be statistically different from zero. Once we estimated the reduced equation, in the next step we estimate the residual of this reduced equation and then incorporated it as a regressor in **our specified** structural equation. In this way, the structural equation's **residual** becomes a function of the reduced equation's **residual** (Vit) plus an error term (Nit). Thus,

$$\varepsilon_{it}. = \gamma_1 v_{it} + \eta_{it} \ldots\ldots\ldots(6)$$

Finally we replaced this residual in our structural model and thus it becomes as follows:

$$BP_{it} = \alpha_0 + \beta_i CS_{it} + \lambda_{it} X_{it} + \theta_t MACRO_t + \gamma_1 v_{it} + \eta_{it} \ldots\ldots\ldots(7)$$

The main condition of holding enedogeneity is that the Gamma **coefficient** must be statistically **significantly** different from zero.

Results of test for endogeneity in reduced equation and in structural equation are provided in Table 5 and 6 respectively. According to Table 5, the coefficient of the instrument, IA, is significantly different from zero and thus ensures the relevancy of the instrument.

Table 5. Test of endogeneity (Reduced equation)

Dependent Var: TDTA	Coef.	Robust SE.	t	P>| t |
IA	.41823	.100150	4.18	0.000**
LTDTA	.03649	.106435	1.34	0.032**
STDTA	.16809	.109157	1.54	0.025**
SIZE	-.02440	.009251	-2.64	0.009**
LQDTY	.00212	.001551	1.37	0.173
GOP	.05538	.051551	1.07	0.084**
RGDP	-.00264	.010421	-0.25	0.800
INF	-.00244	.007280	-0.34	0.737
_cons	.78476	.163577	4.80	0.000**
R-squared	0.1267			
Adj R^2	0.0897			
F -Statistic	10.05 (p-value=0.0000)			

Note: * signifies variable significant at 10%; ** signifies variable significant at 5% and *** signifies variable significant at 1%.

Findings provided in Table 6 indicate that the coefficient of Vit is not significantly different from zero. Thus we reject the null hypothesis that BP and TDTA are endogenous.

Table 6. Test of endogeneity (Structural equation)

Explanatory variables	Dependent variables								
	ROA			**ROE**			**EPS**		
	Coef.	Robust SE.	P>| t |	Coef.	Robust SE.	P>| t |	Coef.	Robust SE.	P>| t |
TDTA	-1.13	1.937	0.063*	-16.84	22.30	0.051**	3.861	7.734	0.618
LTDTA	-2.04	.697	0.004**	-13.22	7.593	0.083*	-3.54	1.926	0.067 *
STDTA	-2.85	.975	0.004**	-13.63	10.44	0.093*	-4.91	2.748	0.075*
SIZE	.1086	.062	0.082*	1.423	.669	0.035**	. 583	.227	0.011**
LQDTY	-.008	.010	0.397	-.0198	.114	0.862	-.137	.032	0.000**
GOP	1.052	.362	0.004**	13.947	3.974	0.001**	3.159	1.169	0.008**
RGDP	-.227	.071	0.002**	-1.177	.893	0.189	-.282	.218	0.197
INF	.090	.047	0.061*	-.008	.567	0.989	-.098	.140	0.484
Vit	-1.03	2.098	0.623	2.823	24.72	0.909	-1.74	8.009	0.827
_cons	3.878	1.846	0.037**	43.190	21.72	0.048**	4.303	7.498	0.067*
R-squared	0.2982			0.2000			0.2465		
Adj R^2	0.2646			0.1617			0.2104		
F -Statistic	9.34(p-value=0.0000)			8.09(p-value=0.0000)			9.19(p-value=0.0000)		

Note: * signifies variable significant at 10%; ** signifies variable significant at 5% and *** signifies variable significant at 1%

4.6 Regression results and their discussion

In order to test the hypotheses we conducted Pooled Ordinary Least Square regression model. We present our outcomes of estimation in Table 7.

As shown in Table 7, our model explains 29.77% of the variations in ROA; 20% of the variations in ROE and 24.63% of variations in EPS. F-value signifies that at least one of the independent variables is considerably associated with the performance. Findings indicate that all capital structure variables, TDTA, LTDTA and STDTA, have significant negative impacts on ROA. Similarly, we found significant negative impacts of TDTA and STDTA on ROE; significant negative impacts of LTDTA and STDTA on EPS. In other words, an increase in TDTA, LTDTA and STDTA associated with decrease in performance of banks. Thus, we claim that capital structure decision has significant inverse effects on performance of Bangladeshi banks. Findings of this study are consistent with (Hasan et al. **[9]**, Salim and Yadav **[22]**) who observed significant negative influence of capital structure variables on performance. Among the bank specific control variables, consistent with the results of Salim and Yadav **[22]**), we observed a significantly positive association of GOP with bank's performance. This suggests that an increase in growth opportunities will end in improved performance of banks. The reason could be attributed to the fact that organisations with high growth prospects have superior status in the market which lower their agency costs and thus reflected in better performance. We also observed a significantly positive connection between size and ROA, ROE, EPS. This result is in harmony with (Hasan et al. **[9]**, Salim and Yadav **[22]**).This finding is imperative for firms to be large in size so as to have better performance. We also examined an inverse association of liquidity with performance of banks which is in agreement with the results of Abbas et al. **[45]**. This indicates more liquidity leads to the lower the performance of Bangladeshi banks. Between the macroeconomic control variables, we found GDP has significant negative associated with ROA whereas inflation has significant positive association.

Table 7. Estimated results with pooled OLS

Explanatory variables	Dependent variables								
	ROA			ROE			EPS		
	Coef.	Robust SE.	P>| t |	Coef.	Robust SE.	P>| t |	Coef.	Robust SE.	P>| t |
TDTA	-1.3	.507	0.009*	-14.117	6.426	0.029**	2.17	1.311	0.097*
LTDTA	-1.9	.683	0.004*	-13.378	7.402	0.072*	-3.4	1.857	0.065*
STDTA	-2.5	.698	0.000*	-14.403	7.212	0.047**	-4.4	1.750	0.012*
SIZE	.089	.054	0.100*	1.475	.542	0.007***	.551	.156	0.001*
LQDTY	-.00	.009	0.477	-.024	.119	0.840	-.13	.029	0.000*
GOP	1.10	.345	0.002*	13.792	3.565	0.000***	3.25	1.053	0.002*
RGDP	-.22	.070	0.001*	-1.172	.896	0.193	-.28	.216	0.190
INF	.087	.048	0.069*	-.009	.554	0.999	-.10	.136	0.451
_cons	4.74	1.070	0.000*	40.827	12.447	0.001***	5.76	3.196	0.073*
R-square	0.2977			0.2000			0.2463		
Adj R^2	0.2679			0.1661			0.2144		
F	10.22(p-value=0.0000)			8.85(p-value		10.30(p-value=0.0000)			

Note: * signifies variable significant at 10%; ** signifies variable significant at 5% and *** signifies variable significant at 1%

5. Conclusions

Using data of 22 banks for the period of 2005-2014, this study empirically observed the impacts of capital structure choice on performance of banks operating in a developing country, viz., Bangladesh. Empirical findings indicate that all capital structure variables, TDTA, LTDTA, STDTA, have significant inverse impacts on ROA which is compatible with the conclusions of (Hasan et al. [9], Salim and Yadav [22]) who observed significant negative impacts of capital structure variables on ROA. Empirical results also indicate that TDTA and STDTA have significant negative impacts on ROE, which is in agreement with the results of   (Hasan et al. [9], Salim and Yadav [22]).Furthermore, in agreement with (Hasan et al. [9], Salim and Yadav [22]), empirical results of this study suggest that LTDTA and STDTA have significant negative impacts on EPS. These findings are in contrast with [10, 14-16], who observed positive impacts. We also observed that growth opportunities, size and inflation have positive association whereas liquidity and GDP have negative association with the performance of banks in developing economy, viz., Bangladesh.

Therefore, we conclude that there are significant negative impacts of capital structure on performance of Bangladeshi banks. These negative impacts can be explained by the characteristics of underdeveloped bond and equity market in developing country, like Bangladesh, such as information asymmetry, strong covenants fond of to the applications of debt and so on; for which there exist higher cost of debt. Empirical findings of this study suggest that financial managers shall try to finance from retained earnings rather than rely heavily on debt capital in their capital structure. However, they can employ debt capital as a last option. With the goal of maximizing performance of firms, managers should make an effort to attain the optimal level of capital structure and endeavour to uphold it as much as possible. These negative impacts also suggest that legislative rules and policies have to be designed in such a way to assist firms in plummeting the reliance on too much use of debt.

Although we observed significant negative impacts of capital structure choice on sampled banks' performance, yet this research suffers from a comprehensive and systematic data base for all banks in Bangladesh. As more systematic data sets become available, we believe further research would be conducted on the same issue, by employing data on larger sample, more control variables for longer period, to confirm our findings.

The introduction should briefly place the study in a broad context and highlight why it is important. It should define the purpose of the work and its significance. The current state of the research field should be reviewed carefully and key publications cited. Please highlight

controversial and diverging hypotheses when necessary. Finally, briefly mention the main aim of the work and highlight the principal conclusions. As far as possible, please keep the introduction comprehensible to scientists outside your particular field of research. References should be numbered in order of appearance and indicated by a numeral or numerals in square brackets, e.g., [1] or [2,3], or [4–6]. See the end of the document for further details on references.

Author Contributions: All authors listed in the manuscript have contributed sufficiently to the article to be included as authors and agreed with the findings of the study. "Md. Nur Alam Siddik. and Sajal Kabiraj conceived and designed the experiments; Md. Nur Alam Siddik performed the experiments; Md. Nur Alam Siddik and Shanmugan Joghee analyzed the data; Sajal Kabiraj contributed reagents/materials/analysis tools; Md. Nur Alam Siddik wrote the paper."

Conflicts of Interest: "The authors declare no conflict of interest."

References

1. Modigliani, F.; Miller, M. H. The cost of capital, corporate finance and the theory of investment. *Amer. Econ. Rev.* **1958**, *48,261-297.*

2. Modigliani, F.; Miller, M. H. Corporation income taxes and the cost of capital: a correction. *Amer. Econ. Rev.* **1963**, *53, 433–443.*

3. Brigham, E. F.; Foster, E.; Houston, J. F. *Fundamental of financial management*; Pearson education, **2004**.

4. Myers, S. C. Determinants of corporate borrowing. *J. Finan. Econ.* **1977**, *5, 147-175.*

5. Muritala, T.A. An empirical analysis of capital structure on firms' performance in Nigeria. *Int. J. Advances Manage. Econ.* **2012**, *1,116-124.*

6. Jensen, M.; Meckling, W. Theory of the firm: managerial behavior, agency costs and ownership structure. *J. Finan. Econ.* **1976**, *3, 305-360.*

7. Rouf, M. Capital structure and firm performance of listed non-financial companies in Bangladesh. *Int. J. Appl. Econ. Finance* **2015**, *9, 25-32.*

8. Hossain, M.I.; Hossain, M.A. Determinants of capital structure and testing of theories: a study on the listed manufacturing companies in Bangladesh. *Int. J. Econ. Finance* **2015**, *7, 176-190.*

9. Hasan, M.B.; Ahsan, A.M.; Rahaman, M.A.; Alam, M.N. Influence of capital structure on firm performance: evidence from Bangladesh. *Int. J. Bus. Manage.* **2014**, *9, 184-194.*

10. Chowdhury, A.; Chowdhury, S.P. Impact of capital structure on firm's value: evidence from Bangladesh. *Bus. Econ. Horizons* **2010**, *3, 111-122.*

11. Besley, S.; Brigham, E.F. *Essentials of managerial finance*: Thomson South-Western, **2008.**

12. Van Horne, J.C.; Wachowicz, J.M. *Fundamentals of financial management*: Pearson Education **2008.**

13. Nikoo, S.F. Impact of Capital Structure on Banking Performance: Evidence from Tehran Stock Exchange. *Int. Res. J. Appl. Basic Sci.* **2015**, *9, 923-927.*

14. Umar, M.; Tanveer, Z.; Aslam, S.; Sajid, M. Impact of capital structure on firm's financial Performance: evidence from Pakistan. *Res. J. Finance Acc.* **2012**, *3, 1-13.*

15. Salteh, H.M.; Ghanavati, E.; Khanqah, V.T.; Khosroshahi, M.A. Capital structure and firm performance: evidence from Tehran stock exchange. *Int. Pro. Econ. Dev. Res.* **2012**, *43, 225-230.*

16. Arbabiyan, A.A.; Safari, M. The effects of capital structure and profitability in the listed firms in Tehran Stock Exchange. *J. Manage. Perspect.* **2009**, *33,159-175.*

17. Abor, J. The effect of capital structure on profitability: an empirical analysis of listed firms in Ghana. *J. Risk Finance* **2005**, *6, 438-445.*

18. Ramadan, Z.S.; Ramadan, I.Z. Capital structure and firm's performance of Jordanian manufacturing sector. *Int. J. Econ. Finance* **2015**, *7, 279-284.*

19. Abdel-Jalil, T. The impact of capital structure on the performance of the Jordanian publicly-held industrial companies. *Jordan J. Bus. Admin.* **2014**, *10, 390-403.*

20. Memon, F.; Bhutto, N.A.; Abbas, G. Capital structure and firm performance: a case of textile sector of Pakistan. *Asian J. Bus. Manage. Sci.* **2012**, *1, 9-15.*

21. Soumadi, M.M.; Hayajneh, O.S. Capital structure and corporate performance empirical study on the public Jordanian shareholdings firms listed in the Amman stock market. *Europ. Sci. J.* **2012**, *8, 173-189.*

22. Salim, M.; Yadav, R. Capital structure and firm performance: evidence from Malaysian listed companies. *Procedia-Soc. Behavioral Sci.* **2012**, *65, 156-166.*

23. Manawaduge, A.; Zoysa, A.D.; Chowdhury, K.; Chandarakumara, A. Capital structure and firm performance in emerging economies: An empirical analysis of Sri Lankan firms. *Corp. Ownership Control* **2011**, *8, 253-263.*

24. Chakraborty, I. Capital structure in an emerging stock market: the case of India. *Res. Int. Bus. Finance* **2010**, *24, 295-314.*

25. AL-Taani, K. 2013. The relationship between capital Structure and firm's performance. *J. Finance Acc.* **2010**, *1, 41-45.*

26. Ebaid, I. E. The impact of capital-structure choice on firm performance: empirical evidence from Egypt. *J. Risk Finance* **2009**, *10, 477-487.*

27. Safiuddin, M.; Islam, M.M.; Anisuzzaman, M. Impact of financial structure on firm's performance: a study on financial and nonfinancial sector in Bangladesh. *Europ. J. Bus. Manage.* **2015**, *7*, 30-38.

28. Akeem, L.B.; Terer, E.; Kiyanjui, M.W.; Kayode, A.M. Effects of capital structure on firm's performance: empirical study of manufacturing companies in Nigeria. *J. Finance Invest.   Anal.* **2014**, *3, 39-57.*

29. Pouraghajan, A.; Malekian, E.; Emamgholipour, M.; Lotfollahpour, V.; Bagheri, M.M. The relationship between capital structure and firm performance evaluation measures: evidence from the Tehran stock exchange. *Int. J. Bus. Comm.* **2012**, *1*(9), pp.166-181.

30. Hall, M.; Weiss, L. Firm size and profitability. *Rev. Econ. Statist.***1967**, *49, 319–331.*

31. Onay, C.; Ozsoz, E. The impact of internet-banking on brick and mortar branches: the case of Turkey. *J. Finan. Services Res.* **2013**, *44, 187–204.*

32. Abu-Rub, N. Capital structure and firm performance: evidence from Palestine stock exchange. *J. Money, Invest. Banking* **2012**, *23, 109-117.*

33. Flamini, V.; Schumacher, L.; McDonald, C. A. The determinants of commercial bank profitability in Sub-Saharan Africa. *IMF Work. Pap.* **2009**, No. 09/15, *1-30.*

34. Jahan, N. Determinants of bank's profitability: evidence from Bangladesh. *Indian J.   Finance* **2012**, *6, 32–38.*

35. Rao, K.R.M.; Lakew, T.B. Determinants of profitability of commercial banks in a developing country: Evidence from Ethiopia. *Int. J. Acc. Finan. Manage. Res.* **2012**, *2, 1-20.*

36. Obamuyi, T. M. Determinants of banks' profitability in a developing economy: evidence from Nigeria. *Organ. Markets Emerging Economy* **2013**, 4, *97–111.*

37. Athanasoglou, P. P.; Brissimis, S. N.; Delis, M. D. Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *J. Int. Finan. Markets, Inst. Money* **2008**, *18, 121–136.*

38. Trujillo-Ponce, A. What determines the profitability of banks? evidence from Spain. *Acc. Finance* **2013**, *53, 561–586.*

39. Sufian, F.; Habibullah, M.S. Determinants of bank profitability in a developing economy: empirical evidence from Bangladesh. *J. Bus. Econ. Manage.* **2009**, *10, 207-217.*

40. Nachane, D. M. Econometrics: theoretical foundations and empirical perspectives. New Delhi: Oxford University Press, **2006**.

41. Gujarati, D.N. *Basic econometrics*. Tata McGraw-Hill Education, **2009**.

42. Adrian, T.; Shin, H.S. Liquidity and leverage. *J. Finan. Intermediation* **2010**, *19, 418-437.*

43. Berger, A.N.; Di Patti, E.B. Capital structure and firm performance: A new approach to testing agency theory and an application to the banking industry. *J. Banking Finance* **2006**, *30, 1065-1102.*

44. Wooldridge, J.M. Introductory econometrics: A modern approach. Nelson Education, **2015**.

45. Abbas, A.; Bashir, Z.; Manzoor, S.; Akram, M.N. Determinants of firm's financial performance: an empirical study on textile sector of Pakistan. *Bus. Econ. Res.* **2013**, *3, 76-86.*