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

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Abstract: The capital structure decision plays an important role in the performance of a firm. Therefore, there have been many studies inspecting the rapport of capital structure with the performance of firms, although the findings of these studies are inconclusive. In addition, there is a relative deficiency of empirical studies examining the link between capital structure and the performance of banks in Bangladesh. This study attempts to fill this gap. Using the 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. The results of the pooled ordinary least square analysis showed that capital structure inversely affects bank performance. The findings of this empirical study are of greater significance for the developing countries like Bangladesh because it calls for the concentration of the bank management and the policy makers to pursue the policies that reduce reliance on debt to achieve the optimal level of capital structure. The results of this study are also analysed in the light of earlier studies.

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

JEL Classification: C23; G30; G32

1. Introduction

Capital structure denotes the mode of finance, usually a blend of the loan and equity capital, through which a firm is financed. It has been an interesting issue for many researchers, wherein they attempted to delineate the connection between capital structure and the performance of firms. The decision of how a firm will be financed is subjected to both the managers of the firms and fund suppliers. If financing is done by employing an incorrect combination of debt and equity, a negative effect is seen in the performance and even endurance of a firm. Thus, in order to maximise the firm value, managers need to carefully consider the capital structure decision, which is a complex task, as the use of leverage varies from one firm to another. Therefore, what managers usually do is try to achieve the best combination of debt and equity in their capital structure.

In this context, there have been several studies that tried to inspect the affiliation of capital structure with the performance of firms. In connection with this issue, Modigliani and Miller (1958) primarily stated that, under perfectly competitive capital market conditions, the firm value is free from the influence of capital structure decisions. Instead, they argued that the firm value is determined solely by its basic earning power. Later, however, they proposed, by taking the effect of tax advantage on debt, that the firm value can be increased by incorporating more debt into the capital structure and thus the optimal capital structure of a firm should be made up of a hundred percent of debt (Modigliani and Miller 1963).

However, it is arguable whether these assumptions hold in the real world; thus, several theories, for instance, the static trade-off theory, pecking order theory and theory of agency cost, have emerged to explain the connection of capital structure decisions with the firm performance.

The argument over the assumptions of Modigliani and Miller (1958) results in the static trade-off theory, which states that, with the incorporation of tax into the Modigliani and Miller (1958) theorem, the advantage for the use of debt capital, if practically possible, can be applied to protect earnings from high taxes. According to Brigham and Houston (2004), the optimal capital structure of a firm, from which the firm value will increase and the cost of capital will decrease, is determined by the trade-off of the benefits of using debt, known as tax savings and the costs of debt such as agency costs. Furthermore, the trade-off theory states that firms having more physical assets should employ additional debt capital, as these physical assets would be collateral. In addition, the intangible asset value is more prone to depreciate in the case of financial suffering. Focusing on the unequal treatment of tax in debt financing and equity financing, Schepens (2016) argued that more equal treatment of debt and equity significantly increases bank capital ratios, driven by an increase in common equity, which ultimately impacts the capital choice of banks.

Myers (1977) developed a capital structure theory, known as the pecking order theory, which believes in no optimal capital structure and suggests that every firm has a preferred hierarchy for the financing decisions and usually prefers the internal financing rather than acquiring funds from outside the organisation. However, financing from outside sources is required when all in-house funds are employed. According to Muritala (2012), in such a case, firms will prefer debt over equity.

Considering that debt is a necessary factor, which creates differences in the goals of shareholders with managers, Jensen and Meckling (1976) developed the agency cost theory. The theory explains that the cash flow of a firm relies on its ownership formation. The authors suggested that there should be the best combination of debt and equity capital that could shrink total agency costs. In other words, prevailing agency cost determines how much debt should be introduced into the capital structure. In the context of a developing economy like Bangladesh, based on survey data of non-financial firms, Haque et al. (2011) supports the agency theory.

Following the above-mentioned theories, some studies have observed the impacts of capital structure on the performance of the firm, even though some findings contradict it. This mixed evidence provokes the researcher to explore and establish the influence of capital structure decision on firm performance. Furthermore, the banking sector of developing economies like Bangladesh plays a significant role in the economic acceleration process of the countries, and, thus, studying performance of banking sectors of developing nations is of greater significance. However, in the context of a developing country like Bangladesh, there exist few studies that are related to this discourse, though none of them are focused on the banking sector performance. Rouf (2015), for example, by using the data from 2008–2011, conducted a study on non-financial companies and observed a significant negative relation of capital structure with Return on Asset (ROA) and Return on Sales (ROS). Hossain and Hossain (2015), by using the data of manufacturing companies over the period of 2002–2011, investigated the antecedents of capital structure in Bangladesh. In a similar study, which excluded the performance of bank sector, Hasan et al. (2014) studied whether Bangladeshi firms are affected by capital structure. Chowdhury and Chowdhury (2010) studied the association of firm value with capital structure choice. They used data only over the period of 1994–2003 for non-financial firms and ignored banking sector performance.

From the above discussions, it is evident that, to date, there is no study seeking a relationship between the capital structure and the performance of banks in Bangladesh. In this study, we attempted to explore the link between the capital structure decisions and the bank performance, since the banking sector is considered as the most strong and dominant sector in Bangladesh as evidenced by Nguyen et al. (2011).

2. Literature Review

The concept of capital structure can be defined as in the proportional relation between a firm's debt capital and equity capital. Firms use capital structure usually to fund their business and expand. This decision is vital for a firm as it has a direct influence on the risk and return of a firm. The scholars around the world have conceptualised capital structure in different contexts and thus in different ways. Besley and Brigham (2008) conceptualised capital structure as the blend of long-term debt capital, preferred share capital and the net worth that is being used as a method of permanent financing by the firm. Describing capital structure as a method of long-term financing, Van Horne and Wachowicz (2008) stated that it is a combination of a firm's preferred share capital, equity capital and debt capital. Therefore, it could be said that, traditionally, capital structure has been conceptualised as a combination of long-term debt capital and equity capital, and thus ignored short-term debt capital. In the present study, besides these components, we incorporate short-term debt capital as a component of capital structure.

2.1. Previous Empirical Studies

There are several empirical studies that have observed the association of capital structure decision with the performance of firms. Some of them have noticed a positive impact, while others have noted either a negative effect or no effect.

2.1.1. Positive Conclusions

Nikoo (2015), by employing the data of 17 banks over a period of 2009–2014, observed a significant positive effect of capital structure choice on the performance of the sampled banks. Umar et al. (2012) used data on 100 listed firms over a period of 2006–2009 and observed a significant positive association between the performance of a firm and capital structure. They used ROA, Earnings Per Share (EPS) and net profit margin as proxies to measure the performance and short-term debt obligations to total asset (STDTA), long-term debt obligations to total asset (LTDTA), and total debt obligations to total asset (TDTA) as the capital structure variables. The authors claimed, on the basis of exponential generalised least squares approach, that their findings support the trade-off theory. Salteh et al. (2012) inspected the influence of capital structure decision on the profitability of 28 firms from the Tehran stock exchange. They, while considering the data for 2005–2009, observed positive impacts of capital structure variables, STDTA, LTDTA, TDTA, on the performance proxies by ROE and Tobin's Q.

Arbabiyan and Safari (2009), using the data of 100 firms for 2001–2007, reported a significant positive link of STDTA and TDTA with ROE. However, the authors observed an inverse association of LTDTA with ROE. The main drawback of this study was that they used only a single variable, ROE, to measure the performance. In a similar vein, Abor (2005) attempted to explore the impacts of capital structure on the performance of the firms belonging to the Ghana stock exchanges and found a significant positive impact of STDTA and TDTA on ROE. Furthermore, the author also observed a negative association between LTDTA and ROE.

2.1.2. Negative Conclusions

In contrast to the empirical studies that observed positive impacts, many researchers have also observed negative impacts. Ramadan and Ramadan (2015) analysed the data over the period of 2008–2012, with an aim to explore the impacts of capital structure variables, TDTA, LTDTA and STDTA, on the performance of Jordanian firms. They used the data of 72 companies over the period of 2005–2013 and by applying the pooled OLS observed the significant negative effect of capital structure on ROA.

Abdel-Jalil (2014), by employing multiple regression analysis, documented a significant inverse influence of debt ratio and the proportion of debt to equity on the rate of return generated from investment activities, ROI. Memon et al. (2012) checked the relationship of a capital structure decision with the performance of the Pakistani organisations, where the authors used ROA as a single measure of performance. They applied the log-linear regression model on the data of 141 Pakistani textile companies for the period of 2004–2009 and reported a significantly negative association between TDTA and ROA. By using the ratio of debt to the total asset as a single proxy of capital structure and ROA as a proxy to measure the performance of firms, Muritala (2012) examined the influence of using leverage in the capital structure on the performance of Nigerian firms. They gathered data on ten firms over the period of 2006–2010 and, by applying panel least square approach, 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 (2012) reported a similar negative influence on ROE and Tobin's Q.

Arguing that a single measure is not enough to measure a firm's performance, Salim and Yadav (2012) employed EPS, ROA, ROE and Tobin's Q as measures of performance. They 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. Manawaduge et al. (2011), in the context of an emerging market, scanned the influence of leverage on Sri Lankan firms' profitability. An analysis of pooled panel data of 155 firms over the period of 2002–2008 indicated an inverse influence of leverage on the profitability of firms. In another study, Chakraborty (2010) also found an inverse relationship between leverage and the performance of firms where performance was considered by the relative amount of profit before interest and taxes.

2.1.3. No Relationship

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

Al-Taani (2013) inspected the association of capital structure choice with the profitability of Jordanian companies. Applying the data of 2005–2009, they found no statistically significant association between ROA and debt ratio. Ebaid (2009) inspected the influence of capital structure decision on the performance of firms. Using the data of 64 firms listed in the Egyptian capital market for the period of 1997–2005, the author conducted multiple regression analysis and observed from a weak to no impact.

2.1.4. Findings in the Context of Bangladesh

In the context of Bangladesh, Safiuddin et al. (2015) applied descriptive statistics to trace the influence of financial structure on the financial and non-financial firms operating in Bangladesh. They employed the data for 40 firms for a period of 2008–2012 and concluded that leverage plays a critical role in the performance of a firm. The major drawback of their study was that it used only descriptive statistics rather than an econometric model to explain the relationship.

In another study, the using data of manufacturing companies over a period of 2002–2011, Hossain and Hossain (2015) explored the antecedents of capital structure in Bangladesh. By using the data of 74 manufacturing firms for the period, 2002–2011, the authors applied a panel corrected standard regression model and observed a negative relationship between most of the variables and then concluded that, in Bangladesh, most firms follow pecking order theory and static trade-off theory. Rouf (2015), considering the data for a period of 2008–2011 for 106 manufacturing companies, investigated the impacts of capital structure on the performance of non-financial companies, where the performance, measured by ROA and ROS, showed a significant negative influence. A similar study by Hasan et al. (2014) excluded the performance of bank sector and inspected the effects of capital structure choice on the performance of Bangladeshi firms over the period of 2007–2012. The authors used ROA, ROE, EPS and Tobin's Q as the measures of performance. Applying pooled OLS, they observed negative impacts. Chowdhury and Chowdhury (2010) checked the influence of capital structure on the goal of the maximising a firm's value. They, excluding the banking sector, considered the data of 77 non-financial firms for a period of 1994–2003 and observed a positive influence.

It can be gleaned from the discussed empirical studies that the impact of capital structure decision on the performance of firms is not clear and most of the available evidence is 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 the performance of banks. Furthermore, there is no empirical study exploring the effects of capital structure decision on the performance of Bangladeshi banks. Hence, our main objective was to fill this gap with a systematic and comprehensive analysis of the database of banks operating in a developing country, i.e., Bangladesh.

3. Methodology

3.1. Data Sources and Description

The relation of capital structure with the performance of a firm has not been delineated in the context of the developing country, Bangladesh. We chose the banking sector as bank efficiency contributes positively to economic growth. To date, there are 30 banks listed on the Dhaka Stock Exchange Ltd., Dhaka, Bangladesh. In order to provide reliable, meaningful and the most updated results, we collected the data for ten years over a period from 2005–2014. We considered only the banks that had audited financial statements from 2005 and onwards. Of the 30 banks, only 22 had financial statements from 2005 to 2014 and were therefore selected.

Therefore, we extracted panel data from 22 banks from their audited annual reports over the period from 2005 and 2014; thus, by nature, it is cross-sectional data for a range of years and can also be considered as time series data. The data on macroeconomic variables are available from the World Bank. Therefore, our data are pooled data. Accordingly, the pooled ordinary least square (OLS) technique was employed in this study, which has also been used in similar studies such as Hasan et al. (2014) and Ramadan and Ramadan (2015).

3.2. Variables Selection

In this study, we attempted to examine empirically the impacts of capital structure choice on the performance of banks operating in Bangladesh. Thus, the dependent variable of the study is bank performance. In order to measure bank performance, we used three proxy variables, which have also been used in most studies. A commonly used measure of bank performance is ROA, which gives a picture of how effective the management of the bank is in generating profits with its available assets. ROA has been employed as a proxy for bank performance in several studies (Rouf 2015; Hasan et al. 2014; Ramadan and Ramadan 2015).

Another good measure of bank performance is ROE (Hasan et al. 2014; Salim and Yadav 2012; Akeem et al. 2014; Pouraghajan et al. 2012). ROE is a measure of how effectively shareholders' funds are being used by the management of the bank. Hall and Weiss (1967), while favouring ROE, argued that, due to the existence of an optimal borrowing level, ROA may vary amongst industries whilst ROE tends to be equal and thus offers a better measurement. Since our study is based on the banking industry only, we use both ROE and ROA to measure the bank performance. To compute ROA and ROE, we use before-tax figures rather than after-tax figures, as tax rates may vary across the banks due to the non-performance allied factors such as an ownership structure.

Apart from ROA and ROE, the scholars around the world have also used another measure, EPS, as a proxy of bank performance. Onay and Ozsoz (2013) argued that the Government intervention may inflate ROE, which may lead to inconsistent results. In order to avoid such an inconsistency, a third fundamental measure, EPS, was used to determine the performance of banks. Abu-Rub (2012) argued that EPS is the basic measurement of corporate performance and the more the EPS, the better the performance is. Arguing the same, we use EPS as a measure of bank performance, which was determined by dividing the net income by outstanding shares.

3.2.1. Independent Variables

Since this study aimed to investigate the link between the capital structure decision and the performance of banks, capital structure variables are taken as the independent variables. In contrast, most studies used TDTA and LTDTA as the measure of capital structure, in this study, to facilitate the comprehensive effects of capital structure on bank performance; we use STDTA along with TDTA and LTDTA as the capital structure variables. We measure STDTA as the proportion of short-term debt to total assets, LTDTA as the proportion of long-term debt to total assets and TDTA as the proportion of total debt to the total assets. In line with Muritala (2012), Ramadan and Ramadan (2015), Abdel-Jalil (2014), Soumadi and Hayajneh (2012), for STDTA, LTDTA and TDTA, we expect a negative (−) impact on the dependent variables.

3.2.2. Control Variables

In order to isolate the effects of capital structure on bank performance, a number of control variables are applied in this study. Two sets of control variables, viz. bank-specific variables and macroeconomic variables, are expected to influence the bank performance and thus are controlled.

Bank-specific control variables employed in this study are liquidity (LQDTY), size (SZ) and growth opportunities (GOP). Liquidity reflects a bank's capability to meet short-term debt obligations when they are demanded. The inverse relationship between the liquidity and profitability is crucial to any organisation. 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 the proportion of the current asset to the current liabilities of a bank. SZ is the manifestation of specific risk, although the expected sign is ambiguous. According to the modern financial intermediation theory, the bank efficiency, derived from economies of scale, is associated with the bank size and implies that a large bank may experience higher profits (Flamini et al. 2009). Jahan (2012) and Rao and Lakew (2012) observed a positive association between the size and the profitability of a bank. They argued that, due to the economies of scale, large-sized banks experience more profits as compared to small-sized banks, while in the context of Nigerian banking industry, Obamuyi (2013) observed a negative relationship. Thus, there is mixed evidence on the association of size with the profitability of banks. We consider a positive sign and compute SZ by taking the natural logarithm of total assets of banks.

Several studies have argued that firm performance and growth opportunities are closely related. Soumadi and Hayajneh (2012) and Salim and Yadav (2012) observed a positive link between the growth opportunities and the firm performance and thus concluded that a growth opportunity is the key determinant of the firm performance. Arguing the same, we expect a positive (+) sign. We compute the growth opportunities by calculating the difference between present year's assets and the preceding year's assets and then dividing the difference by assets of the previous year.

Economic growth (RGDP) and inflation rate (INF) are also used in this study to control for the impacts of the macroeconomic state of affairs over the period of 2005–2014. Athanasoglou et al. (2008) argued that, during economic slowdowns, a bank's lending can be reduced, which, in turn, will lower the banks' profitability. On the other hand, during economic booms, in an economic condition where all sectors are performing well, the demand for a loan could increase which may widen the interest margin of the bank. Trujillo-Ponce (2013) observed a significant positive link connecting the economic growth and profitability of banks. Therefore, with an expectation of positive sign (+), we measure RGDP by GDP growth for the respective years of the country. Flamini et al. (2009) discussed that whether inflation can affect firm performance depends on the anticipated inflation rate. By considering the anticipated inflation, banks can adjust their interest rates in a manner so that their revenue will be more than the cost and therefore will achieve higher profits. Trujillo-Ponce (2013) established an affirmative connection between inflation and ROA of banks, whereas Sufian and Habibullah (2009) observed an inverse relationship. We expect a positive sign for this variable and measure the 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. The summary of variables used and their specifications.

Variable	Legend	Measurement	Sign
Dependent variables:			
Return on asset	ROA	Net profit (before taxes)/Total assets	+
Return on equity	ROE	Net profit (before taxes)/Equity	+
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	LQDTY	Current asset/Current liabilities	−
Size	SZ	Natural logarithm of total assets	+
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	+

Note: ROA: Return on Asset; ROE: Return on equity; EPS: Earnings Per Share; STDTA: Short-term debt obligations to total asset; LTDTA: Long-term debt obligations to total asset; TDTA: Total debt obligations to total asset; LQDTY: Liquidity; SZ: Size; GOP: Growth opportunities; RGDP: Economic growth; INF: Inflation.

3.3. Empirical Model

Based on the works of Hasan et al. (2014), Salim and Yadav (2012) and Onay and Ozsoz (2013), 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:

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

In this 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 the macroeconomic state of affairs' variables, which is measured by GDP growth rate and an inflation rate of the country in year t. ε_{it} is a disturbance error term, autonomously and equally distributed as N (0, σ2) and α_0 corresponds to a bank permanent consequence term, which measures the time-invariant effect exactly for 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 Equations (2), (3), and (4), respectively, for ROA, ROE and EPS:

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

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

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

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

4. Empirical Findings and Their Discussion

4.1. Descriptive Statistics

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

Table 2. Descriptive statistics.

Variable	Obs	Mean	Standard Deviation	Min	Max
ROA	220	1.476628	0.6374654	0.21	3.8
ROE	220	19.04206	7.292161	6.11	46.22
EPS	220	3.727909	1.762933	0.3264574	9.74
TDTA	220	0.8704154	0.0843272	0.6680902	0.9801438
LTDTA	220	0.7847493	0.0928381	0.5305739	0.9001438
STDTA	220	0.1397861	0.088877	0.0114734	0.3831729
SIZE	220	4.543462	0.6903714	2.038187	6.425046
LQDTY	220	11.1721	4.420662	3.094959	31.12727
GOP	198	0.2782329	0.1292053	0.032776	0.8618333
RGDP	220	6.195767	0.5546968	5.045125	7.058636
INF	220	6.757129	1.07456	4.586361	8.164598

On the other hand, for the main variables of interest, viz. TDTA, LTDTA and STDTA, we observed mean values of 0.8704154, 0.7847493 and 0.1397861, respectively, and the standard deviations of 0.08432, 0.0928 and 0.08887, respectively, which imply that these companies operate with a significant level of debt, and there is also a low deviation from the mean value. Amongst the bank specific control variables, in the case of liquidity, we assume that the firms with high liquidity will experience low profitability and vice versa. In this case, we observed a mean value of 11.721 with a maximum value of 31.12727, a minimum value of 3.094959, and a standard deviation of 4.420662. The average growth opportunity of the sample Bangladeshi banks is observed to be 0.2782329. It confirms a moderate level deviation of 0.1292053, which implies that, in Bangladesh, firms have an 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.

4.2. Multicollinearity Test

In this study, we use cross-sectional panel data of 22 banks with 11 variables over the period of 2005–2014; thus, multicollinearity might be an issue. To check for the collinearity among variables, first of all, we examined the correlation coefficients among the explanatory variables well, as the explained variable, which is presented by a correlation matrix. According to Wooldridge (2015), multicolinearity exists if the correlation coefficient is greater than 0.7. Results presented in Table 3 show that there is no high correlation between variables, signifying that multicollinearity is not a serious concern in the estimations.

Table 3. Correlation matrix.

	ROA	ROE	EPS	TDTA	LTDTA	STDTA	SIZE	LQDTY	GOP	RGDP	INF
ROA	1.00										
ROE	0.56	1.00									
EPS	0.41	0.48	1.00								
TDTA	−0.23	−0.18	0.02	1.00							
LTDTA	−0.08	−0.08	−0.18	−0.11	1.00						
STDTA	−0.21	−0.13	−0.01	0.23	−0.41	1.00					
SIZE	0.28	0.28	0.31	−0.16	−0.13	−0.12	1.00				
LQDTY	0.11	0.11	−0.18	0.03	0.22	−0.32	0.10	1.00			
GOP	0.32	0.31	0.21	0.05	−0.16	−0.01	0.21	0.37	1.00		
RGDP	−0.29	−0.17	−0.17	0.03	0.01	0.04	−0.26	−0.07	−0.14	1.00	
INF	0.13	−0.02	−0.04	−0.01	0.03	0.01	−0.16	0.02	−0.05	−0.17	1.00

Secondly, we conduct a VIF test to examine whether multicollinearity exists amongst independent variables. Nachane (2006) suggested that VIF < 10.0 is acceptable. According to Table 4, the highest variance inflation factor (VIF) is 2.48; therefore, there is a low level of multicollinearity and, as such, multicollinearity does not seem to be an issue in this study.

Table 4. 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	

Note: VIF: Variance inflation factor.

4.3. Cross-Sectional Dependence Test

When dealing with panel data, it is crucial to investigate the cross-sectional dependence (CD) among the series. Ignoring cross-sectional dependence determination might lead to produce biased and inconsistent results. According to Pesaran (2004), the cross-sectional dependence test is a general test pertinent to a large array of panel data models, including stationary and non-stationary dynamic heterogeneous panels. To examine whether cross-sectional dependence exists for the models dealt with, we perform Pesaran (2004) cross-sectional dependence test, which is calculated as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right) \tag{5}$$

In the above equation, T is for the time period; N indicates the number of the cross-sections and $\hat{\rho}_{ij}$ reflects the correlation between the ith and jth error terms. Furthermore, it has a zero average for the fixed values of T and N. In the above equation,

$$\hat{\rho}_{ij} = \sum_{t=1}^{T}\frac{\ell_{it}\ell_{jt}}{(\sum_{t=1}^{T}\ell_{it}^2)^{1/2}(\sum_{t=1}^{T}\ell_{jt}^2)^{1/2}} \tag{6}$$

where ℓ_{it} explains the OLS error terms based on T observation for each i = 1, . . . ,N. Following Table 5 exhibits the results of the Pesaran CD test for the models we dealt with in this study. According to results of CD test, we reject the null hypothesis of no cross-sectional dependence.

Table 5. Results of Pesaran's CD test.

Model 1		Model 2		Model 3	
CD Statistic	**Probability**	**CD Statistic**	**Probability**	**CD Statistic**	**Probability**
8.761	0.000 ***	5.349	0.000 ***	8.003	0.000 ***

*** indicates significant at 1%.

4.4. Panel Unit Root Tests

We observed cross-sectional dependence among the series. Thus, we resort to 2nd generation unit root tests instead of 1st generation on the ground, in which second generation panel unit root tests consider the cross-sectional dependence among the cross-sectional units of the panel, while 1st generation panel unit root tests assume that all of the cross-sections are independent. To cure the cross-dependence problem, Pesaran (2007) proposes the cross-sectional augmented Dickey Fuller test statistic (CADF) by adding the cross-section average of lagged levels and first-differences of the individual series to conventional Dickey Fuller or augmented Dickey Fuller regressions. Pesaran's test is an extension of the CIPS test of Im et al. (2003):

$$\Delta y_{it} = c_i + \alpha_i y_{i,t-1} + \beta_i \overline{y}_{t-1} + \sum_{j=0}^{p} \gamma_{ij} \Delta \overline{y}_{t-j} + \sum_{j=1}^{p} \delta_{ij} \Delta y_{i,t-j} + \varepsilon_{it} (i = 1 \ldots, n) \tag{7}$$

In the above equation, c_i reflects a deterministic term, $\overline{y}_t$ represents the cross-sectional mean at time t and p denotes the lag order. Let t-ratio of α_i be represented by $t_i(N, T)$. The average of the t-ratios, denoted by $CIPS$, is determined as follows:

$$CIPS(N, T) = N^{-1} \left(\sum_{i=1}^{N-1} t_i(N, T) \right) \tag{8}$$

In order to avoid extreme statistics that may arise in small time dimensions, Pesaran (2007) also proposed a truncated version of CADF, which is denoted by CADF*:

$$CIPS^*(N, T) = \frac{1}{N} \left(\sum_{i=1}^{N-1} t_i^*(N, T) \right) \tag{9}$$

where

$$t_i^* = \begin{cases} t_i(N, T) & -K_1 < t_i(N, T) < K_2 \\ -K_1 & t_i(N, T) < K_1 \\ -K_2 & t_i(N, T) \geq K_2 \end{cases}$$

Values of K_1 and K_2 depend upon the deterministic element of the models. Pesaran (2007) presents values for K_1 and K_2 obtained by simulations for models with intercept and no trend (K_1 = 6.19 and K_2 = 2.61) and models with intercept and trend (K_1 = 6.42 and K_2 = 1.70) for various combinations of N and T. Applying the truncated version, the test was calculated for both "intercept" and "intercept and trend" specifications. Table 6 presents Pesaran's panel unit root test allowing for CD.

Table 6. Results of the unit root tests for cross-sectionally dependent panels.

Variables	Intercept		Intercept and Trend	
	$p = 0$	$p = 1$	$p = 0$	$p = 1$
ROA	−1.367	−1.301	−2.345	−2.451
ROE	−1.512	−1.411	−1.642	−1.697
EPS	−1.268	−1.371	−1.489	−1.532
STDTA	−1.817	−1.894	−2.712 **	−2.915 **
LTDTA	−1.355	−1.390	−1.677	−1.714
TDTA	−1.473	−1.491	−1.618	−1.708
LIQDTY	−1.543	−1.579	−1.671	−1.719
SZ	−1.442	−1.474	−1.616	−1.678
GOP	−1.389	−1.464	−1.654	−1.672
RGDP	−1.456	−1.519	−2.717 **	−2.899 **
INF	−1.475	−1.492	−1.687	−1.723

Notes: (1) ** denotes statistical significance at the 5% levels. (2) The lag order, p, is selected by the Akaike information criterion (AIC) or the Bayesian information criterion (BIC) with the maximum order number being set to 3. (3) The Pesaran (2007) test is performed using the Stata "pescadf" command.

Results presented in Table 6 indicate a non-stationary kind of behavior of all the variables of the STDTA and the RGDP but only when p is selected to be equal to 0 or 1. On the other hand, the different series are found to be stationary, indicating the presence of a panel unit root in the level series.

4.5. Dealing with the Possible Heteroskedasticity

Under the condition when the error terms do not have constant variance, the dataset faces the problem of heteroskedasticity and such a situation might bias the results. To overcome the problem of possible heteroskedasticity, following the suggestion of Gujarati and Porter (2009), we employed heteroscedastic robust standard errors in estimating the coefficients of the regressors.

4.6. Test of Endogeneity

We theorise that capital structure decisions have an impact on bank performance; while some prior studies suggest endogeneity between the leverage and the value of the firms (Adrian and Shin 2010; Berger and di Patti 2006). Following the work of Wooldridge (2015), we employed the instrumental variable method to test the endogeneity of leverage in determining bank performance. On the basis of the facts that, in deciding their own ratio, the banks target the industry's average leverage ratio, we employed average sector leverage ratio (IA) as the instrument. In order to implement the instrument, we used an average of total debt rather than classifying it as a short-term debt and long-term debt.

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

$$TDTA_{it} = \alpha_0 + \beta_i IA_{it} + \lambda_{it} X_{it} + \theta_t MACRO_t + \varepsilon_{it} \quad (10)$$

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 estimate the reduced equation, in the next step, we estimate the residual of this reduced equation and then incorporate 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 (V_{it}) plus an error term η_{it}. Thus,

$$\varepsilon_{it}. = \gamma_1 v_{it} + \eta_{it} \quad (11)$$

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

$$BP_{it} = \alpha_0 + \beta_i CS_{it} + \lambda_{it} X_{it} + \theta_t MACRO_t + \gamma_1 v_{it} + \eta_{it} \quad (12)$$

The main condition of holding endogeneity is that the Gamma coefficient must be significantly different from zero. The results of the test for endogeneity in the reduced equation and in the structural equation are provided in Tables 7 and 8, respectively. According to Table 7, the coefficient of the instrument, IA, is significantly different from zero and thus ensures the relevancy of the instrument.

Table 7. The test of endogeneity (reduced equation).

Dependent Var: TDTA	Coef.	Robust SE.	*t*	P > |t|
IA	0.4182352	0.1001509	4.18	0.000 ***
LTDTA	0.036497	0.106435	1.34	0.032 **
STDTA	0.1680941	0.1091572	1.54	0.025 **
SIZE	−0.0244025	0.0092514	−2.64	0.009 ***
LQDTY	0.0021219	0.001551	1.37	0.173
GOP	0.0553865	0.0515511	1.07	0.084 **
RGDP	−0.002645	0.0104215	−0.25	0.800
INF	−0.0024468	0.0072802	−0.34	0.737
_cons	0.7847624	0.1635777	4.80	0.000 ***
R-squared		0.1267		
Adj R^2		0.0897		
F-Statistic		10.05 (*p*-value = 0.0000)		

Note: ** signifies that the variable is significant at 5% and *** signifies that the variable is significant at 1%.

The findings provided in Table 8 indicate that the coefficient of V_{it} is not significantly different from zero. Thus, we reject the null hypothesis that BP and TDTA are endogenous.

Table 8. The 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	−1.135	1.937	0.063 *	−16.845	22.308	0.051 **	3.861	7.734	0.618
LTDTA	−2.046	0.697	0.004 ***	−13.222	7.593	0.083 *	−3.545	1.926	0.067 *
STDTA	−2.850	0.975	0.004 ***	−13.638	10.443	0.093 *	−4.915	2.748	0.075 *
SIZE	0.1086	0.062	0.082 *	1.423	0.669	0.035 **	0.583	0.227	0.011 **
LQDTY	−0.0086	0.010	0.397	−0.0198	0.114	0.862	−0.137	0.032	0.000 **
GOP	1.052	0.362	0.004 ***	13.947	3.974	0.001 ***	3.159	1.169	0.008 ***
RGDP	−0.227	0.071	0.002 ***	−1.177	0.893	0.189	−0.282	0.218	0.197
INF	0.090	0.047	0.061 *	−0.008	0.567	0.989	−0.098	0.140	0.484
Vit	−1.033	2.098	0.623	2.823	24.721	0.909	−1.749	8.009	0.827
_cons	3.878	1.846	0.037 **	43.190	21.721	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 that the variable is significant at 10%; ** signifies that the variable is significant at 5% and *** signifies that the variable is significant at 1%.

4.7. The Results and Discussion of Regression

In order to test the hypotheses, we employed the Pooled Ordinary Least Square regression model. The outcomes of estimation are given in Table 9.

As shown in Table 9, our model explains 29.77% of the variations in ROA; 20% of the variations in ROE and 24.63% of variations in EPS. The F-value signifies that at least one of the independent variables is considerably associated with the performance. The results 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 is associated with a decrease in the bank performance. Thus, we claim that the capital structure decision has significant inverse effects on the performance of Bangladeshi banks. Our results are consistent with those obtained by Hasan et al. (2014) and Salim and Yadav (2012), who observed a significant negative influence of the capital structure variables on performance. Amongst the bank specific control variables, in line with the results of Salim and Yadav (2012), we also observed a significantly positive association of GOP with the bank performance. This suggests that an increase in the growth opportunities will culminate in a better bank performance. The reason could be attributed to the fact that the organisations with high growth prospects have superior status in the market, which lowers their agency costs and thus reflect better performance. We also observed a significantly positive connection between the size and ROA, ROE and EPS. This result is in a harmony with those of Hasan et al. (2014) and Salim and Yadav (2012). This observation is imperative for firms to be large in size so as to have better performance. We also noted an inverse association of liquidity with bank performance, which concords with the results of Abbas et al. (2013). This indicates that more liquidity leads to a lower performance of Bangladeshi banks. Amongst the macroeconomic control variables, we found that GDP has a significant negative association with ROA, whereas inflation has a significant positive association.

Table 9. The 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	−1.334	0.507	0.009 ***	−14.117	6.426	0.029 **	2.170	1.311	0.097 *
LTDTA	−1.989	0.683	0.004 ***	−13.378	7.402	0.072 *	−3.448	1.857	0.065 *
STDTA	−2.570	0.698	0.000 ***	−14.403	7.212	0.047 **	−4.441	1.750	0.012 **
SIZE	0.0896	0.054	0.100 *	1.475	0.542	0.007 ***	0.551	0.156	0.001 ***
LQDTY	−0.007	0.009	0.477	−0.024	0.119	0.840	−0.134	0.029	0.000 **
GOP	1.109	0.345	0.002 ***	13.792	3.565	0.000 ***	3.255	1.053	0.002 ***
RGDP	−0.229	0.070	0.001 ***	−1.172	0.896	0.193	−0.284	0.216	0.190
INF	0.087	0.048	0.069 *	−0.009	0.554	0.999	−0.103	0.136	0.451
_cons	4.743	1.070	0.000 ***	40.827	12.447	0.001 ***	5.767	3.196	0.073 *
R-squared		0.2977			0.2000			0.2463	
Adj R^2		0.2679			0.1661			0.2144	
F-Statistic	10.22 (p-value = 0.0000)			8.85 (p-value = 0.0000)			10.30 (p-value = 0.0000)		

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

4.8. Robustness Check

To shed further light on the relationship between capital structure and performance of banks, we check the robustness of our findings by two methods. First of all, we divide sample periods from 2005–2009 and 2010–2014 and perform the OLS separately. Secondly, we perform quantile regressions. With the first method, column 3 and column 4 of Tables 10–12 report the regression results for all three of the models for period 2005–2009 and 2010–2014, respectively. The results observed are very similar to those obtained previously.

Table 10. Results of regressions (based on sample periods of 2005–2009 and 2010–2014) and quantile regressions (Model 1: dependent variable ROA).

Variables	OLS (2005–2014)	OLS (2005–2009)	OLS (2010–2014)	Quantile Regressions				
				1st Quant.	2nd Quant.	3rd Quant.	4th Quant.	5th Quant.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
TDTA	−1.334 (0.009) ***	−1.790 (0.014) **	−1.176 (0.080) *	−0.505 (0.528)	−1.425 (0.092) *	−1.442 (0.007) ***	−0.876 (0.323)	−3.276 (0.022) **
LTDTA	−1.989 (0.004) ***	−2.340 (0.075) **	−1.586 (0.054) *	−1.146 (0.143)	−0.662 (0.427)	−2.217 (0.020) **	−3.038 (0.008) ***	−2.772 (0.054) *
STDTA	−2.570 (0.000) ***	−3.150 (0.024) **	−1.800 (0.035) **	−2.99 (0.007) ***	−0.796 (0.385)	−2.039 (0.012) **	−3.599 (0.001) ***	−4.702 (0.027) **
SIZE	0.0896 (0.100) *	0.250 (0.016) **	0.038 (0.654)	−0.012 (0.856)	0.066 (0.050) **	−0.0047 (0.291)	0.049 (0.083) *	0.233 (0.147)
LQDTY	−0.007 (0.477)	0.004 (0.733)	−0.020 (0.208)	−0.045 (0.002) ***	−0.020 (0.204)	0.744 (0.656)	0.006 (0.683)	−0.020 (0.353)
GOP	1.109 (0.002) ***	0.153 (0.728)	1.748 (0.006) ***	2.24 (0.000) ***	1.509 (0.022) **	−0.325 (0.160)	1.229 (0.009) ***	0.337 (0.677)
RGDP	−0.229 (0.001) ***	−0.1627 (0.039) **	−0.737 (0.001) ***	−0.274 (0.001) ***	−0.319 (0.004) ***	0.076 (0.000) ***	−0.121 0.105	−0.010 (0.962)
INF	0.087 (0.069) *	0.0299 (0.707)	0.239 (0.003) ***	0.118 (0.100) *	0.039 (0.543)	0.097 (0.093) *	0.097 (0.189)	0.256 (0.187)
_Cons	4.743 (0.000) ***	4.923 (0.005) ***	6.378 (0.000) ***	3.28 (0.000) ***	4.19 (0.026) **	5.585 (0.000) ***	4.910 (0.003) ***	5.558 (0.019) **

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

Table 11. Results of regressions (based on sample periods of 2005–2009 and 2010–2014) and quantile regressions (Model 2: Dependent variable ROE).

Variables	OLS (2005–2014)	OLS (2005–2009)	OLS (2010–2014)	Quantile Regression				
				0.05	0.25	0.50	0.75	0.95
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
TDTA	−14.117 (0.029) **	−5.236 (0.608)	−16.445 (0.013) **	0.348 (0.969)	−13.731 (0.004) ***	−15.831 (0.076) *	−17.205 (0.197)	−17.038 (0.072) *
LTDTA	−13.378 (0.072) *	−46.872 (0.013) **	0.459 (0.954)	−2.860 (0.082) *	−0.512 (0.966)	−11.223 (0.373)	−8.540 (0.213)	−38.211 (0.091) *
STDTA	−14.403 (0.047) **	−46.509 (0.019) **	−1.175 (0.887)	7.662 (0.406)	3.274 (0.768)	−13.443 (0.283)	−14.089 (0.072) *	−55.163 (0.021) *
SIZE	1.475 (0.007) ***	2.966 (0.044) **	0.952 (0.254)	1.309 (0.257)	1.404 (0.010) *	0.989 (0.189)	1.334 (0.227)	2.275 (0.052) *
LQDTY	−0.024 (0.840)	−0.220 (0.225)	0.1184 (0.461)	−0.378 (0.177)	0.046 (0.628)	0.157 (0.207)	0.040 (0.843)	−0.009 (0.998)
GOP	13.792 (0.000) ***	3.678 (0.560)	10.732 (0.079) *	15.791 (0.042) **	18.735 (0.000) ***	8.330 (0.075) *	20.858 (0.024) **	8.913 (0.693)
RGDP	−1.172 (0.193)	−0.211 (0.848)	−1.560 (0.218)	−1.022 (0.478)	−0.966 (0.209)	−0.241 (0.793)	1.454 (0.341)	0.579 (0.754)
INF	−0.009 (0.999)	0.296 (0.794)	0.485 (0.437)	0.829 (0.340)	0.131 (0.797)	0.234 (0.690)	−0.291 (0.740)	0.859 (0.563)
_Cons	40.827 (0.001) ***	55.861 (0.023) **	63.627 (0.000) ***	4.686 (0.801)	19.392 (0.100) *	33.767 (0.009) ***	45.217 (0.024) **	60.898 (0.031) **

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

Table 12. Results of regressions (based on sample periods of 2005–2009 and 2010–2014) and quantile regressions (Model 3: Dependent variable EPS).

Variables	OLS (2005–2014)	OLS (2005–2009)	OLS (2010–2014)	Quantile Regression				
				0.05	0.25	0.50	0.75	0.95
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
TDTA	2.170 0.097 *	6.412 (0.004) ***	−0.268 (0.864)	0.831 (0.576) ***	0.183 (0.879)	0.889 (0.612)	5.411 (0.014) **	8.090 (0.004) ***
LTDTA	−3.448 0.065 *	−1.277 (0.074) *	−2.965 (0.096) *	0.196 (0.084) *	−0.854 (0.620)	−3.299 (0.252)	−3.805 (0.309)	−6.962 (0.097) *
STDTA	−4.441 0.012 **	−6.134 (0.138)	−1.054 (0.059) *	1.452 (0.413)	−0.683 (0.623)	−3.823 (0.133)	−7.181 (0.039) **	−8.797 (0.080) *
SIZE	0.551 0.001 ***	0.766 (0.014) **	0.445 (0.028) **	0.351 (0.002) ***	0.376 (0.007) ***	0.423 (0.082) *	0.746 (0.029) **	1.330 (0.009) ***
LQDTY	−0.134 0.000 **	−0.182 (0.000) ***	−0.122 (0.002) ***	−0.098 (0.142)	−0.059 (0.185)	−0.110 (0.002) ***	−0.188 (0.000) ***	−0.192 (0.000) ***
GOP	3.255 0.002 ***	1.930 (0.147)	2.344 (0.100) *	1.632 (0.309)	3.101 (0.008) ***	3.248 (0.005) ***	2.853 (0.056) *	3.655 (0.373)
RGDP	−0.284 0.190	−0.072 (0.754)	−0.285 (0.210)	−0.675 (0.170)	−0.244 (0.250)	−0.608 (0.052) *	−0.353 (0.327)	−0.162 (0.710)
INF	−0.103 0.451	−0.090 0(.705)	0.541 (0.004) ***	0.145 (0.407)	−0.088 (0.611)	−0.114 (0.636)	−0.333 (0.205)	−0.244 (0.217)
_Cons	5.767 0.073	−0.273 (0.097)*	14.808 (0.000) ***	2.993 (0.382)	3.392 (0.117)	8.866 (0.032) **	6.625 (0.135)	3.813 (0.637)

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

With the second method, quantile regressions, we next check whether our results are robust. One of the important properties of quantile regressions is that quantile regressions estimation allows for different values of the regression coefficients across the different quantiles of the distribution of sample, and is thus competent to capture nonlinearities in the response of the dependent variable to its determinants, while conventional regressions focus on the mean. In this study, based on banks' asset size, we investigated at the 1st, 2nd, 3rd, 4th and 5th quantiles by means of quantile regressions. Column 5 to column 9 of Tables 10–12 exhibits the quantile regressions results for all three of the models. The results with this alternative estimation method are similar to those pooled OLS methods, except for some magnitude changes. Since we found similar findings with the two methods used for robustness check, our findings are more persuasive.

5. Conclusions

By considering the data of 22 banks for the period from 2005–2014, this study empirically examined the impacts of capital structure choice on the performance of banks operating in a developing country, i.e., Bangladesh. The results indicate that all capital structure variables, viz. TDTA, LTDTA, and STDTA, have significant inverse impacts on ROA, which is compatible with the conclusions of Hasan et al. (2014) and Salim and Yadav (2012), who observed significant negative impacts of capital structure variables on ROA. It was also found that TDTA and STDTA have significant negative impacts on ROE, which concords with the observation made by Hasan et al. (2014) and Salim and Yadav (2012). Furthermore, in agreement with Hasan et al. (2014) and Salim and Yadav (2012), the results of this study suggest that LTDTA and STDTA have significant negative impacts on EPS. These findings are in contrast with that of others (Chowdhury and Chowdhury 2010; Umar et al. 2012; Salteh et al. 2012; Arbabiyan and Safari 2009), who observed positive impacts. We also observed that growth opportunities, size and inflation have positive association, whereas liquidity and GDP have negative association to the performance of banks in the developing economy, i.e., Bangladesh.

Therefore, we conclude that there are significant negative impacts of capital structure on the performance of Bangladeshi banks. These negative impacts can be explained by the characteristics of an underdeveloped bond and equity market in the developing countries like Bangladesh, such as information asymmetry, strong covenants of debt and so on, for which there exists a high cost of debt. This study suggests that financial managers should try to finance from retained earnings rather than relying heavily on debt capital in their capital structure. However, they can employ debt capital as the last resort. With a goal of maximising the performance of firms, the managers should make an effort to attain an optimal level of capital structure and endeavour to uphold it as much as possible. These negative impacts also suggest that the legislative rules and policies have to be designed in such a way to assist firms in sharply reducing the reliance on too much use of debt.

Although we observed significant negative impacts of capital structure choice on the performance of the sampled banks, this investigation still suffers from a comprehensive and systematic database for all banks in Bangladesh. As more systematic datasets become available, we suggest that further research can be conducted on the same issue by employing data from a larger sample and more control variables for a longer period to confirm our findings.

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