

The Effect of Capital Adequacy and Leverage on Bank Performance in Bangladesh: An Empirical Study

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Abstract

Being a deposit driven organization, a bank is highly levered in nature. The assets of bank are infused with fluctuating risk of loss subject to type of assets. Adequate level of capital should be maintained to meet the probable loss. This study tries to empirically identify how capital adequacy and leverage impact banks' performance in Bangladesh. This study mostly uses secondary data for the development of initial model. However, researchers have consulted with academics and bank professionals to derive recommendations. A number of econometric models using panel data from 2004 to 2015 of 30 commercial banks of Bangladesh have been estimated to achieve the objective of this study. Return on Asset (ROA), Tobin's Q, and Return on equity (ROE) have been used as a measure of performance of banks. According to estimated result it has been found that capital adequacy has significant positive impact on a bank's profitability. However, the study has found conflicting results when impact of leverage on bank performance is measured. Taking the empirical findings into consideration, the management of the commercial banks should embrace policies that are likely to help the banks to maintain sufficient capital.

Keywords: Capital Adequacy, Leverage, Bank Performance, Profitability, Bank Equity

1. Introduction

A commercial bank is a profit oriented financial intermediary which usually accepts deposits, offers loan and transfers funds among businesses, banks and individuals. A sound and healthy banking system is very crucial for any economy. If a bank fails, it would affect its retail and institutional clients which could trigger a negative multiplier effect on the economy. To maintain customers' trust, a proper regulatory framework is required in this industry. Bank capital which functions as buffer against losses is one of the most important parts of the regulatory framework. According to Sharpe (1964), the amount that a bank holds apart from assets and deposits is called the bank capital. It is evident from the definition that higher level of capital makes a bank safer for its depositors. Adequate capital is the level of capital that a bank should keep to ensure the prudent business operations (Nwankwo, 1991).

High leverage (higher level of debt) is one of the major characteristics of bank as the bank is a deposit driven organization. Improper blend of debt and equity in a firm may lead to financially painful situation like shrinking profit. Finding the perfect

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combination of debt and equity is a challenging task for managers as the optimum use of leverage differs from industry to industry. In one of the earlier studies Modigliani and Miller (1958) presented “the irrelevance theory of capital structure” which argued that a firm’s basic earning power entirely determines its value and decision regarding capital structure does not influence a firm’s value in a perfectly competitive market condition.

After the early breakthrough in this field, numerous studies have been conducted to explore the relationship between capital adequacy, leverage and a firms’ performance. However, these researches have showed a mixed result. Gilbert and Wheelock (2007) argue that capital adequacy requirement improves the safety and quality of the banking sector and has positive impact on profitability. However, alternative school of thought is also present in the literature. Cavallo and Majnoni (2001) showed that the high capital requirements lead to contraction of bank credit which eventually lowers the profit. In a study conducted in the context of European countries, Gleason et al. (2000) revealed that a firm’s leverage has a considerable negative impact on firm’s performance. On the other hand, Hadlock and James (2002) found that leverage and firm’s performance are positively related. They stated that use of higher level of debts leads to higher profitability. Likewise, Holz (2002) also suggest similar relationship. According to Smith and Watts (1992), growth potential of a business and corporate leverage has a negative relationship. In a study emphasizing on the uneven tax treatment on debt and equity of banks, Schepens (2016) claimed that a more alike treatment of bank’s debt and equity leads to upsurge in the level of common equity which eventually increases bank capital ratios.

Banking industry of Bangladesh started its journey with 6 state-owned commercial banks, 2 specialized banks and 3 foreign commercial banks. Currently the industry consists of 39 private commercial banks (PCBs), 6 state-owned commercial banks (SCBs) and 9 foreign commercial banks (FCBs). To the researchers’ best knowledge there is a lack of academic researches related to determination of the influence of capital adequacy and leverage on banks’ performance in Bangladesh. Using a data set of 32 Bangladeshi banks Zheng et al. (2017) tried to examine how capital requirements impact profitability of banks. They found that the higher the bank regulatory capital, the greater the bank profitability. Safiuddin et al. (2015) attempted to find capital structure’s impact on the Bangladeshi firms using descriptive statistics. They analyzed the data of 40 firms for a five-year period (2008–2012) and found that leverage has negative impact on the firm’s performance. However, they did not use any econometric model to explain this relationship. The present study tries to fill this gap through econometric analysis involving variables linked to the banks’ financial performance, capital adequacy and leverage.

2. Literature Review

As decision regarding capital and debt is one of the major financial decisions for any firm, it has a strong presence in the financial academic literature. Durand (1952) summarized three theories of capital structure: “net theory, net operating income theory

and traditional compromise theory". Modigliani and Miller (1958) suggest that optimal capital structure is nonexistent. In a fully effective capital market situation, there is no connection between capital structure and company's value. From then on, besides emphasizing on capital structure solely, some economists also paid attention to explore the way firm's capital structure influences performance.

As an extension to MM theory Myers (1984) came up with static trade-off theory which accounts for the cost of bankruptcy and agency costs of leverage into attention. It suggested that tax could be avoided through debt financing but at the expense of risk increment. If the benefit from tax avoidance surpasses the cost associated with increased risk, a firm should consider adding leverage to its capital structure. Agency theory explains the relationship between firm's shareholders (principal) and firm's executives (agent). Agent is hired by the principal to run business. The concerns for this theory are the goal conflict between the principal and agent, and different risk tolerance level for the principal and agent. Signaling theory takes internal factors into account and suggests that asymmetry of information exists among investors and internal managers. Investors can judge value of this firm from the signal received from managers' decision on capital structure.

Examining the asset-liability ratio Ross (1977) suggested positive correlation between asset-liability ratio and firm value. Afterward, Myers and Majluf (1984) proposed the pecking order theory. They expressed that financial pecking order which is basically a hierarchy of financing, starting with the firm's retained earnings, followed by loan financing, and lastly issuance of equity, comes to play in order to lessen the problem of asymmetric information between firms' managers and investors. This study tries to investigate the impact of capital adequacy and leverage on the banks' profitability. In line with the objective of the study most relevant literatures on this issue will be discussed from now on.

The impact of higher capital on profitability of bank is quite uncertain. In general, interest payments are reduced due to higher level of capital and that lowers the profitability by decreasing the tax shield coming from interest deductibility. But Berger (1995) argue that higher capital lowers the expected bankruptcy cost which positively impacts the profitability. On a study on U.S. commercial banks over the period from 1983–1989, he showed capital positively granger-causes the profitability. Correspondingly, from a study on a sample of banks from Asian countries, Chien-Chiang and Hsieh (2013) found that capital ratios and bank profitability are positively correlated. There are also some other studies which found conflicting results. For instance, investigating a sample of banks from eight European countries, Goddard et al. (2013) concluded a negative connection between capital and profitability ratios. Similarly, Altunbas et al. (2007) found that well-capitalized banks in Europe are inefficient which causes lower profitability.

Unlike capital adequacy, Leverage showed positive impact on bank's profitability in the previous studies. Lawal (2014) argued that leverage plays major role in amplifying the value of Nigerian banks and suggested that leverage usage should be promoted to increase the value of firm by managers, stockholders and regulators. Abubakar (2015)

examined the relation between leverage and success of the banks using a selective sample of 11 out of the 23 commercial banks operating in Nigeria and found a statistically significant positive relationship among debt to equity ratio and return on equity.

Exploring an unbalanced panel data over the period 2005–2011, Beltratti and Paladino (2015) tried to find how leverage is related to income for international banks. They have established an econometric model considering both bank specific and country specific variables. They concluded a statistically significant positive relationship between the capital ratio and residual income for the global banking sector.

However, leverage is found to show both positive and negative impact on firm's profitability in industries other than banking industry. In the context of Iran, Ebrat et al., (2013) found the evidence of both positive and negative relationship between firm performance and capital. They examined evidence from 85 Iranian companies from Tehran Stock Exchange. Salim and Yadav (2012) studied the performance of 237 Malaysian companies and found a varied relationship between performance of firm and capital structure. Leverage negatively affects the firm's performance where performance is measured through Return on Assets (ROA), Return on Equity (ROE) and Earning per Share (EPS). But when growth is taken into consideration leverage seemingly has a positive effect on it.

Zeitun and Tian (2007) found a significant effect of a firm's capital structure choice on the firm's performance. According to Manawaduge et al. (2011), use of more short-term in comparison to long-term debt to finance the operations is common for majority of the Sri Lankan companies. This study provides strong evidence that the presence of more debt negatively affects firm performance.

Majority of the literature shows that capital adequacy and leverage have significant influence on the firms' performance. The scenario of Bangladeshi banks is yet to be revealed.

3. Objectives

The broad objective of this study is to find out the relationship between capital adequacy, leverage and firm performance in the context of commercial Banks of Bangladesh. Specific objectives of this study include the following:

- To identify and quantify the influence of capital adequacy and leverage on the commercial banks' performance in Bangladesh.
- To provide some recommendations and policy guidelines based on the empirical results.

4. Variables Construction

The objective of this study is to examine the influence of capital adequacy and leverage on firm's performance. Based on the literature review, researchers have identified the following variables for the study:

4.1. Bank Performance (Dependent Variable): According to Chakravarthy (1986), financial performance of a firm is related to its purpose of maximizing profit for shareholders, while the firm's operational performance relates to expansions and growth resulting from sales and market value (Sandberg and Hofer, 1987). Tobin's Q, ROE and ROA are used as a proxy of financial performance in this study. Tobin's Q is highly accepted proxy of firm's performance (Tobin, 1969). The dependent variables are defined as follows:

Tobin's Q= (Market value of equity+ book value of debt)/ book value of assets

ROE = Profit after tax / total equity

ROA = Profit after tax / total asset

4.2. Capital Adequacy and Leverage (Independent Variable): The most commonly used indicator of banks' capital adequacy is Capital Adequacy Ratio (CAR). It is the extent of a bank's core capital showed as a percentage of bank's total risk weighted assets. But due to unavailability of the related data, the ratio of total equity to total asset (CAP) is used as proxy for capital adequacy in this study (vong and Chan, 2009 ; Zheng et al. 2017). To get insight into the market perception, the ratio of market value of the equity of the bank to book value of the same (MBVR) is also incorporated in the model. The ratio of total debt to total equity (TDTE) has been used as proxy for leverage. Bank size calculated as logarithm of total asset (LogTA) is another independent variable in this model. As size is combination of debt and equity, it is considered as a component of both capital adequacy and leverage.

In line with the previous researches mentioned above the researchers form expectations on the behaviour of independent variables on firm performance. Measures of all the variables used here in this study as well as the expected effect of each of the independent variable on bank performance are shown in the Table 1.

Table-1: Variables, notations, measures, expected impacts on the performance of banks and sources of data

Variables	Notations	Measures	Expected Impact	Sources of Data
Dependent variables:				
Tobin's Q	TQ	Tobin's Q= (Market value of equity+ Book value of debt)/ Book value of assets		Annual reports and DSE website
Return on Equity	ROE	Net profit after tax/Total equity		Annual reports
Return on Assets	ROA	Net profit after tax/Total assets		Annual reports
Independent variables:				
Total Equity to Total Assets	CAP	Total equity /Total assets	+/-	Annual reports
Total Debt to Total Equity	TDTE	Total debt/Total equity	+	Annual reports
Size	LogTA	Log (Total assets)	+/-	Annual reports
Market Value of Equity to Book Value of Equity Ratio	MBVR	(Market value/Book value) of equity	+/-	Annual reports and DSE website

Source: Developed by researchers

5. Methodology

This study mostly uses secondary data collected from selected banks' annual report for the development of initial model to examine the effect of capital adequacy and leverage on the Bangladeshi commercial banks' performance. However, researchers have consulted with academics and bank professionals to derive recommendations. The researchers have selected the data of all 30 banks enlisted in Dhaka Stock Exchange (DSE). Due to the unavailability of the data, the banks which are not listed in the capital market are not included in the study. These banks are observed over the years 2005-2014 (10 years), allowing the researchers to form a panel data set.

5.1. Empirical Model

The diagnostic framework of the study assumes that performance or profit of bank 'i' in period 't' depends on the capital adequacy level and level of leverage of firm in period t along with other additional independent variables which are expected to influence the performance of bank.

This study initially uses a pooled ordinary regression model as Park (2011) suggests ordinary least squares (OLS) produces most consistent and efficient parameter estimates where individual effect μ_i (cross-sectional or time specific effect) does not exist ($\mu_i = 0$).

According to this assumption this study will examine the influence of capital adequacy and leverage on bank's performance using the following regression models:

$$TQ_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 TDTE_{it} + \beta_3 LogTA_{it} + \beta_4 MBVR_{it} + \varepsilon_{it} \dots\dots\dots(1)$$

$$ROE_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 TDTE_{it} + \beta_3 LogTA_{it} + \beta_4 MBVR_{it} + \varepsilon_{it} \dots\dots\dots(2)$$

$$ROA_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 TDTE_{it} + \beta_3 LogTA_{it} + \beta_4 MBVR_{it} + \varepsilon_{it} \dots\dots\dots(3)$$

Where, ROE_{it} (Return on equity), ROA_{it} (Return on asset), and TQ_{it} (Tobin's Q) are financial performance indicators for bank i in year t. CAP_{it} (Total equity to total assets ratio), $TDTE_{it}$ (Total debt to total equity ratio), $LogTA_{it}$ (Size of the bank) and $MBVR_{it}$ (Market value of equity to book value of equity ratio) are explanatory variables for the bank i in year t. And $\beta_0 - \beta_4$ are regression coefficients and ε_{it} is the error term. STATA software has been used to conduct necessary statistical analysis starting from descriptive statistics to the development of the final model after cleaning the data for errors.

Pooled OLS does not provide the best result in the presence of heteroscedasticity and auto correlation. Homoscedasticity, i.e., no heteroscedasticity suggests that each disturbance terms in model have the same variance and no auto correlation means that disturbance terms are not correlated with each other (Greene, 2012). If the individual effect μ_i exists ($\mu_i \neq 0$) in the longitudinal data assumptions of having

homoscedasticity and no auto correlation may be violated due to the heterogeneity (individual specific characteristics). This problem can be dealt in panel data model. This panel regression enables to control for the unobservable effects subject to entity. Fixed effect model assumes constant individual-specific error over time whereas random effect model assumes it random. Based on the nature of those issues either fixed effect or random effect model may be used.

5.2. Fixed Effect Model and Random effect Model

To analyze the impact of the variables those are time invariant fixed effect model is used. A fixed effect model allows the intercept in the regression model to vary across cross sections but does not allow the intercept to vary across time. The equation of fixed effect model considering all the dependent variables of this study as PROFIT is:

$$PROFIT_{it} = (\beta_0 + \mu_i) + \beta_1 CAP_{it} + \beta_2 TDTE_{it} + \beta_3 LogTA_{it} + \beta_4 MBVR_{it} + v_{it} \dots\dots\dots(4)$$

Here, μ_i represents fixed or random effect specific to bank or time period that is excluded from the regression. It is allowed to be correlated with other regressors as an individual specific effect is time invariant and treated as a part of the intercept. v_{it} denotes independent and identically distributed error.

On the other hand, Random effect model is used to examine the differences in error variance components across time period or individual. Here, the disparity across individuals (banks) is supposed to be random and not correlated with the independent variables. The equation of random effect model is:

$$PROFIT_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 TDTE_{it} + \beta_3 LogTA_{it} + \beta_4 MBVR_{it} + (\mu_i + v_{it}) \dots\dots\dots(5)$$

It has been assumed that, in a random effect model, individual effect (heterogeneity) and any predictor variables are not correlated. Based on this assumption, the model estimates error variance subject to groups or times (Park, 2011).

5.3. Diagnostic Tests for Model Selection

Several diagnostic tests have been used to validate the estimated regression model in this study. Those tests are described below in brief.

5.3.1. Test for Serial Autocorrelation

Wooldridge (2002) comes up with a simple test that is known as Wooldridge test to detect serial correlation in the individual error term in a panel-data framework. Drukker (2003) recommends that Wooldridge test can have better estimate in a practically sized sample.

5.3.2. Test for Heteroscedasticity

Heteroscedasticity means a condition where the variance of the regressand differs across the dataset. Heteroscedasticity creates problems in analysis as most approaches in regression analysis assume equal variance. A test named Modified Wald test is used to identify group wise heteroscedasticity in fixed effect model. Greene (2012, pp.324)

shows the estimate for the Modified Wald Test Statistic as follows:

$$w' = \sum_{i=1}^n \frac{(\hat{\sigma}_i^2 - \hat{\sigma}^2)}{f_{ii}}$$

Here, $\hat{\sigma}^2$ is the disturbance variance estimator of the regression and f_{ii} is estimate of $\text{Var} [\hat{\sigma}_i^2]$.

The resulting test statistic is Chi-squared.

5.3.3. Test for Cross Sectional Dependence

Cross-sectional dependence across errors may arise if there is existence of mutual shocks and overlooked components which eventually become chunk of the error term and error terms becomes correlated across cross-sections. This results contemporaneous correlation which can be identified using Pesaran CD test suggested by Pesaran (2004).

5.3.4. Hausman Test

Hausman (1978) suggests a test that can be applied to the hypothesis testing problems with two different estimators. This test is called Hausman test. To select between fixed effect and random effect model Hausman test has been applied in this study.

6. Results and Discussion

Same cross-sectional component has been observed over time in panel data that ensures both space and time dimensions in data set (Gujarati, 1978). Due to this unique feature panel data can estimate better than only cross-section or time series data. With the support of STATA software, the panel data regression has been done to go in depth of the influence of capital structure on the performance of the selected banks. This is in conformity with the previously discussed literatures regarding capital structure and firm's performance (see Zheng et al. (2017), Lawal (2014), Abubakar (2015)).

6.1. Descriptive Analysis

Output of the descriptive statistics of all the variables of the study are mentioned below:

Table-2: Summary of descriptive statistics

Variable	ROE	ROA	TQ	CAP	TDTE	LogTA	MBVR
Obs.	292	292	284	292	292	292	284
Mean	16.33	1.14	1.18	.06	10.79	10.89	2.87
Std. Dev.	19.26	2.26	0.47	.09	28.59	0.33	6.57
Min.	(193.17)	(22.94)	0.47	(0.68)	(414.67)	10.15	(37.65)
Max.	184.36	13.52	5.78	.15	230.98	11.81	63.37
Variance	370.83	5.09	0.22	0.001	817.45	0.11	43.11
Skewness	(2.90)	(4.57)	5.32	(5.37)	(9.78)	(0.15)	4.15
Kurtosis	73.31	56.11	41.93	34.37	181.23	2.54	42.24

Source: Researchers' findings

Table-2 shows a summary of descriptive statistics of the regressands and regressors of this study. It includes mean, standard deviation, minimum and maximum values of the

variables, variance, skewness and Kurtosis values. Thus, here the researcher provides a broad-spectrum summary of the features of the data. It can be noted that mean of all the variables (dependent and independent) is positive. However, the mean of ROE and ROA are 16.33 and 1.14 respectively which indicates moderate performance of the banks during 2005 - 2014. The Mean of the Tobin's Q is 1.176. As mean of Tobin's Q is greater than one, it can be deduced that the market value of the banks is more than their book values. This indicates that the profits made are greater than the expense of using assets of the selected banks and also suggests that additional investment is needed to be made by the selected banks. In contrast, the mean of the CAP and TDTE are 0.06 and 10.79 respectively indicating a trifling amount of equity compared to debt of the banks. MBVR is 2.87, market value of equity being almost triple of book value of equity of the DSE enlisted banks. The skewness shows that majority of the data are not symmetrical. Only LogTA is quite symmetrical. All the Kurtosis values are positive, and most of the values are much higher than zero meaning that the data do not follow normal distribution and the distribution has heavier tails with a sharper peak in comparison to normal distribution.

6.2. Correlation Analysis

Correlation Analysis describes the strength of relationship between two variables.

Table-3: Combined pair-wise correlation matrix

	TQ	ROE	ROA	CAP	TDTE	LogTA	MBVR
TQ	1						
ROE	-	1					
ROA	-	-	1				
CAP	0.3144	-0.0482	-0.3728	1			
TDTE	-0.017	0.6247	0.0445	0.0989	1		
LogTA	-0.1811	-0.1634	0.1846	0.3922	-0.0029	1	
MBVR	0.6677	0.3667	0.0899	0.1004	0.5822	-0.053	1

Source: Researchers' findings

The matrix in Table-3 shows the combined pair-wise correlation calculations. Tobin's Q is positively related to CAP and MBVR whereas it is negatively related to TDTE, size (LogTA) of the banks. ROE is positively related to TDTE and MBVR; on the other hand it is negatively related to CAP and size. ROA is positively related to all the independent variables except CAP. Most of the relationships are quite weak except for the correlation between ROE and TDTE, and Tobin's Q and MBVR.

6.3 Diagnostic Analysis

The results of the Modified Wald test for group-wise heteroscedasticity in fixed effect regression model tests for three models are mentioned in Table-4. The researcher has gone for the test of heteroscedasticity and the result is the presence of heteroskedasticity. Table-4 shows that heteroskedasticity is present in all the three models, meaning that the variances of the error terms vary from observation to observation.

Wooldridge test for autocorrelation in panel data for the three models was done in STATA and the results are shown in Table-4 representing that all the models contain autocorrelation. Therefore, there is correlation between the members of the series of observations ordered in time.

Table-4: Heteroskedasticity, autocorrelation and cross-sectional dependence test results

<i>Tests</i>			
	Tobin's Q	ROE	ROA
Modified Wald test for group wise heteroskedasticity			
H ₀ : $\sigma^2(i) = \sigma^2$ for all i			
χ^2 (30)	1.5e+08	11640.25	21723.69
Prob. > χ^2	0.0000	0.0000	0.0000
Wooldridge test results for autocorrelation			
H ₀ : No autocorrelation			
F (1, 29)	9.063	28.727	21.291
Prob. > F	0.0054	0.0000	0.0001
Pesaran test results for cross-sectional dependence			
H ₀ : No cross-sectional dependence			
Pesaran's test result	6.642	31.286	20.837
Prob.	0.000	0.000	0.000

Source: Researchers' findings

Table-4 also shows the results of Pesaran's Cross-sectional dependence test. The results of the Pesaran test show that there is cross-sectional dependence among the data of all the three models.

Here in Table-5, for all the three models, H₀: Difference in coefficients is not systematic (Random Effect)

Table-5: Hausman test for Tobin's Q model, ROE model and ROA model

	TQ			ROE			ROA		
	Coefficients		F _{ERE}	Coefficients		F _{ERE}	Coefficients		F _{ERE}
	FE	RE	Diff.	FE	RE	Diff.	FE	RE	Diff.
CAP	-6362803	-1.27942	.6431396	100.5402	32.39089	68.14934	-6.153746	11.41716	-17.5709
TDTE	-0100596	-0098343	-0002252	.3812007	.3976147	-016414	-0026394	-0033256	.0006862
LogTA	-0227398	-0626307	.0398909	-11.22993	-10.95129	-2786415	-40555	-2568659	-1486841
MBVR	.0744114	.0748862	-0004748	.0723525	.0095808	.0627717	.0135968	.0163734	-0027767
Ch^f	24.82					5.65			130.86
Prob. Ch²	0.0001					0.2267			0.0000

Source: Researchers' findings

The null hypothesis has been rejected for Tobins'Q model and ROA model. This suggests presence of fixed effect. On the other hand, presence of random effect has been suggested for ROE model as we fail to reject the null hypothesis.

6.4. Selection of Final Model

Selection of model that provides best estimate is the major concern of panel data analysis. As there is evidence of first order auto correlation and heteroscedasticity in the data set of this study, general pooled ordinary least square model may lead to biased estimate. To handle this issue fixed effect and random effect models are estimated. According to Hausman test, fixed effect has been found when ROA and Tobin's Q have been used as dependent variable. In the presence of cross-sectional dependence, Driscoll and Kraay (1998) standard errors for coefficient estimated by fixed-effects (within) regression will provide the best estimate. On the other hand, due to presence of the random effect and cross sectional dependence, Panel Corrected Standard Error (PCSE) method has been applied in the model where ROE is the dependent variable. Using STATA, the researchers found the result of this regression model which is presented in the Table-6.

The final model for Tobin's Q in Table-6 shows that the independent variables TDTE and MBVR are significant 1% at significance level. Among them TDTE has negative relationship with Tobin's Q whereas the relationship between MBVR and Tobin's Q is positive. It indicates that the less the debt compared to equity, the more the profit. And when banks have the equities' market value more compared to the book value of the same, the performance becomes better.

Variables	Coefficient of Variables		
	Tobin's Q	ROE	ROA
CAP	-0.636 (-1.45)	34.3019*** (3.00)	-6.153 (-1.65)
TDTE	-0.01006*** (-4.45)	0.4001*** (14.44)	-0.0026 (-0.72)
LogTA	-0.0227 (-0.75)	-14.6211*** (-2.34)	-0.4055 (-1.02)
MBVR	0.0744*** (5.04)	0.0584 (0.54)	0.0135 (0.78)
Cons.	1.36037*** (4.15)	168.463 (4.06)	6.030 (1.37)
Diagnostic statistic of the estimated models			
R ²	.7535	0.5241	0.0543
F/chi ²	21.55	384.97	0.3901

Note: ***, **, and * denote coefficients are significant at 1%, 5% and 10% level of significance respectively

Source: Researchers' findings

The final model for ROE shows that the independent variables CAP, TDTE and LogTA (bank size) are significant at 1% level. Among them, TDTE and CAP have a positive relationship with ROE whereas LogTA has negative relationship with ROE. This indicates that the impact of capital adequacy on the performance of a bank is positive. We have found a negative relationship between TDTE with bank performance in the model for Tobin's Q. But in this model for ROE we have found a positive relationship between them. The result of ROE model also suggests that the smaller the bank's size, the better the bank's performance.

The final model for ROA shows that no variable is truly significant. Diagnostic statistic also indicates a poor explanatory power of this model whereas models for Tobins' Q and ROE show quite satisfactory explanatory power.

6. Findings and Recommendations

According to the findings of this study the regulatory authority and bank management may take the following issues into their consideration:

- As capital adequacy positively impacts the financial performance of bank, bank management should think of strengthening capital base through maintaining sufficient capital to monitor the use of leverage in bank's asset.
- As we cannot be sure about the impact of leverage on bank profitability, the regulatory institutions of banks along with the management of banks, should adopt policies that are likely to monitor the use of debt instruments with more caution.
- Empirical result shows that MBVR has significant positive relationship with banks' performance. Most of the Bangladeshi commercial banks in the study are vastly levered. Equity's market value is almost triple of its book value of the banks of interest. It suggests that investors' trust reflects in the bank performance. Further studies can be done in this regard.
- As size of the bank negatively affects the bank performance, the banks which are big in terms of total asset should try to focus on profitability rather than on expanding the size.

7. Conclusion

The rationale of this study is to empirically investigate the impact of capital adequacy and leverage on firm performance. Data were collected from the annuals of the thirty enlisted banks of DSE for the period of last ten years from 2005 to 2014. Pooled regression analysis has been done to analyze the data and find out the relationships between variables. When Tobin's Q is used as proxy of bank performance, we have found TDTE and MBVR significantly affect bank performance. The researchers have found CAP, TDTE and LogTA (bank size) as significant independent variable using ROE as dependent variable. On the other hand, there is no statistically significant relation between capital adequacy, leverage and banks' performance when performance is measured by ROA. Evidence from empirical result suggests that capital adequacy has positive influence on the profitability of Bangladeshi banks whereas the size affects negatively on the performance of banks. Leverage has significant impact on bank profitability but the study is inconclusive to make

comment on the direction of the significance as leverage shows both positive and negative relationship with bank performance. Thus, there is a mixed result regarding the influence of capital adequacy and leverage on banks' performance which is consistent with the findings of existing literature.

There is scope for further study regarding the impact of leverage and capital adequacy on banks' performance by taking into account some other ratios as proxy of capital adequacy and leverage. There has been a limitation in this study of not having access to data of capital adequacy ratio (CAR). Some of the commercial banks have also been excluded from the study due to data unavailability. In spite of the limitation, the researchers have given their full effort to make the study a valuable one which might help the policy makers to bring effective decisions for the profitability and growth of the banking industry of Bangladesh.

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