Issues on Bank's Capital Structure and Profitability:
A Developing Country Context

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Abstract:

Purpose: The study aims to show the effect of capital structure on banks' profitability in developing countries.

Design/Methodology/Approach: The study is conducted on 28 commercial banks from 2009 to 2016 of panel data to infer the concurrent relationship between capital structure and profitability. The preliminary diagnoses picked up the Generalized Methods of Moments (GMM) method to address the endogeneity issue in dynamic panel data.

Findings: The study found that the bank's capital structure is negatively associated with profitability and vice versa. Moreover, asset tangibility and regulatory capital harm banks' current capital structure, whereas tax shield and 1-year lagged capital structure have a positive influence. On the contrary, a bank's profitability is positively associated with bank growth, and 1-year lagged profit, while credit risk and liquidity are negatively affected. The study implies that banks should use an appropriate mixture of debt and equity; otherwise, immature decisions in capital structure may demise banks' profitability, which will ultimately turn into bank failure.

Practical Implications: Adherence to the adoption of stringent capital structure allures banks in maximizing profit to cope with market competition. Beyond the theoretical aspects, the study extends its scope in the practical implications of adopting a profit-maximizing capital structure in a developing country context. However, capital structure choice differs from bank to bank based on their performance and position in the market. The study clearly addressed some of the relevant issues which affect banks' performance adversely in practice.

Originality/Value: The study contributes to the existing literature and tries to explain the role of capital structure in banks' performance, mostly in submerge economies.

Keywords: Capital structure, leverage, GMM, panel data, Commercial bank, Bangladesh.

JEL Classifications: C23, G30, G32.

Paper Type: Research Paper.

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1. Introduction

Capital structure signifies a firm's actions with debts and equity (Brounen *et al.,* 2006). The firm's characteristics and economic conditions, basically, determine the approximate proportion of debts and equity. Following the great work of Modigliani and Miller (1958), capital structure theory is still in the limelight of corporate finance study, but all the studies fail to recommend unanimously a single theory to use. The debate about capital structure decisions starts from MM's (1958) capital irrelevancy theory, which states that capital structure is irrelevant for its market value. Afterward, the same authors admit that capital structure is relevant to a firm's market value (Modigliani and Miller, 1963). Later some other theories like trade-off theory, pecking order theory, agency cost theory, free cash flow theory, and market timing theory are used to reveal the determinants of capital structure decision.

The trade-off theory, developed from the dispute of Modigliani and Miller (1958), refers that firms can use debt up to an unspecified level as a financing source to balance tax advantages against bankruptcy costs. This balance can be obtained by an optimal (static or dynamic) debt-equity ratio; (Myers, 1984; Myers and Majluf, 1984; Sorana, 2012). On the other hand, pecking order theory, developed by Myers (1984) and Myers and Majluf (1984), does not rely on an optimal debt-equity ratio. Rather, it built on the assumption of managers' access to superior information about the firm's true financial condition along with the rational reaction of investors in the capital market. According to pecking order theory, firms should invest following their financial order, that is, first from internal sources, then debt, and lastly equity. Internal sources of financing are preferable as it reduces the cost of adverse selection. In contrast, equity financing is discouraged, or the firm may use it as a last resort because it requires more adverse selection costs (Myers and Majluf, 1984).

However, Baker and Wurgler (2002) focus on a new idea irrespective of balancing gain and cost of debt financing and the financing order. The authors suggest that firms should decide on debt or equity financing based on market reaction. According to market timing theory, firms should take advantage of market inefficiency means they will issue equity when the share price is overvalued and repurchase when undervalued. This theory does not suggest an optimal capital structure like trade-off theory. Here, the optimal capital structure is the accumulative effect of taking advantage of market inefficiency.

Furthermore, the empirical studies suggest that capital structure decision depends on firm-specific factors, macroeconomic factors, and even stock market factors. However, all the studies fail to suggest a unanimous decision about key determinants or a single theory (Graham, 2000; Leary and Roberts, 2010).

This paper, mainly, is focused on contributing to empirical literature of capital structure by resolving the endogeneity problem on capital structure or leverage and profitability through the GMM approach. Like corporate governance and control, every area of experimental corporate finance, capital structure, financing and

investing decision, dividend payout, share repurchase, etc., have an endogeneity problem.

This study's center of interest is, particularly, to discover the way banks are setting their capital mix. Two dominant capital structure theory, named trade-off theory and pecking order theory, is considered to identify the movement of capital structure or leverage with some variables. The inclusive data set of the year 2008 to 2016 of 27 commercial banks listed in the Dhaka Stock Exchange is considered to resolve the endogeneity of capital structure or leverage and profitability. Although most of the studies based on Bangladesh exclude the banking sector like Chowdhury and Chowdhury (2010), Hasan *et al.* (2014), Hossain and Hossain (2015), Rouf (2015), still there is some work like Siddik, *et al.* (2017), Sharif and Muhammad (2019), about commercial bank's capital structure. This paper is focused on the banking sector to explore how determinants of capital decision react with GMM estimator. The other part of the study includes literature review, methodology, data analysis, and conclusion.

2. Literature Review

The driving forces of capital structure are determined from theories of Modigliani and Miller (1958), Modigliani and Miller (1963), Jensen and Meckling (1976), Myers (1977), Myers and Majluf (1984), Myers (2001), Fama and French (2002). These theories can be classified into some major classes, the trade-off theory, the pecking order theory, the agency theory, and the market timing theory. The trade-off theory considers tax advantages and bankruptcy costs as key forces, the pecking order theory uses financing ranking, the market timing theory considers market value (Barker and Wurgler, 2002), and the agency theory focuses on agency cost (Gungoraydinoglu and Öztekin, 2011) to determine the optimum combination of debt and equity. Nonetheless, all empirical studies failed to offer definite and generally approved theories (Graham, 2000; Leary and Roberts, 2010; de Jong *et al.,* 2011). Consequently, further research is required on this matter.

The development of different theories recommends extensive research for determining the reasonableness of these theories from different angles. Though most research includes country-specific variables, there also have huge study on firm-specific factors to determine the shape of capital structure. The firm-specific factors like profitability, tangibility, size, growth opportunities, dividend-payout ratio, tax shield, etc., are commonly used in different research (Rajan and Zingales, 1995; Bevan and Danbolt, 2002; Panno, 2003; Sheikh and Wang, 2010; Sorana, 2012).

The firm-specific factors basically depend on the firm's characteristics, nature, and preferences (Mokhova and Zinecker, 2014). The financing mixture of highly leveraged firms has a trend of using high debt; on the other hand, firms with high market-to-book value ratios and profitability tend to have a low possibility of debt financing (Frank and Goyal, 2009). Moreover, large firms with more tangible assets also have a high propensity for using leverage.

2.1 Evidence from the Experiential Study

The literature about capital structure finds the significance of different variables on the capital structure of a firm. Most of the study finds a negative relationship between profitability and capital structure or leverage (Titman and Wessels, 1988; Rajan and Zingales, 1995; Bevan and Danbolt, 2002; Fama and French, 2002; Panno, 2003; Bevan and Danbolt, 2004; Zou and Xiao, 2006; Sheikh and Wang, 2010), a positive correlation between tangibility and capital structure or leverage (Titman and Wessels, 1988; Rajan and Zingales, 1995), a positive relationship between tax shield and capital structure or leverage (Bradley *et al.,* 1984; Sorana, 2012); and a negative relationship between credit risk and profitability (Noomen and Abbes, 2018; Zheng *et al.,* 2018).

2.2 Profitability

In both ways, conceptually and empirically, the association between profitability and capital structure or leverage is contentious (Friend and Lang, 1988; Harris and Raviv, 1991; Rajan and Zingales, 1995; Booth *et al.,* 2001; Sbeti and Moosa, 2012). Predominantly, Modigliani and Miller (1963) support a firm's debt financing to enjoy a tax shield. In support of debt financing, Jensen (1986) also states that debt can be used as a management device to reduce agency conflict.

Based on the pecking order theory, profitable and high-growth firms prefer internal funds to external to reduce ownership risk (Vo, 2016). Thus, the expected movement between capital structure or leverage and profitability is negative (Titman and Wessels, 1988; Rajan and Zingales, 1995; Bevan and Danbolt, 2002; Fama and French, 2002; Panno, 2003; Bevan and Danbolt, 2004; Zou and Xiao, 2006; Sheikh and Wang, 2010; Ali and Faisal, 2020).

However, the trade-off theory recommends a positive relationship as high profitable firms use a high level of debt by keeping fixed assets as collateral (Frank and Goyal, 2003), ultimately reducing the chances of bankruptcy (Fama and French, 2002). Additionally, La Rocca *et al.* (2009) state that more profitable firms prefer debt financing due to tax shields' benefit (Frank and Goyal, 2003; Frank and Goyal, 2009). Furthermore, Rajan and Zingales (1995) state that creditors usually go for profitable firms for lending. Moreover, Panno (2003) also found a positive relationship between these variables based on UK and Italian sample.

These two theories provide a different relationship between profitability and financial capital structure because the pecking order theory focuses on two factors: trade-off theory considers the dynamism of the factors or variables (Shenoy and Koch, 1996). However, Sorana (2012) illustrates that the relationship between profitability and capital structure or leverage is negative if financial and market conditions and investor's behavior are considered. In this study, Return on Asset (ROA) is used as a proxy of profitability, and it is calculated as:

$$Profitability = \frac{Earnings\ before\ Interest\ and\ Taxes\ (EBIT)}{Total\ Assets\ (TA)} \tag{1}$$

H₁ₐ*: Ceteris paribus, bank's profitability increased with the use of lower capital structure or leverage.*

2.3 Capital Structure

The leverage ratio is used as a proxy of capital structure. Different kinds of literature support the strong influence of leverage on a firm's profitability. According to some studies regarding leverage and profitability, both variables move oppositely, which means they are negatively associated (Muritala, 2012; Salim and Yadav, 2012; Soumadi and Hayajneh, 2012; Abdel-Jalil, 2014; Hasan *et al.,* 2014; Ramadan and Ramadan, 2015; Siddik *et al.,* 2017; Nguyen and Nguyen, 2020). Here, capital structure is calculated as:

$$Capital\ Structure = \frac{Total\ Debt}{Total\ Assets} \tag{2}$$

H₂ₐ*: Ceteris paribus, high degree of leverage lessens bank's profitability.*
Asset Tangibility

Tangible assets have important implications in capital structure determination. The trade-off theory and the agency theory suggest the positive impact of tangible assets on the usages level of leverage as tangible assets can be used as collateral. Thus, a firm with more fixed assets can have more access to debt (Titman and Wessels, 1988; Zou and Xiao, 2006; Sbeti and Moosa, 2012; Sorana, 2012; Vinh Vo, 2016; Khan *et al.,* 2020). As a result, firms with more tangible assets can reduce the agency cost and the cost of external funds (Myers, 1977; Booth *et al.,* 2001).

On the contrary, firms that do not have tangible assets to use as collateral have a chance of an increase in agency cost and the cost of borrowing (Jenson and Meckling, 1976). Also, firms without sufficient collateral must pay more interest, forcing them to issue equity rather than cheap or low-cost debt (Scott, 1977). As a result, Bevan and Danbolt (2002), Pandey (2004), Mazur (2007), Sheikh and Wang (2010) discover negative association which supports the pecking order theory. In this study tangibility of assets is determined by using the following formula:

$$Asset\ Tangibility = \frac{Tangible\ Fixed\ Assets}{Total\ Assets} \tag{3}$$

H₁ᵦ*: Ceteris paribus, bank's asset tangibility has negative effect on capital structure or leverage.*

2.4 Tax Shield

Since the capital structure theory of Modigliani and Miller, it is widely accepted that interest payment is a tax-deductible expense. The tax-deduction feature of capital structure or leverage greatly impacts the capital mix decision (Rajan and Zingales, 1995; Graham, 2000). Some research on tax-based hypothesis substantially influences financing decisions (Lim, 2012), while others do not have proof to accept it (Titman and Wessels, 1988; Chen, 2004). Based on the tax savings properties of debt financing, trade-off theory demonstrates a positive relationship between tax shield and capital structure or leverage. Thus, if the tax rate increases at a higher rate, large firms use more debt to enjoy the tax savings facility (Bradley *et al.,* 1984; Sorana, 2012).

Other than debt, firms have some other tax-deductible items, also like non-cash items. Hence, if firms have high agency conflicts, then the use of debt is not desirable (Sorana, 2012). However, tax permits a firm to reduce its earnings before tax by subtracting non-cash items like depreciation and amortization on tangible and intangible assets (Teker *et al.,* 2009). So, firms can use non-debt tax shields to replace debt tax write-off (DeAngelo and Masulis, 1980). The Tax Shield is calculated as:

$$Tax\ Shield = Interest\ of\ Debt\ X\ Tax\ Rate \tag{4}$$

H_{1c}: Ceteris paribus, tax shield has positive effect capital structure or leverage.
Capital Adequacy Ratio

A bank failure is the primary concern of stakeholders as it acts negatively in the economy. Regulators are trying to protect the depositors by ensuring higher capital adequacies of banks by BASEL norms. It also encourages keeping the level of leverage minimum to protect banks from the process of the insolvent. The Capital Adequacy Ratio (CAR) is calculated as:

$$Capital\ Adequacy\ Ratio\ (CAR) = \frac{Tier\ 1\ Capital + Tier\ 2\ Capital}{Risk\ Weighted\ Assets} \tag{5}$$

From a market perspective, banks' capital structure is substantially relied on capital adequacies in maximizing stockholder's wealth. Pringle (1975, p. 546) argued that banks' capital structure directly influenced the individual lending policy and affected the aggregate form's financial intermediation. In market imperfections, Modigliani and Miller's (1958) irrelevance theory became invalid and revealed an interesting finding that the means of higher composition of debt in the capital structure ends with the bank failure and higher cost of intermediation. In this study, the capital adequacy ratio is denoted as regulatory capital (RegCap).

H_{1d}: Ceteris paribus, there is an association between Capital Adequacy Ratio (Regulatory Capital) and capital structure or leverage.

2.5 Credit Risk

The borrowing cost of funds and the bank credit risk are collectively responsible for higher capital structure or leverage and lowering the capital ratios (Akbar, 2013). Indeed, bank credit risk indicates the proportion of non-performing loan to total loan which reflects the poor performance of banks. However, the study conducted by Noomen and Abbes (2018) found that credit risk have no direct effect on capital structure or leverage but have a negative relationship with profitability. Moreover, Zheng *et. al.* (2018) revealed that bank credit risk has negative effect on profitability as higher non-performing loan causes to decrease interest revenue and also decrease the earning capacity of assets. In most of the cases, credit risk is supposed to be the cause of bank failure. Credit risk is calculated as:

$$Credit\ Risk = \frac{Total\ Nonperforming\ Loan}{Total\ Loan} \tag{6}$$

H_{2b}: *Ceteris paribus, bank's credit risk has negative effect on profitability.*

2.6 Liquidity

Liquidity means a firm's ability to meet short-term debt obligation. The empirical study about the relation between liquidity and profitability is found negative (Siddik *et al.,* 2017). The inverse relation between these variables is required as more liquidity refers lower rate of return. In this study, the association between liquidity and profitability are assumed negative. Current Ratio is used as a proxy of liquidity. The liquidity is calculated as:

$$Liquidity = \frac{Current\ Assets}{Current\ Liabilities} \tag{7}$$

H_{2c}: *Ceteris paribus, there is a negative association between bank's liquidity and profitability.*

2.7 Growth

Growth opportunities have crucial impact on firm's profitability. The relation between growth and profitability are suggested positive by different studies (Salim and Yadav, 2012; Soumadi and Hayajneh, 2012; Siddik *et al*., 2017). This report also considers positive relation between these variables. Growth is calculated as:

$$Growth = \frac{Market\ Value\ of\ Total\ Assets}{Book\ Value\ of\ total\ Assets} \tag{8}$$

H_{2d}: *Ceteris paribus, bank's growth opportunity ensures higher profitability.*

3. Methodology

The study considered twenty-seven (27) commercial banks for the period of 2009 to 2016 of 243 observations of balanced panel data. Based on the preliminary diagnosis and empirical evidence, it is found that capital structure model has endogenous effect on bank profitability. Therefore, we deploy a simultaneous equation for both capital structure and profitability model. The study conducted by Asteriou and Hall (2007) revealed that panel data deals with increased number of observation due to the effect of both time series (t) and cross-sections (i).

The simultaneous equation is most preferred in the ground that it checks "back and forth" causation of the variables of interest. The Generalized System of Moments (GMM) technique is used in dynamic panel (Arellano and Bover, 1995; Blundell and Bond, 2000) to overcome the problem of endogeneity, heteroskedasticity, and autocorrelation. The empirical model of the study is given below:

Model (1): Capital Structure

$$CAPStruc_{it} = \beta_1 CAPStruc_{it-1} + \beta_2 Profitability_{it} + \beta_3 Tangibility_{it} + \beta_4 Tax\ Shield_{it} + \beta_5 RegCap_{it} + \varepsilon_{it} \tag{9}$$

Model (2): Profitability

$$Profitability_{it} = \alpha_1 Profitability_{it-1} + \alpha_2 CAPStruc_{it} + \alpha_3 CRisk_{it} + \alpha_4 Liquidity_{it} + \alpha_5 Growth_{it} + \varepsilon_{it} \tag{10}$$

Where $CAPStruc_{it}$ represents the model of Capital structure and $Profitability_{i,t}$ represents the model of bank profitability. Subscript 'i' refers the cross-sectional dimension across banks. 't' denotes the time dimension (i.e., t = 2009, 2010, 2011…...., 2016). One year lagged dependent variable represented by $Y_{i,\ t-1}$. In the preliminary diagnosis, it is found that the models are appropriate in fixed effect rather than random effect based of Hausman test where the rejection of null hypothesis confirms the validity of fixed effect model in the regression equation model.

Finally, the result of Sargan test shows that the over identification restriction is valid, i.e., instruments are suited and sufficient for both models.

3.1 Preliminary Diagnosis

3.1.1 Data Stationary Check
The panel unit root tests strongly statistically significant at all testing level. That means, Levin, Lin and Chu adjusted t-static, Im, Pesaran and Shin W-stat, Maddala and Wu (1999) ADF - Fisher Chi-square and PP - Fisher Chi-square test reject the null hypothesis and support the presence of stationarity in the panel data set.
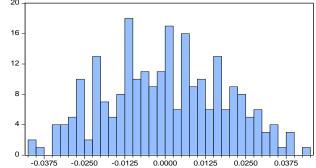
Table 1. *Summary of Panel Unit Root Test*

Series: Capital structure or leverage				
Sample: 2008 to 2016				
User-specified lags: 1				
Method	**Statistic**	**Prob.****	**Cross-sections**	**Observation**
Null: Unit root (assumes common unit root process)				
Levin, Lin and Chu t*	-15.229	0.000	27	216
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.3259	0.000	27	216
ADF - Fisher Chi-square	137.763	0.000	27	216
PP - Fisher Chi-square	125.543	0.000	27	216

Note: *** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.*
Source: *Authors' Calculation.*

Figure 1. *Normality Check*

Source: *Authors' Calculation.*

The normality check graph shows that the data set are normally distributed as the Jarque-Bera test 5.178241 is statistically significant at 10% significance level.

3.1.2 Heteroskedasticity Test
The probability of F-statistic, Obs*R-square and Scaled explained SS indicate that the panel data series are statistically significant at 5% or 1% significance level. That means the presence of heteroskedasticity is found by rejecting the null hypothesis.

Table 2. *Heteroskedasticity Test: White*

Heteroskedasticity Test: White			
F-statistic	13.20142	Prob. F (20,222)	0.0000
Obs*R-squared	132.0065	Prob. Chi-Square (20)	0.0000
Scaled explained SS	1050.083	Prob. Chi-Square (20)	0.0000
Breusch-Godfrey Serial Correlation LM Test			
Obs*R-squared	53.73736	Prob. Chi-Square (2)	0.0000
Endogeneity Test			
	Value	df	Probability
Difference in J-stats	6.109697	1	0.0134

Source: *Authors' Calculation.*

3.1.3 Serial Correlation Test

Table 3. *Breusch-Godfrey Serial Correlation LM Test*

Obs*R-squared	53.73736	Prob. Chi-Square (2)	0.0000

Source: Authors' Calculation.

The Obs*R-squared, 53.73736 is statistically significant at 1% significance level, that means, the null hypothesis is rejected with the existence of serial correlation.

3.1.4 Endogeneity Test

Table 4. *Endogeneity Test*

	Value	df	Probability
Difference in J-stats	6.109697	1	0.0134

Source: Authors' Calculation.

The probability or p-value of difference in J-stats is statistically significant at 5% significance level. That means the Husman endogeneity test supports alternative hypothesis, that is, the data set have endogeneity.

3.2 Analysis and Findings

3.2.1 Descriptive Statistics

The summary of statistical descriptions of the panel data set are shown in the table 05. From 243 observations, the mean and the standard deviation of capital structure or leverage are 0.9155 and 0.0245, respectively. On the other hand, among all variables, profitability has highest mean, 1.4147 and variability, 0.7550. After profitability, growth has 1.0665 mean value and 0.2201 standard deviation.

Table 5. *Descriptive Statistics*

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
CAPStruc	243	0.9155	0.0245	0.8457	1.0992
Profitability	243	1.4147	0.7550	-0.1000	6.0500
Tangibility	243	0.0210	0.0113	0.0026	0.0764
Tax Shield	243	0.0722	0.0166	0.0274	0.1114
RegCap	243	0.0923	0.0247	-0.1048	0.1478
CRisk	243	0.0465	0.0344	0.0017	0.3129
Liquidity	243	0.3180	0.0689	0.1658	0.5256
Growth	243	1.0665	0.2201	0.9023	3.1403

Source: Authors' Calculation.

3.2.2 Univariate Analysis

Table 6. *Pearson's Correlation Matrix*

	CAPStruc	Profitability	Tangibility	Tax Shield	CAR	CRisk	Liquidity	Growth
CAPStruc	1	-.347**	-.178**	-.171**	-.872**	.439**	.049	-.039
Profitability		1	-.154*	-.070	.305**	-.366**	-.329**	.327**
Tangibility			1	-.110	-.032	.381**	.269**	-.075
Tax Shield				1	.174**	-.174**	-.031	-.191**
RegCap					1	-.571**	-.137*	.026
CRisk						1	.450**	-.109
Liquidity							1	-.113
Growth								1

*Note: *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level*
Source: Authors' Calculation.

The correlation between profitability and tangibility, regulatory capital or capital adequacy ratio and liquidity are significant at 10% significance level. On the other hand, capital structure or leverage and profitability, capital structure and tangibility, capital structure and tax shield, capital structure and regulatory capital, capital structure and credit risk are significant at 5% level.

However, the correlation of profitability with regulatory capital, credit risk, liquidity and growth are significant at 5% level. Tangibility and credit risk, tangibility and liquidity, tax shield with regulatory capital, credit risk and growth, regulatory capital with credit risk, and credit risk with liquidity are statistically significant at 5% significance level.

Capital structure or leverage is negatively related with profitability, tangibility, tax shield, regulatory capital, and growth; and positively correlated with credit risk and liquidity. On the other hand, profitability is positively related with regulatory capital and growth. Tangibility has negative association with tax shield, regulatory capital, and growth. Here tax shield, only move positively with regulatory capital. Both credit risk and liquidity have negative relation with growth.

3.2.3 Multivariate Analysis

Table 7. *Pooled regression model for Capital structure or leverage of the commercial banks in Bangladesh (2008-2016)*

Source	SS	df	MS	Observations		216
Model				**F(5, 210)**		183
	0.0844	5	0.0169			.54
Residual	0.0193	210	0.0001	**Prob> F**		0.0000
Total	0.1038	215	0.0005	**Adj R-squared**		0.8093
Variables	**Coef**		**Std. Err.**	**P > I t I**	**[95% Conf. Interval]**	
Lag 1						
CAPStruc	0.2586		0.0347	0.0000	0.1902	0.3270
Profitability	-0.0059		0.0009	0.0000	-0.0077	-0.0040

Tangibility	-0.4769	0.0587	0.0000	-0.5926	-0.3612
Tax Shield	-0.0541	0.0410	0.1880	-0.1349	0.0266
RegCap	-0.5655	0.0418	0.0000	-0.6479	-0.4830
Constant	0.7524	0.0350	0.0000	0.6833	0.8214

Source: Authors' Calculation.

Table 7 represents the pooled regression model for capital structure or leverage. The coefficient of capital structure and the constant has positive value whereas other four variables- profitability, tangibility, tax shield and regulatory capital have negative relation. Here, the lag 1 capital structure change in the same direction of capital structure as the coefficient is positive. On the other hand, the negative coefficient of profitability indicates that the increase of profitability will decrease the use of capital structure or leverage. This also applicable for tax shield, means higher the tax savings lower the capital structure. However, all other variables, lag 1 capital structure, profitability, tangibility, and regulatory capital are statistically significant at 1% level, except tax shield.

Table 8 shows the fixed and random effect of capital structure. For both cases, fixed effect model and random effect model, lag 1 capital structure, profitability, tangibility, and regulatory capital are statistically significant at 1% level and tax shield is significant at 10% level.

Moreover, both methods have negative co-efficient for profitability, tangibility, tax shield, and regulatory capital. This is a clear indication of negative relation of profitability, tangibility, tax shield and regulatory capital. Thus, the increase of profitability decreases the level of leverage or vice versa. Similarly, the more the leverage in capital mix the less the firm's tax benefit and this result supports trade off theory, which states that more leverage decreases the tax benefit and ultimately increase the bankruptcy cost.

Table 8. *Comparative position of Capital structure or leverage in Fixed Effect and Random Effect*

Variables	Fixed Effect		Random Effect	
Lag 1 CAPStruc	0.0858*** (0.0334)		0.2454*** (0.0345)	
Profitability	-0.0044*** (0.0008)		-0.0058 (0.0009)	
Tangibility	-0.6799*** (0.0998)		-0.4815*** (0.0601)	
Tax Shield	-0.0755* (0.0438)		-0.0583 (0.0411)	
RegCap	-0.5682*** (0.0411)		-0.5713*** (0.0415)	
Constant	0.9145*** (0.0329)		0.7652*** 0.0348)	
Observations = 216	R-squared:		R-squared:	
Groups = 26	within	0.7511	within	0.7217
	between	0.8103	Between	0.9031
	overall	0.7714	overall	0.8137
	F(5,184)	111.08	Wald chi2(7)	470.59
	Prob> F	0.0000	Prob> F	0.0000

*Note: *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.*
Source: Authors' Calculation.

However, the overall R-squired in fixed effect is 0.7714 indicates the 77.14% variability of the variables can be explained by this model. The random effect model R-squired is explaining 81.37% variability. The probability of F test also statistically significant at 1% significance level for both methods.

Table 9 shows the Hausman test for fixed effect and random effect. The probability of chi2 shows that the Hausman test is statistically significant at all level. This indicates the null hypothesis is rejected indicating the difference in coefficients are systematic. So, fixed effect model is applicable for this model.

Table 9. *Hausman test for selection of Fixed Effect/Random Effect*

Variables	Fixed Effect (fe)	Random Effect (re)	Difference
Lag 1 CAPStruc	0.0858	0.2454	-0.1596
Profitability	-0.0044	-0.0058	0.0014
Tangibility	-0.6799	-0.4815	-0.1984
Tax Shield	-0.0755	-0.0583	-0.0172
RegCap	-0.5682	-0.5713	0.0032

Source: *Authors' Calculation*

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic

$$\text{chi2}(5) = (b-B)'[(V\_b-V\_B)^{\wedge}(-1)](b-B)$$
$$= 215.76$$
$$\text{Prob>chi2} = 0.0000$$

Table 10. *Pooled regression model for Profitability of the commercial banks in Bangladesh (2008-2016)*

Source	SS	df	MS	Observations		216
Model	62.5527	5	12.5105	F (5, 210)		40.10
Residual	65.5238	210	0.3120	Prob> F		0.0000
Total	128.0766	215	0.5957	Adj R-squared		0.4762
Variables	Coef	Std. Err.		$P > I t I$	[95% Conf. Interval]	
Lag 1 Profitability	0.4343	0.0573		0.0000	0.3213	0.5472
CAPStruc	-6.5788	1.9205		0.0010	-10.3648	-2.7929
CRisk	-2.0922	1.5193		0.1700	-5.0872	0.9029
Liquid	-1.5841	0.6378		0.0140	-2.8414	-0.3267
Growth	0.6462	0.1709		0.0000	0.3092	0.9831
Constant						10.2347
	6.6833	1.8015		0.0000	3.1319	

Source: *Authors' Calculation.*

Table 10 represents the pooled regression model for profitability. Among all variables, lag 1 profitability, growth and constant have positive coefficient, means more ROA and growth the more will be the profitability. On the other hand, capital structure, credit risk and liquidity have negative slope coefficient. This means if the

firm use more leverage or increase credit risk or hold more liquid asset then the profitability will decrease. All variables are, lag 1 profitability, capital structure, growth, and constant are statistically significant at 1% level, except credit risk and liquidity.

Table 11 shows the fixed and random effect of profitability. Both fixed effect and random effect model show that lag 1 profitability and growth are statistically significant at 1% level. The coefficients of capital structure, credit risk and liquidity are negative, indicating inverse relation with profitability. Here all variables are statistically significant either in 1% or 5% or 10% except credit risk in case of random effect.

Table 11. *Comparative position of Profitability in Fixed Effect and Random Effect*

Variables	Fixed Effect		Random Effect	
Lag 1 Profitability	0.3050*** (0.0618)		0.4343*** (0.0573)	
CAPStruc	-4.9833* (2.7718)		-6.5788*** (1.9205)	
CRisk	-5.4364** (2.4434)		-2.0922 (1.5193)	
Liquid	-3.4962*** (0.8981)		-1.5841* (0.6378)	
Growth	0.7698*** (0.1864)		0.6462*** (0.1709)	
Constant	6.0573** (2.5661)		6.6833*** (1.8015)	
Observations = 216	R-squared:		R-squared:	
Groups = 26	within	0.4470	within	0.4114
	between	0.4775	Between	0.7535
	overall	0.4345	overall	0.4884
	F(5,184)	29.74	Wald chi2(7)	200.48
	Prob> F	0.0000	Prob> F	0.0000

Note: *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level
Source: *Authors' Calculation.*

However, the overall R-squired in fixed effect is 0.4345 indicates the 43.45% variability of the variables can be explained by this model. The random effect model R-squired is explaining 48.84% variability. The probability of F test also statistically significant at 1% significance level for both methods.

Table 12. *Hausman test for selection of Fixed Effect/Random Effect*

Variables	Fixed Effect (fe)	Random Effect (re)	Difference
Lag 1 Profitability	0.3050	0.4343	-0.1292
CAPStruc	-4.9833	-6.5788	1.5955
CRisk	-5.4364	-2.0922	-3.3443
Liquid	-3.4962	-1.5841	-1.9121
Growth	0.7698	0.6462	0.1236

Source: *Authors' Calculation.*

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 36.89
Prob>chi2 = 0.0000

Table 12 shows the Hausman test for fixed effect and random effect in case of profitability. The probability of chi[2] shows that the Hausman test is statistically significant at all level. This indicates the null hypothesis is rejected indicating the difference in coefficients are systematic. So, fixed effect model is applicable for this model.

Table 13. *GMM based regression model for Capital structure or leverage of the commercial banks in Bangladesh (2009-2016)*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Lag 1 CAPStruc	-0.1478	0.0156	-9.4796	0.0000
Profitability	-0.0042	0.0014	-3.0540	0.0027
Tangibility	-0.6905	0.0670	-10.3093	0.0000
Tax Shield	0.0262	0.0968	0.2701	0.7874
RegCap	-0.1486	0.0898	-1.6546	0.1000
Constant	-0.4552	0.1651	-2.7568	0.0065
S.E. of regression	**0.0072**	**Durbin-Watson stat**		**1.4795**
R-squared	**0.9382**	**J-statistic**		**2.4542**
Adjusted R-squared	**0.9256**	**Prob(J-statistic)**		**0.2931**

 Note: Dependent Variable: Capital structure, Method: Panel GMM, Sample (adjusted): 2009 to 2016, Periods included: 8, Cross-sections included: 27, Total panel (balanced) observations: 216
Source: *Authors' Calculation.*

Table 13 shows GMM based regression model for capital structure or leverage. Here, the coefficient of profitability is negative and statistically significant. This result indicates that profitable banks in Bangladesh are using lower level of capital structure or leverage. This finding also support the concept of pecking order theory and some empirical studies mentioned in current literature (Titman and Wessels, 1988; Rajan and Zingales, 1995; Bevan and Danbolt, 2002; Fama and French, 2002; Panno, 2003; Bevan and Danbolt, 2004; Zou and Xiao, 2006; Sheikh and Wang, 2010).

The tangibility parameter has negative coefficient which is also statistically significant at all level. This result proves the fact that banks having higher portion of fixed assets in total assets have lower debt ratio. So the negative association of tangibility with capital structure or leverage is consistent with pecking order theory and with empirical studies of Bevan and Danbolt (2002), Pandey (2004), Mazur, (2007) and Sheikh and Wang, (2010).

On the other hand, the coefficient of tax shield is positive but statistically insignificant. The positive coefficient supports trade-off theory and studies of Bradley *et al.* (1984) and Sorana, (2012). However, the probability of J-statistic is not significant indicating the null hypothesis cannot be rejected, means the instrumental variables are valid.

Table 14 shows GMM based regression model for profitability. The coefficient of capital structure is negative and statistically significant. This means profitable banks in Bangladesh are using less capital structure to solve their financing problem.

Table 14. *GMM based regression model for Profitability of the commercial banks in Bangladesh (2009-2016)*

Variable		Coefficient	Std. Error	t-Statistic	Prob.
Lag	**1**				
Profitability		0.2824	0.0912	3.0968	0.0023
CAPStruc		-5.9212	3.2490	-1.8225	0.0700
CRisk		-8.0154	1.8043	-4.4423	0.0000
Liquid		-2.6024	0.6081	-4.2796	0.0000
Growth		0.6830	0.1754	3.8941	0.0001
Constant		6.8699	2.7089	2.5361	0.0120
R-squared		**0.7345**	**Durbin-Watson stat**		**1.8639**
Adjusted R-squared		**0.6898**	**J-statistic**		**9.3371**
S.E. of regression		**0.5408**	**Prob (J-statistic)**		**0.2513**

Note: *Dependent Variable: Profitability, Method: Panel GMM, Sample (adjusted): 2009, Periods included: 8 2016, Cross-sections included: 27, Total panel (balanced) observations: 216*
Source: *Authors' Calculation.*

The liquidity coefficient is also negative and statistically significant. This signifies that higher liquidity earn lower profit. This also found in the studies of Tran *et al.* (2016), Siddik *et al.* (2017) and Abbas *et al.* (2019). So, liquidity management is essential for Bangladeshi banks to earn higher profits. On the other hand, credit risk also has negative and statistically significant impact on profitability of commercial banks in Bangladesh. This association also found in Abbas *et al.* (2019). In contrast, the growth parameter has positive and significant coefficient. This means commercial banks with higher growth in Bangladesh has higher profitability. This also found in case of lag 1 profitability. The probability of J-statistic (0.2513) is not significant indicating the null hypothesis is not rejected, means the instrumental variables are valid.

4. Conclusions

Banking sector plays a significant role in the economic development of a country. The most alluring incentive for the shareholder is the profit which is extracted from the complex business operation. Therefore, any deviations of the continuing profit tagging firms fall in a greater pressure both in internal and external forces. The study addressed the concurrent effect of leverage as a proxy of capital structure and profitability in the developing country context like Bangladesh. It is found that bank capital structure and profitability are endogenously determined and have a negative effect. Though firms are interested to use debt in the capital structure, but they should be aware of being overuse as it demises firm's profitability and ultimately turns into

financial crisis. The regulatory authorities should guide the banks to use appropriate mixture of debt in the capital structure so that it can resist bank failure.

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