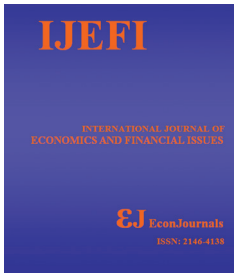


International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2019, 9(5), 63-70.

Testing Trade-off and Pecking Order Theories of Capital Structure: Evidence and Arguments

Md Takibur Rahman*

Department of Accounting Information Systems, Faculty of Business Administration and Management, Patuakhali Science and Technology University, Patuakhali-8602, Bangladesh. *Email: takib@pstu.ac.bd

Received: 05 July 2019 **Accepted:** 01 September 2019 **DOI:** https://doi.org/10.32479/ijefi.8514

ABSTRACT

Empirical studies suggests that banks' capital structure is time invariant and bank-specific. Unobserved time invariant bank-specific effects are important in explaining the financial decision of the banks regarding capital structure. Two theories of finance explaining the target capital structure decisions are tested based on bank specific variables using traditional and advanced panel data econometric models. The study used twenty-seven listed commercial banks in Bangladesh over a period of 2009-2013. The results suggest that profitability, tangibility, liquidity, dividend payment and growth rate have statistically significant effects on capital structure. Five bank specific variables out of the seven confirm the trade-off theory and remaining two confirm pecking order theory. The implication of this study is that the bank specific determinants of capital structure are same as in the finance theory, suggesting that the finance managers of the sample banks may consider these determinants as a benchmark in capital structure decision.

Keywords: Leverage, Trade-off, Pecking Order, Bank, Capital Structure
JEL Classifications: C5, C58, G11

1. INTRODUCTION

The capital structure is defined by the composition of the capital of a firm from different sources of finance e.g., debt and equity, which a firm considers appropriate for improving and continuing its operations over time. The selection of target capital structure is an important strategic financial decision for every finance manager (Gropp and Heider, 2010; Modigliani and Miller, 1958). It is because the costs of capital and financial risks mainly depend on the choice of capital structure (Mishkin et al., 2000), which encouraged the academics and professionals to carry many empirical works focused on the determinants of capital structure. Several factors of both firm specific, industry specific and macro-economic variables were tested empirically to identify the determinants of capital structure.

Many of the empirical works are based on the two theories of capital structure like trade-offand pecking order theory developed by Modignliani and Miller's in 1963, and by Myers and Majluf in 1984 respectively. However, Shyam-Sunder and Myers (1999) study concluded that pecking order theory has more explanatory power than trade-off theory. The study of Fama and French (2002) concluded that both theories have some explanatory power of explaining financial behavior of the firms and neither of these can be uniformly accepted or rejected. It is because the differences in assumptions; for instances the trade-off and pecking order theory assume that differences in capital structure is due to the differences in taxes and information respectively.

The trade-off theory supports that firm should use a reasonable amount of both debt and equity for maximizing the value of the firm (Amidu, 2007). It is because the use of debt enables the firms to save tax due to the increased interest expenditure of additional debt capital (Modigliani and Miller, 1963). However, Beattie et al. (2004) concluded that firms should maintain a capital structure that allows a balance between costs and benefits of additional

debt capital. Accordingly, each firm should maintain the capital structure that gives the maximum value of the firm and minimizes the financial risks.

The pecking order theory assumes that insider (managers) have more information about the prospects of the firms than the outsiders (investors) do and hence managers act in the best interest of the owners of the firms (Modigliani and Miller, 1958). This theory is an alternative to the trade-off theory suggesting that firms prefer internal financing (such as retained earnings) to external financing. However, debt financing is preferred only when equity funds are not sufficient to finance the growth of the firm. Contrary to trade-off theory there is no optimal debt ratio in pecking order theory rather it suggest that capital structure of firm depends on the financing requirements of the firms over time. Accordingly, there is no concept of optimum capital structure (Beattie et al., 2004).

The objective of this study is to test relevance of trade-off and pecking order theories of capital structure based on bank specific variables using a panel data sample of twenty seven listed commercial banks in Bangladesh. The study is carried using traditional and advanced panel data econometric models supported by different statistical tests for panel data estimators.

There are many studies focused on the determinants of capital structure of commercial banks in many countries. Specifically, Jucá et al. (2012) who tested and confirmed that the assets risks, amount of deposits, profitability and growth opportunities have the significant influence on capital structure of North-American financial institutions. Studies by Octavia and Brown (2010), Gropp, and Heider (2010) found that, size, profitability, growth, bank guarantees[1], dividend payment, and assets risks have significant influence on capital structure and concluded that commercial banks holding capital over the Basel[2] minimum requirement have lesser risk. However, the findings of Nguyen and Kayani (2013) study are more interesting who found that the stage of growth, collateral and profit are significant factors influencing the capital structure and results in disparity between banks' capital structure of Asian developed and developing countries.

Bangladesh banking sector is seem to be an interesting case for this study for many reasons including the growth of the sector in terms of number of banks, instruments, and volume of assets. However, the sector is facing many challenges due to increasing malpractices, frauds and heist. These opportunities and challenges may have significant impact on financial behavior of commercial banks in Bangladesh. It is because the lack of governance in internal management and in markets influence profitability, growth opportunities, size and business risks of the banks, which in turns, affect target capital structure of the banks. In empirical study, effects of different factors specific to the bank such as size, profitability, growth rate, taxes and business risk are used to identify a target capital structure that allows a balance between long terms value of the banks and its exposure to risk. This study considers profitability, tangibility, liquidity, dividend payout ratio, growth, age and size of the banks covering a period of 5 years (2009-2013).

The finding of this study may be of interest to the finance manager of individual bank and regulators of markets in understanding the financial behaviors influencing the capital structure of the banks. Furthermore, the other researchers may use this study as a basic guideline for handling panel data econometric models for analyzing capital structure with a macro panel of long time series for more insight.

The paper is structured as follows: The second section describes the data, materials, and methods; the third section provides results and discussion; the fourth section concludes the paper.

2. DATA, MATERIALS AND METHODS

2.1. Data

The data of this study is based on the published annual reports of twenty-seven listed commercial banks in Bangladesh. The banks are selected based on the availability of published annual reports online for the studied period from 2009-2013. The selected variables include tangibility, profitability, growth rate, liquidity, dividend payout ratio, size and age of the banks. The variables are based on the research objective and available relevant literatures including (Ali et al., 2013; Leary, 2009; Daskalakis and Psillaki, 2008; Sayılgan et al., 2006; Gaud et al., 2005; Hall et al., 2004; Cassar and Holmes, 2003; Ozkan, 2001; Michaelas et al., 1999; Rajan and Zingles, 1995). The variables, its measurement and theoretical expectations are briefly presented in Table 1.

In Table 1, the variables are listed in first column and abbreviated in third column. The last column provides the expected impacts (positive or negative) of the selected variables (determinants) on leverage of the bank based on trade-off and pecking order theory of capital structure.

The descriptive statistics of dependent (leverage) and explanatory variables of the sample banks over studied period are given in Table 2.

The standard deviation of the selected variables shows reasonable amount of variations across the banks except age. However, when age is logarithmically transformed it gets smaller indicating minimum variations. It also show that at least one bank in the samples has very high liquidity ratio (7.77). It may be due to that, either the investment opportunities are limited in general in the economy or that particular bank may not exploit the available investment opportunities. The mean growth rate is negative which indicates that during the studied period the banks in the sample have experienced negative growth rate may be due to sluggish economy. Although, some of the banks, at least one, in the sample have experience moderately higher positive growth rate, it again highlights weakness in the market since in a perfectly competitive market it is difficult for a particular bank to perform above the

[1] Bank guarantees refers to the given promise by the bank in favor of its clients that the liabilities will be met at the event of failure in fulfilling its contractual obligations.

[2] Basel refers to a set of international banking regulations by the Basel Committee on Bank Supervision (BCBS) that sets out the minimum capital requirements of Banking institution to minimize credit risk.

Table 1: Data description and measurement

Independent variables	Definition and measurements	Variable name used	*Theoretical expectation
Leverage ratio	Long-term debt divided by total assets. It is the dollar amount of debt against each dollar of assets. Ideally, it should not be more than 1:1 (Rajan and Zingales, 1995; Xu, 2012; Gaud et al., 2005)	LevR	
Independent variables			
Profitability	Return on Assets (ROA). Net income before interest and taxes divided by the net assets value. It is assumed that higher the ratio lower the dependence on external financing (Harris and Raviv, 1991; Titman and Wessels, 1998; Qiu and La, 2010; Noulas and Genimakis, 2011)	ROA	+ (tradeoff)/− (pecking order)
Tangibility	Fixed assets to total assets. It measures tangibility of assets. It attempts to differentiate fixed assets from all other assets that a Bank consider while valuing the Bank like goodwill, patents, and current assets (Rajan and Zingales, 1995; Gaud et al., 2005; Sayılgan et al., 2006).	TanR	+ (tradeoff)/− (pecking order)
Liquidity	Current ratio (i.e., Current assets divided by current liabilities). It measure the ability of the bank to meet current financial obligation. Ideally should be more than 1:1 for financial institution (Deesomsak et al., 2004; Viviani, 2008).	LiqR	+ (tradeoff)/− (pecking order)
Dividend payout ratio	It is calculated by dividing amount dividend paid by the total amount of net income after interest and taxes. Dividend is the amount of net income which is paid out to the shareholders (Myers, 1984; Aggarwal and Kyaw, 2010)	DPR	+ (tradeoff)/− (pecking order)
Growth	Percentage increase in total assets over time is considered as growth of the banks. Growing bank will need more external fund to finance its growth opportunities (Rajan and Zingales, 1995; Chen et al., 1997; Chen, 2004; Bevan and Danbolt, 2001; Ameer, 2013)	GrR	− (tradeoff)/+ (pecking order)
Size	It is natural logarithm of amount of total assets. Larger banks needs more external source of funding (Padrón et al., 2005; Gaud et al., 2005; Sayılgan et al., 2006)	size	+ (tradeoff)/− (pecking order)
Age	It is the number of years the banks are in operations. The banks' borrowing capacity increase as the bank become more mature (Wald, 1999; Eriotis et al., 2007)	Age	+ (tradeoff)/− (pecking order)

average, which is only possible if does have some strategic advantages over the other.

2.2. Empirical Models

Different models are primarily estimated such as pooled ordinary least square (OLS), fixed effects (FE) and random effects (RE). The pooled OLS (POLS) is estimated based on the assumption that there are no groups or individuals effects among the banks in the sample. Furthermore, fixed and RE models are used assuming that, there might have cross sectional effects on each bank or on set of group of banks since the panel contained on the same cross sectional units (banks) over 5 years' time period. In addition, the FE model considers the individuality of each bank in the sample by allowing intercept to vary for each bank, but still assuming that the slope coefficients are constant across banks. The RE model estimates the coefficient assuming that the individual or group effects are uncorrelated with the independent variables. Finally, different statistical tests are performed to select the final model to be used for result discussions and conclusions. The three primary models are specified as follows.

POLS:

The POLS model ignores the panel structure of the data.

$$LevR_{it} = \beta_0 + \beta_1 ROA + \beta_2 TanR + \beta_3 LiqR + \beta_4 DPR + \beta_6 GrR + \beta_7 SIZE + \beta_8 AGE + u_{it} \quad (1)$$

The subscript i refers to the cross sectional dimension and t denotes time series dimension of the dataset. $LevR_{it}$ denotes the dependent variable, leverage ratio. The term β_0 is the intercepts and β_{it} are the slope coefficients and X_{it} are the independent variables (Table 1) as follows (k=1, 2, 3,……, 7). The term u_{it} is the random error term of bank 'i' and time't'.

Table 2: Summary statistics of the dependent and explanatory variables of the sample banks

Independent variables	Mean	Max	Min	Std. dev.
LevR	0.24	2.98	0.00	0.50
ROA	0.22	7.77	0.01	0.81
TanR	0.25	3.69	0.01	0.50
LiqR	1.45	9.96	0.01	1.75
DPR	0.32	2.96	−0.99	0.56
GrR	−0.08	6.65	−1.00	0.90
AGE (years)	18.00	44.00	9.00	7.00
LnAGE	2.85	3.78	2.20	0.34
SIZE (in million BDT)	6.60	10.34	1.04	3.82

FE model:

$$LevR_{it} = \beta_0 + \beta_1 ROA + \beta_2 TanR + \beta_3 LiqR + \beta_4 DPR + \beta_6 GrR + \beta_7 Size + \beta_8 Age + u_{it} \quad (2)$$

$$u_{it} = \alpha_i + \gamma_t + \epsilon_{it} \quad (3)$$

Where, overall error term u_{it} contains three components, of which $\alpha_i; i = 1,\ldots\ldots,n$ gives bank specific effects, $\gamma_t; t = 1,\ldots\ldots,T$ gives time specific effects, and $\epsilon_{i,}$ gives the remaining (idiosyncratic) component of overall error term u_{it}. The model specified in Eqs. (2) and (3) is the two ways FE model accounting

for both bank specific and time specific effects (Henningsen and Henningsen, 2019).

RE model

This model assumes that variation across banks are random and uncorrelated with the independent variables.

$$LevR_{it} = \beta_0 + \beta_1 ROA + \beta_2 TanR + \beta_3 LiqR + \beta_4 DPR + \beta_6 GrR + \beta_7 SIZE + \beta_8 AGE + \alpha + u_{it} + \varepsilon_{it} \quad (4)$$

Where, u_{it} captures the error between and ϵ_{it} captures error within the individual bank, since, it assumes that bank specific error term is not correlated with the independent variables.

3. RESULTS AND DISCUSSION

This section provides description and discussion on results of the estimated models and are organized as; first, results from three basic models of panel data are described and associated statistical tests to make the final choice of the model. Later on, the results based on finally selected models are described and discussed to reach the conclusions.

Different empirical study used different panel data models individually or in a combination of the models in analyzing the data. This paper has also used combination of different models fitting the panel structure and the data set. According to the argument placed at the methodology part, the data is analyzed with POLS, FE and RE model framed in Eqs. (1), (2 and 3) and (4). The results of these three models are presented in Table 3. The results in Table 3 indicate that how much leverage (Y) changes overtime on average per bank when explanatory variables (X_i) change. The tests results of the models are presented in Table 4. Furthermore, the heterogeneity across the banks and time are shown in Figure 1 in the Appendix A1.

The POLS model (Eq. 2) is estimated assuming that the data is time and cross section invariant. However, the FE model is estimated assuming that there is bank specific individual effects. That is the estimated parameters vary statistically and significantly between the models if differences of individual bank are taken into account. For instance, ROA is significant in both POLS and FE models but parameters are different (Table 3). However, LiqR is significant only in FE model but not in POLS model. It means that there is individual effects so POLS is not suitable (Table 4). Therefore, preferred model is FE model, which will give bank specific intercept. The P value of the FE model is lower than 5% and indicate that the model is okay and adjusted R^2 value of 0.56 confirms the fits of the model. The estimated model also show that each bank has separate intercept (Appendix A2). Furthermore, the FE model is tested against POLS and shows that FE there are significant individual effects and/ or time effects (P=0.000 with df1=26 and df2=101; F=5.12).

However, interpretation of coefficients of explanatory variables obtained from FE model are tricky, since they include both the within-bank and between-bank effects. In the case of this, it indicate only average effect of explanatory variables (ROA and so) on dependent variable (Leverage), when ROA changes across time and between banks. Therefore, it is important to see if the model is time variant using RE model. The RE model results are presented in Table 3 and tests statistics are in Table 4. The p value of the model estimates only indicate that coefficient in the model are different from zero but it is not possible to say anything about relationship between dependent and explanatory variables precisely and about the model validity (Croissant and Millo, 2008; 2019).

The tests results supporting the model selection and its validity are presented in Table 4. Tests results are: First, there is no panel effects (Lagrange-BP test for balanced panel). Second, there is time and individual FE (pFtest and Lagrange multiplier test) indicating that there is no time and individual effects. Third, the residuals of estimated models are correlated indicating that there is cross sectional dependence (BP LM and Pesaran CD tests for cross sectional dependence). Fourth, there is no serial correlation (Bruesch-Goodfrey/Woolridge test) indicating that estimated standard error and R^2 are not biased. Fifth, test for stochastic trend indicating that there is no unit root and indicating that it is stationary. Sixth, test for homoskcedasticity indicating that the model is heteroscedastic.

However, tests for cross sectional dependence using BP-LM and Pesaran CD tests provide contradictory result, but it should not

Table 3: The effects of independent variables on leverage using POLS, FE and RE models

Independent variables	POLS model (Eq. 1)		FE model (FE) (Eq. 2 and 3)		RE model (RE) (Eq. 4)	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Intercept	***0.1	0.27	-	-	***0.06	0.32
ROA	***0.29	0.04	***0.21	0.04	***0.25	0.04
TanR	***0.35	0.07	***0.79	0.08	***0.48	0.07
LiqR	*−0.03	0.02	*−0.03	0.02	**−0.04	0.02
DPR	0.06	0.05	0.05	0.05	0.07	0.05
GrR	**0.10	0.04	***0.17	0.05	**0.11	0.04
LnAGE	0.01	0.09	−0.15	0.24	0.01	0.11
SIZE	0.01	0.01	0.02	0.04	0.01	0.01
Multiple R-squared		0.57		0.67		0.58
Adjusted R-squared		0.55		0.56		0.56
F-statistic: 24.34 on 7 and 127 DF, P<2E-16			29.45 on 7 and 101 DF, P<2E-16		Chisq: 176 on 7 DF, P<2E-16	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 4: Summary of tests statistics

Tests	Tests statistics and hypothesis	Null is
1	Poolability test: Lagrange Multiplier Test - (Breusch-Pagan) for balanced panels Chi-sq=20.681, df=1, P=5.426e-06	
	Alternative hypothesis: significanteffects	Rejected
	Decision: Don't use OLS model	
2	Tests for individual and time effects: PF test: (F test for individual effects) F=0.48775, df1=4, df2=97, P=0.7447	
	Alternative hypothesis: significant effects	Accepted
	Decision: No need to use FE model Lagrange Multiplier Test - time effects (Breusch-Pagan) for balanced panels chisq=1.9478, df=1, P=0.1628	
	Alternative hypothesis: significanteffects	Accepted
	Decision: No need to use FE model	
3	Test for cross sectional dependence: Breusch-Pagan LM test for cross-sectional dependence in panels chisq=464.48, df=351, P=4.48e-05	
	Alternative hypothesis: Cross-sectional dependence	Rejected
	Decision: RE model is more efficient Pesaran CD test for cross-sectional dependence in panels z=0.43527, P=0.6634	
	Alternative hypothesis: Cross-sectional dependence	Accepted
	Decision: RE model is not more efficient	
4	Test for serialcorrelation: Breusch-Godfrey/Wooldridge test for serial correlation in panel models chisq=24.348, df=5, P=0.0001861	
	Alternative hypothesis: Serial correlation in idiosyncratic errors	Accepted
	Decision: RE model is more efficient	
5	Test for stationarity/unit root test: AugmentedDickey-Fuller Test Dickey-Fuller=-5.417, Lag order=2, P=0.01	
	Alternative hypothesis: stationary	Rejected
6	Test for Homoskcedasticity: BP=393.74, df=33, P<2.2e-16	
	The test indicates that there is heteroscedasticity. The null is that it is homoscedastic.	Rejected
	Decision: Use heteroscedastcity consistent RE model	

be problem for micro panel with short time series like this study (Baltagi, 2006).

Hence, the final model should be robust covariance matrix estimation (Sandwich estimator) controlling for heteroscedasticity (Croissant and Millo, 2019). Furthermore, heteroscedasticity consistent fixed and RE model are tested which rejects the null hypothesis that the preferred model is RE controlling for heteroscedasticity. Therefore, following discussions on resultsof this paper are based on heteroscedasticity consistent RE model as shown in Table 5. Furthermore, summary of the results and theories supporting the findings of the study are presented in Table 6.

Profitability (ROA) has statistically significant positive effects on capital structure indicating that higher profitable banks prefer external financing to internal financing, which supports trade-off theory. This result is different from the other studies like Aremu et al. (2013) which supports pecking order theory that highly profitable banks prefer internal sources of financing as an alternative to external source of financing. However, it depends on the expectation of shareholder about dividend, because; if the shareholder expect regular and higher dividend management need to look for external source of financing for the expansion. It indicates that profitable banks pay more dividend than the less profitable banks and use external source for financing growth activities.

Table 5: The effects of independent variables on leverage using heteroscedasticity consistent RE model

Independent variables	Estimate	Std. error	t value	Pr(>|t|)
(Intercept)	***0.06	0.33	0.17	0.86
ROA	*0.25	0.10	2.54	0.01
TanR	***0.48	0.14	3.46	0.00
LiqR	**−0.04	0.02	−2.28	0.02
DPR	*0.07	0.04	1.85	0.07
GrR	**0.11	0.05	2.04	0.04
LnAGE	0.01	0.11	0.09	0.93
SIZE	0.01	0.01	0.25	0.80

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Tangibility (TanR) has statistically significant influence on capital structure of selected banks supporting trade-off theory. It means that leverage increases if proportion of tangible assets increase. This indicates the banks' preferences for external financing when ratio of total fixed assets to total assets is relatively higher. Reasons may be that, tangibility increases collateral capacity of banks, which induce it, to borrow more from outside. However, for non-financial organizations the relationship is negative may be because more fixed assets offers higher profit potential resulting more internally generated fund for financing expansion activities (Cornelli et al., 1998; Huang and Song, 2002; Smith et al., 2012).

Liquidity (LiqR) has statistically significant negative relationship with leverage indicating that leverage is lower for banks with higher liquidity. It means that the banks with more liquidity prefers internal funds rather external funds supporting pecking order theory, which also supports negative relationship. It means that banks in the sample prefers internally generated funds for long term financing needs may be to avoid the costs and risks associated with debt financing. However, trade-off theory suggests that banks with high liquidity can easily manage debt finance, as it is easy for them to pay off interest on time, which may be true for non-financial firms.

Dividend payment (DPR) has statistically significant positive relationship with leverage supporting the trade-off theory indicating that banks paying more dividend, borrow more from external sources. This conclusion is also supported by the positive relationship of ROA and leverage indicating that leverage increases if ROA increases supporting trade-off theory. It means that profitable banks prefer to pay more dividend rather retaining for further investment. It may be due to that dividend payment ratio acts as a good signal to the shareholder about the future growth of the bank.

Growth ratio (GrR) has statistically significant positive relationship with leverage indicating that higher growth banks prefer external

Table 6: Summary of the results and theories supporting the findings of the study

Independent variables	Estimated influence	Trade-off	Theoretical expectation	
			Pecking order	Suggested theory
ROA	+	+	−	Trade off
TanR	+	+	−	Trade off
LiqR	−	+	−	Peckingorder
DPR	+	+	−	Trade off
GrR	+	−	+	Peckingorder
AGE	+	+	−	Trade off
SIZE	+	+	−	Trade off

fund to finance growth opportunities supporting pecking order theory. However, banks need to be more careful in borrowing heavily to finance the expansion because, higher profit leads to higher risk due to the greater uncertainty connected with expansion (Myers, 1977).

Age (LnAGE) and size of the banks has no statistical significant relationship with leverage indicating that it don't have any statistically significant effects on the target capital structure of banks. One reason may be that there is insignificant variation in size and the age of banks in the sample during studied period.

Empirical findings indicate that profitability (ROA), tangibility (TanR), and dividend payment (DPR) have statistically significant influence on banks capital structure supporting trade-off theory (Table 6). It means that the sample banks finance its activities following the financing pattern implied by trade off theory. The implications of these relationships are that the banks in the sample with higher profit (ROA), fixed assets (TanR) and dividend payment ratio are more likely to operate at high debt levels due to their ability to diversify the risk and to take benefits of tax shields on interest payments (Titman and Wessels, 1998; Rajan and Zingales, 1995; Diaz, 2017).

However, statistically significant positive relationship between growth rate (GrR) and leverage supporting the pecking order theory indicates that the sample banks finances its activities following the finance pattern of pecking order theory. The implications of which are similar to that of ROA, TanR and DPR.

The negative relationship of liquidity with leverage imply that the sample banks prefer to follow the financing pattern suggested by the pecking order theory. Which indicate that the banks in the sample prefer to use internal source of fund for long-term financing to avoid costs and risks associated with debt financing. It may be also due to the limited profitable expansion opportunity.

4. CONCLUSION

This empirical study attempted to tests the theories of capital structure specially trade-off and pecking order theory with a panel data set of twenty seven listed commercial banks over a period of 2009-2013 in Bangladesh. The theories are tested by taking leverage as independent variable and seven variables such as leverage, profitability (ROA), tangibility (TanR), liquidity (LiqR), dividend payment (DPR), growth rate (GrR), age (LnAGE) and size specific to bank.

The study used several models and statistical tests appropriate for panel data econometrics for selecting a statistically valid model fitting the data sets. The results and findings are based on the heteroscedascity consistent RE model suggested by different traditional and more advanced statistical tests.

The results show that profitability, tangibility, dividend payment and growth rate have statistically significant positive relationship with leverage and confirms the trade-off theory. However, liquidity and growth rate confirms the pecking order theory which have statistically significant positive and negative effects on leverage respectively. No significant relationship found between age and size of the sample banks.

Although, this study supports the underlying theory of finance governing capital structure, some limitations still exist that should be addressed in future research of this kind. First, the capital structure may be influenced by the quality of the management, status of the bank, share holdings and listing status. Second, often macro-economic variables influence the capital structure and the industry life cycle as well. Third, this study is based on 5 years period that bias the estimated parameters. The future research should consider macro-economic variables and industry characteristics covering more periods.

The implications of this study is that most of the bank specific determinants of capital structure are same as in the finance theory, suggesting that the management of the banks may consider these determinants as a benchmark in decision related to capital structure.

5. ACKNOWLEDGMENTS

The author is grateful to Associate Professor, Arne Henningsen and Frank Jensen, at Institute of Food and Resource Economics, University of Copenhagen; and Professor Jakir Hossen, ACA, at Department of Accounting and Information Systems of Patuakhali Science and Technology University for their suggestions on the earlier draft of the manuscript.

REFERENCES

Aggarwal, R., Kyaw, N.A. (2010), Capital structure, dividend policy, and multinationality: Theory versus empirical evidence. International Review of Financial Analysis, 19(2), 140-150.

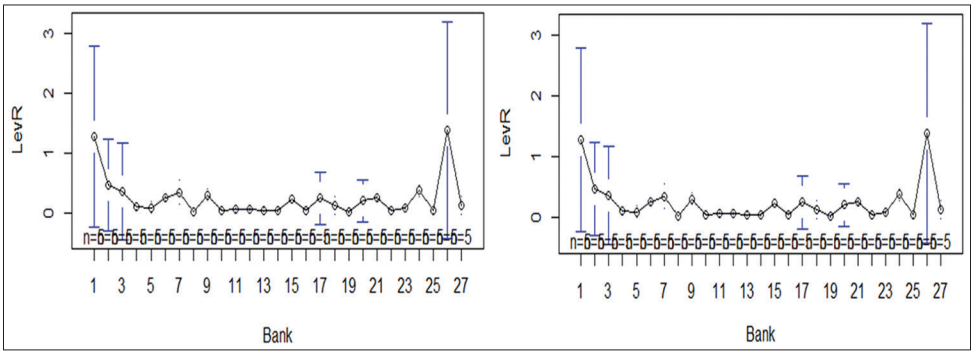
Ali, M.S., Yadav, R., Jamal, A. (2013), Theories of capital structure: Analysis of capital structure determinants. International Research Journal of Management Science and Technology, 4(3), 695-704.

Ameer, R. (2013), Financial liberalization and firms' capital structure adjustments evidence from Southeast Asia and South America. Journal of Economics and Finance, 37(1), 1-32.
Amidu, M. (2007), Determinants of capital structure of banks in Ghana: An empirical approach. Baltic Journal of Management, 2(1), 67-79.
Aremu, M.A., Ekpo, I.C., Mustapha, A.M., Adedoyin, S.I. (2013), Determinants of capital structure in Nigerian banking sector. International Journal of Academic Research in Economics and Management Sciences, 2(4), 27-35.
Baltagi, B.H., editor. (2006), Panel Data Econometrics Theoretical Contributions and Empirical Applications. Bingley: Emerald Group Publishing Limited.
Beattie, V., McInnes, B., Fearnley, S. (2004), September. A methodology for analysing and evaluating narratives in annual reports: A comprehensive descriptive profile and metrics for disclosure quality attributes. In Accounting Forum, 28(3), 205-236.
Bevan, A.A., Danbolt, J. (2001) Testing for Inconsistencies in the Estimation of UK Capital Structure Determinants. Department of Accounting and Finance, University of Glasgow. Working Paper.
Cassar, G., Holmes, S. (2003), Capital structure and financing of SMEs: Australian evidence. Accounting and Finance, 43(2), 123-147.
Chen, C.J., Cheng, C.A., He, J., Kim, J. (1997), An investigation of the relationship between international activities and capital structure. Journal of International Business Studies, 28(3), 563-577.
Chen, J.J. (2004), Determinants of capital structure of Chinese-listed companies. Journal of Business Research, 57(12), 1341-1351.
Cornelli, F., Portes, R., Schaffer, M.E. (1998), The capital structure of firms in central and Eastern Europe. In: Bouin, O., Coricelli, F., Lemoine, F., editors. Different Paths to a Market Economy: China and European Economies in Transition. London: CEPR/CEPII/OECD.
Croissant, Y., Millo, G. (2008), Panel data econometrics in R: The plm package. Journal of Statistical Software, 27(2), 1-43.
Croissant, Y., Millo, G. (2019), Panel Data Econometrics with R. Hoboken, NJ: John Wiley and Sons, Incorporated.
Daskalakis, N., Psillaki, M. (2008), Do country or firm factors explain capital structure? Evidence from SMEs in France and Greece. Applied Financial Economics, 18(2), 87-97.
Deesomsak, R., Paudyal, K., Pescetto, G. (2004), The determinants of capital structure: evidence from the Asia Pacific region. Journal of Multinational Financial Management, 14(4-5), 387-405.
Diaz, J.F.T. (2017), Determinants of banks' capital structure: Evidence from Vietnamese commercial banks. Asian Journal of Finance and Accounting, 9(1), 261-284.
Eriotis, N., Vasiliou, D., Ventoura-Neokosmidi, Z. (2007), How firm characteristics affect capital structure: An empirical study. Managerial Finance, 33(5), 321-331.
Fama, E.F., French, K.R. (2002), Testing trade-off and pecking order predictions about dividends and debt. The Review of Financial Studies, 15(1), 1-33.
Gaud, P., Jani, E., Hoesli, M., Bender, A. (2005), The capital structure of Swiss companies: An empirical analysis using dynamic panel data. European Financial Management, 11(1), 51-69.
Gropp, R., Heider, F. (2010), The determinants of bank capital structure. Review of Finance, 14(4), 587-622.
Hall, G.C., Hutchinson, P.J., Michaelas, N. (2004), Determinants of the capital structures of European SMEs. Journal of Business Finance and Accounting, 31(5□6), 711-728.
Harris, M., Raviv, A. (1991), The theory of capital structure. The Journal of Finance, 46(1), 297-355.
Henningsen, A., Henningsen, G. (2019), Analysis of panel data using R. In: Panel Data Econometrics. Denmark: Academic Press. p345-398.
Huang, S.G., Song, F.M. (2002), The Determinants of Capital Structure: Evidence from China. Hong Kong Institute of Economics and Business Strategy Working Paper No. 1042. p. 14.
Jucá, M.N., de Sousa, A.F., Fishlow, A. (2012), Capital structure determinant's of North American banks and the compensation executive program-an empiric study on the actual systemic crisis. International Journal of Business and Management, 7(17), 13-23.
Leary, M.T. (2009), Bank loan supply, lender choice, and corporate capital structure. The Journal of Finance, 64(3), 1143-1185.
Michaelas, N., Chittenden, F., Poutziouris, P. (1999), Financial policy and capital structure choice in UK SMEs: Empirical evidence from company panel data. Small Business Economics, 12(2), 113-130.
Mishkin, F.S., Eschker, E., McArthur, J. (2000), The Economics of Money, Banking, and Financial Markets: Study Guide. Boston, MA: Addison-Wesley.
Modigliani, F., Miller, M. (1963), Taxes and the cost of capital: A correction. American Economic Review, 53(3), 433-443.
Modigliani, F., Miller, M.H. (1958), The cost of capital, corporation finance and the theory of investment. The American Economic Review, 48(3), 261-297.
Myers, S.C. (1977), Determinants of corporate borrowing. Journal of Financial Economics, 5(2), 147-175.
Myers, S.C. (1984), The capital structure puzzle. The Journal of Finance, 39(3), 574-592.
Nguyen, H., Kayani, Z. (2013), Determinants of Banks' Capital Structure in Asia a Comparison Amongst Developed and Developing Countries. School of Economics and Management, Lunds University. Master Thesis.
Noulas, A., Genimakis, G. (2011), The determinants of capital structure choice: Evidence from Greek listed companies. Applied Financial Economics, 21(6), 379-387.
Octavia, M., Brown, R. (2010), Determinants of bank capital structure in developing countries: regulatory capital requirement versus the standard determinants of capital structure. Journal of Emerging Markets, 15(1), 50-60.
Ozkan, A. (2001), Determinants of capital structure and adjustment to long run target: Evidence from UK company panel data. Journal of Business Finance and Accounting, 28(1□2), 175-198.
Padrón, Y.G., Apolinario, R.M.C., Santana, O.M., Martel, M.C.V., Sales, L.J. (2005), Determinant factors of leverage: An empirical analysis of Spanish corporations. The Journal of Risk Finance Incorporating Balance Sheet, 6(1), 60-68.
Qiu, M., La, B. (2010), Firm characteristics as determinants of capital structures in Australia. International Journal of the Economics of Business, 17(3), 277-287.
Rajan, R.G., Zingales, L. (1995), What do we know about capital structure? Some evidence from international data. The Journal of Finance, 50(5), 1421-1460.
Sayılgan, G., Karabacak, H., Küçükkocaoğlu, G. (2006), The firm-specific determinants of corporate capital structure: Evidence from Turkish panel data. Investment Management and Financial Innovations, 3(3), 125-139.
Smith, D.J., Chen, J., Anderson, H.D. (2012), The relationship between capital structure and product markets: Evidence from New Zealand. Review of Quantitative Finance and Accounting, 38(1), 1-24.
Titman, S., Wessels, R. (1998), The determinants of structure choice. The Journal of Finance, 43, 17-20.
Viviani, J.L. (2008), Capital structure determinants: An empirical study of French companies in the wine industry. International Journal of Wine Business Research, 20(2), 171-194.
Wald, J.K. (1999), How firm characteristics affect capital structure: An international comparison. Journal of Financial Research, 22(2), 161-187.
Xu, J. (2012), Profitability and capital structure: Evidence from import penetration. Journal of Financial Economics, 106(2), 427-446.

APPENDIX

Appendix A1

Figure 1: Heterogeneity across the banks and years



Appendix A2

Bank specific intercepts							
Banks	**Intercept**	**Banks**	**Intercept**	**Banks**	**Intercept**	**Banks**	**Intercept**
1	−0.33	8	0.43	15	0.21	22	0.54
2	0.57	9	0.63	16	0.13	23	0.64
3	0.80	10	0.28	17	0.57	24	0.65
4	0.17	11	0.28	18	−0.47	25	−0.43
5	0.10	12	0.18	19	0.41	26	0.62
6	0.49	13	0.18	20	0.49	27	0.07
7	0.77	14	0.19	21	0.50	-	-