Determinants of Financial Stability: Evidence from Listed Private Commercial Banks in Bangladesh

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Abstract: *Bangladesh should encourage progressing its banking industry to promote economic growth. As a rising country determining financial stability (FS) of banking sector of Bangladesh is a vital issue nowadays.This study examined the factors affecting financial stability in listed Private Commercial Banks (PCBs) in Bangladesh using panel data consisted of five year observations (2012-2016) for each of 28 PCBs listed in Dhaka Stock Exchange (DSE). FS is measured by Altman's Z-score and Pooled Ordinary least square (Pooled OLS) and Panel regression methods have been applied to find out the factors necessary to maintain FS in banks. On the basis of Altman's Z-score model the study observed that listed PCBs in Bangladesh are not financially stable. Both regression and Random effect model analysis postulated that Capital to Risk weighted Assets Ratio(CRAR), Non-Interest Income to Non-Interest Expense ratio (NIINE), Net Interest Income to Revenue ratio (NIIR) have significant positive contribution to uphold FS on PCBs. Research also found that Total Debt to Total Assets (TDTA) ratio has significant negative consequences on FS of PCBs. This study suggests that PCBs should give more concentration on the positive significant variables CRAR, NIINE and NIIR and be more careful to handle the negative significant variables TDTA, LN (SIZE) to improve the FS of banking sector of Bangladesh in the upcoming days.*

Key Words: *Financial Stability (FS), Listed PCBs, Pooled OLS, Random Effect Model, Altman's Z-score*

1. Introduction

Commercial banks, the most crucial functionary of the financial system, play a dynamic role in the economic development of a nation through mobilization of savings and allocation of credit to production sectors. Banks help to boost economic performance through mobilizing capital funds. Thus ensuring financial stability (FS) or soundness in banking sector is required to maintain smooth economic activity. Global financial crisis (GFC) in 2007–2009 exposed the existence of systemic financial risk and the significance of maintaining the FS (Morgan &Pontines, 2014). The GFC also heightened alertness of FS and the need for a macro prudential dimension to financial surveillance and regulation, as financial systems are complex with multiple dimensions, institutions,

products, and markets. FS is a condition in which the financial system-comprising of financial intermediaries, markets and market infrastructures-is capable of withstanding shocks, thereby reducing the likelihood of disruptions in the financial intermediation process which are severe enough to significantly impair the allocation of savings to profitable investment opportunities (ECB, 2012). Further the ECB gives emphasis on three particular conditions regarding financial stability. The ECB declare(1) financial system should be able to efficiently and smoothly transfer resources from savers to investors (2) financial risks should be assessed and priced reasonably accurately and should also be relatively well managed and (3)financial system should be in such a condition that it can comfortably absorb financial and real economic surprises and shocks (ECB, 2012). The third condition has been considered as the most important one, because the inability to absorb shocks can lead to a downward spiral whereby they are propagated through the system and become self-reinforcing, leading to a general financial crisis and broadly disrupting the financial intermediation mechanism. To define FS is a difficult one actually. It refers to the banks' ability to resist any shock and to maintain the basic functions efficiently. Thus to prove the resilience of the financial system the financial institutional system has to resist economic shocks and smoothly fulfill its basic functions. Eventually the intermediation of financial funds, management of risks and the arrangement of payments everything will go well.

Nowadays the financial sector of Bangladesh is becoming troublesome and is experiencing loan defaults and delinquencies, manipulated financial reporting, misconduct in resource allocation, nepotism in loan sanctioning, and these inconsistencies create an effect on the financial performance of the firms (The Daily Star, August 14, 2017). Moreover, the Sonali Bank loan scandal of Tk. 3,500 core associated with Hallmark group during 2013, Basic Bank loan scandal of Tk. 4500 revealed in 2014, Janata Bank loan scandal of Tk. 5,500 crores associated with Anontex group during January 2018 and Farmers bank loan scandal of Tk. 500 crores have challenged the survival of the banking sector (Hossain, 2018). Bangladesh bank financial stability report says that the amount of non -performing loan stood at Tk.74,303 crore and around 57.53% of total classified loan in the banking sector is shared by State Owned Banks (Bangladesh Bank, 2017). Besides, the amount of rescheduled loan in 2017 is estimated to be TK 19,120 crore of which 53.1%,41.9%, 4.1% and 0.9% are attributed to PCBs, SCBs, SSBs and FCBs respectively (Bangladesh Bank, 2017). Writing off bad loans is also rising. Bangladesh bank also reported Tk 447.3 billion total bad debt written-off by banking sector and in this case, PCBs stood in the second position next to SCB; due to poor profitability, banks are facing provisioning shortfall which increased by 17.59% at the end of March 2018 (Bangladesh Bank, 2018). Government and authorities are putting new regulations time to time but scenarioof financial sector has not improved yet.

Performance of capital market is also largely dependent on banking sector as shares of this sector are prominent in the stock exchange. Poor performance of listed private banks affects investors trading in stock exchange. In one study, Jahan (2018) found that SCBs of Bangladesh are financially distressed and in another study Hamid et al., (2016)

found that most of the NBFIs are lying on the bankruptcy level and cannot attain a minimum score. Taking into account the unstable situations in banking sector the objective of the study aims to find out factors that determine the financial stability of listed Private Commercial Banks (PCBs) in Bangladesh. Altman Z- score has been used to measure financial stability.

2. Literature Review

Measuring financial stability is important for an organization itself and its beneficiaries. But no widely established method for measuring financial stability in financial institutions like banks is available till date. Around the world researchers use various models namely Altman(1968) Z- score, Ohlson (1980) O- score, Zmijewski (1984) X- score, Grover (2003) G- score, neural network model and logistic model to predict financial stability. No model can determine the financial stability accurately. For example- Qamruzzaman (2014) assessed the financial stability of listed PCBs in Bangladesh using Altman's Z-score. Similarly Kokkoris and Anagnostopoulou (2016) used Altman's Z-score to predict bankruptcy risk in Greek nationalized banks, where they found those banks are surviving because of government interventions despite having the possibility of bankruptcy. Some earlier studies also tried to find out the factors affecting financial stability or causing distress in banks. For example, Demirgüç-Kunt and Detragiache (1997) investigated the factors driving systematic bank crisis both in the developing and the developed countries. Using multivariate logit model, the study postulated that low growth in weak macroeconomic environment, high inflation, high real interest rates, and vulnerability to balance-of-payments increase possibility of bank crisis. Konstandina (2006) employed proportional hazard model and multivariate logit regression and found that management efficiency can increase financial stability but holding too many government securities can put banks in risky position. Recently,Hilman (2014) developed a bankruptcy prediction model based on discriminant and logistic regression analysis. Linear discriminant analysis reported 27 financial ratios as discriminators variables and logistic regression technique reported 20 financial ratios as influential variables to bankruptcy in banks. Bankruptcy prediction model for 6 months period, 12 months period, 24 months period and for small, medium and big banks have a high goodness of fit score and significant financial risks were credit risk, market risk, liquidity risk, operational risk and capital risk that affect bankruptcy of banks. Another study by Zhang et al., (2014) examined which factors determine financial distress measured by distance to default (DD) rate in 354 US large bank holding companies (LBHC). The study found macroeconomic factor- housing price index has positive significant impact on DD rate. Risk characteristics such as NPL, short term wholesale funding and credit risk factors have negative association with DD rate. Measures of activity diversity –

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non-interest income ratio has positive impact whereas off-balance sheet activity has negative impact on DD measure. Capital requirement measures- Tier 1 risk based capital ratio and leverage ratio, total risk based capital ratio have significant effect on default risk. Some cross country comparative studies on financial stability are also carried out. For example- Altaee et al., (2013) and Elbadri and Bektaş (2017) investigated financial stability in Islamic and conventional banks. Altaee et al., (2013) found that financial stability in Shariah-compliant banks and in conventional banks did not statistically vary whereas Elbadri and Bektaş (2017) found that financial stability in large Islamic bank is less than the large commercial banks. Another cross country study by Zhen-Jia-Liu (2015) used logistic regression model and found that bank failure prediction for NAFTA countries was predicted with the most accuracy. The study concluded that bank failure prediction is necessary to minimize operating risk in capital markets, to optimize regulations and to maintain economic stability. Using similar method on a cross country analysis, Baklouti et al., (2016) found that investor protection and economic growth rate were significant determinants and CAMEL type characteristics variables were appeared insignificant in different periods. Hossain et al., (2017) also used Altman Z-score to predict bankruptcy risk of 29 listed private commercial banks in Bangladesh. Applying system GMM and difference GMM the study found that bank specific factor such as capital adequacy ratio has significant positive effect and efficiency has positive but insignificant effect on Z-score whereas age and NPL have significant negative influence on Z-score.

Table-1: Summary of the Reviewed Literature

Author(s)	Sample countries	Period	Method/ Indicator	Findings
Demirgüç-Kunt & Detragiache (1997)	63 countries including developed and developing countries	1981-1994	Multivariate logit model	-low growth in weak macroeconomic environment, high inflation, high real interest rates, and vulnerability to balance-of-payments increase possibility of bank crisis - countries having weak law enforcement and explicit deposit insurance scheme were prone to risk
Konstandia (2006)	Russian Banks (including functioning and failed banks)	1999–2003	logit model and proportional hazard model	-Significant effect of efficiency measures as well as size and regional belonging Insignificant effect of macroeconomic variables
Altaee et al., (2013)	GCC Countries 55 conventional banks and 42 Shariah-compliant banks	2003-2010	Z-score indicator OLS method	- No statistically difference between Shariah-compliant banks and conventional banks during pre and post financial crisis
Hilman (2014)	Several bankrupt and non-bankrupt banks in Indonesia	1996-1998	Linear Discriminant analysis and Logistic regression	-Discriminator variables around 27 financial ratios, and estimator variables around 20 financial ratios. -Credit risk, market risk, liquidity risk, operational risk and capital risk were significant financial risks

Zhang et al., (2014)	354 US LBHCs	2003-2012	-Distance to Default rate -Univariate and multivariate regression analysis	- Significant positive effect of housing price index - Negative effect of NPL, short term wholesale funding and credit risk factors - Positive impact of non-interest income ratio - Negative impact of off-balance sheet activity -Significant effect of Tier 1 risk based capital ratio and leverage ratio, total risk based capital ratio
Zhen-Jia-Liu (2015)	772 cross country banks	2002-2015	Logit regression	-Significant negative association of capital ratios, interest income to interest expenses, non-interest income to non-interest expenses, return on equity and provisions for loan losses on bank failure - Positive effect of loan ratios, non-performing loans and fixed assets on bank failure
Baklouti et al. (2016)	147 banks from 18 countries	2005-2011	Logistic regression	-Significant impact of investor protection, a proxy of governance vark2iable -Insignificant impact of CAMEL variables and bank size -Negative impact of economic growth
Elbadri&Bektaş(2017)	24 Islamic and Conventional are	2006-2013	Z-score indicator Panel regression	-Less financial stability of large Islamic bank than the large commercial banks -Large Islamic bank and commercial banks are financially stronger than their small counterparts.
Hossain et al., (2017)	29 listed PCBs in Dhaka Stock Exchnage	2005-2015	Altman Z-score System GMM and Difference GMM	-Significant Positive effect of CAR and efficiency and negative effect of NPL on Z-score

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Though a lot of researches have been conducted on financial stability in global context, there is a dearth of research on this topic taking into account of all listed PCBs in Bangladesh. This gap creates a motivation to do research on this topic. This study considers a broad range of bank specific characteristics along with macroeconomic variables. The incorporation of the outcome of the study will include a significant contribution in the literature.

3. Research Methodology
3.1 Sample Design

The study is based on the listed private commercial banks (PCBs) in Dhaka Stock Exchange (DSE) in Bangladesh. There are 30 PCBs listed in DSE right now. Sample data have been collected for the 28 PCBs from the period of 2012 to 2016. Thus, a panel data set of 140 bank-year observations has been formed. One listed bank namely Rupali Bank Ltd has been excluded from the sample as its majority shares are owned by the state and hence the bank is considered as State Owned Bank. Another bank namely Standard Bank Limited has been excluded due to limited year observations. All the data except macroeconomic data has been collected manually from the respective annual reports of the banks, available in the websites. Macroeconomic indicators data have been collected from Bangladesh Bank annual report.

3.2 Description of the Variables
3.2.1 Response Variable

Researchers and academicians have attempted to develop different types of models such as Altman(1968) Z- score, Ohlson (1980) O- score, Zmijewski (1984) X- score and many others to determine the financial condition of different institutions. Actually no model can ensure hundred percent accuracy of prediction regarding financial condition, but an approximation of prediction can be made about the financial instability of an entity before the ultimate economic failure takes place. So far Altman Z-score model is proved to be the best predictor of insolvency among all the models (Altman, 1993) and is widely used in many empirical literatures.

Altman Z-score (Altman, 1993) can be applied to any type of industry such as manufacturing, non-manufacturing firm including financial institutions. Thus the study has used Altman Z-score to determine the FS or defaulting probability of a firm. Many researchers such as Altaee (2013), Qamruzzaman (2014), Badea and Matei (2016), Hamid et al., (2016), Kokkoris and Anagnostopoulou (2016), Hossain et al., (2017) and Elbadri and Bektaş (2017) applied Z-score to measure FS in banks. Net current liquidity gap has been used here as net working capital is not directly available due to non-classification of current assets and liabilities in financial statements of banks. The study used operating profit of banks as EBIT and Market value of equity is used for

listed PCBs traded in stock market. The cut off points to predict FSfor financial institutions are divided into three categories. The cut off points to predict FS are respectively ($Z > 2.6$) indicating Safe zone (good position of firm), ($1.1 < Z < 2.6$) indicating Grey Zone (alarming situation), ($Z < 1.1$) indicating Distress Zone (bad signal for the firm,therefore urgent actions are needed to avoid financial crises).

The model is given below-

$Z = 6.56\,X_1 + 3.26\,X_2 + 6.72\,X_3 + 1.05\,X_4$
Here, X_1 = Net Working Capital/ Total Assets
   X_2 = Retained Earnings/ Total Assets
   X_3 = EBIT/ Total Assets
   X_4 = Market Value of Equity/ Book Value of Total Liabilities

3.2.2 Control Variables

To find out the factors affecting financial stability in banks, the study has used Capital to Risk Weighted Assets (CRAR), Non-interest Income to Non-interest Expense (NIINE), Net Interest Income to Total Revenue(NIIR), Total Debt to Total Assets (TDTA), Bank Size (LNSIZE), GDP and Inflation (INF) rate (Sahut & Mili, 2011; Altaee, 2013; Hilman, 2014; Zhen-Jia-Liu, 2015; Baklouti et al., 2016; Hossain et al.,2017; Elbadri & Bektaş, 2017) as control variables. Initially the study includes non-performing loan ratio or loan loss provision to total loan ratio (LLPR) but these variables have high collinearity (above 0.80) with CRAR. Therefore, the regression model has been developed excluding these variables to avoid any multicollinearity problem.

CRAR: It is a cushion against banks excessive risk taking and capital losses. Basel III guidelines by Bangladesh Bank require banks to maintain minimum capital 10% of risk weighted assets. Empirical evidences support the fact that increase in CRAR positively contributes to FS.

NIINE: Measures how efficient a bank is in its operation. So, better efficiency can increase FS.

NIIR: It is considered as a measure of earning ability. Net interest spread is the major source of profitability for banks. Increase of net interest income will reduce the possibility of bankruptcy.

TDTA: Measures the solvency of a firm. Increase of total liabilities over total assets can put a firm into financial difficulties.

SIZE: Several empirical literatures used total assets as a proxy of bank size. If banks size increases, banks may have more capability to resist shocks. So, a positive relationship of bank size with financial stability can be assumed. On the contrary, increase of size can also have negative effect on stability if the banks cannot manage the assets efficiently to generate long term profit.

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GDP: Growth of GDP positively influences FS in a booming economy, financial risk tends to be lower.

INF: When INF rate increases, nominal interest rate also increases. Then investors will not be interested to borrow money from banks at high interest rate which prevents banks from sufficient income generation.

Table-2: Summary of the control Variables

Symbol of Control Variables	Measurement	Expected sign
CRAR	$\dfrac{(Tier\ 1\ +\ Tier\ 2)\ Capital}{Total\ Risk\ Weighted\ Assets}$	+
NIINE	$\dfrac{Non-interest\ Income}{Non-interest\ Expense}$	+
NIIR	$\dfrac{Net\ Interest\ Income}{Total\ Revenue}$	+
TDTA	$\dfrac{Total\ Debt}{Total\ Assets}$	-
LNSIZE	Natural log of total assets	-/+
GDP	Collected	+
INF	Collected	-

3.2.3 Model Specification and Analysis Methods

The following model has been developed to find out the factors affecting FS in banks.
Z-score it = α0 + α1CRARit + α2NIINEit+ α3NIIRit+ α4TDTAit + α5 LN (SIZE)it+ α 6GDP it + α7INF+eit

Where, subscript it denotes bank year observation, *α1, α2, α3, α4, α5, α6, α7, α8* are the coefficients for the independent variables and represents error term.

To find out the factors affecting FS in listed PCBs, at first Pooled Ordinary Least Square (OLS) regression has been run. Then heteroskedasticity test has been done using White's (1980) test to see whether the variance of the error term is constant, one of the core assumptions of OLS method. The study found heteroskedasticity problem. So, white's (1980) heteroskedasticity consistent-error adjustment has been applied to remove the problem. Yet another problem with the pooled OLS method is that it doesn't account for the serial correlation and firm specific heterogeneity or inborn fixed effect problem in case of panel data set. So, panel regression like fixed effect (FE) or random effect (RE) model has been used and subsequently Hausman test has been conducted to choose the best model between FE and RE model. Hausman test accepts the null hypothesis and therefore RE model has been selected as appropriate model.

3.2.4 Research Hypotheses

The study attempts to observe the financial stability in PCBs in Bangladesh. Therefore the title "Determinants of Financial Stability: Evidence from the listed Private Commercial Banks in Bangladesh" requires to test the following hypothesis:

1. HA1: There is a significant relationship between FS and CRAR in PCBs in Bangladesh.
2. HA2: There is a significant relationship between FS and NIINE in PCBs in Bangladesh.
3. HA3: There is a significant relationship between FS and NIIR in PCBs in Bangladesh.
4. HA4: There is a significant relationship between FS and TDTA in PCBs in Bangladesh.
5. HA5: There is a significant relationship between FS and LN(SIZE) in PCBs in Bangladesh
6. HA6: There is a significant relationship between FS and GDP in PCBs in Bangladesh.
7. HA7: There is a significant relationship between FS and INF in PCBs in Bangladesh.

4. Results and Interpretation
4.1 Descriptive Statistics

A summary of descriptive statistics has been presented in Table-3. The table represents mean, minimum and maximum values and standard deviation for all the responses and control variables used in the study. Mean and minimum value of Z-score indicates that listed PCBs in DSE are in financial distress as these values are below the cutoff point set by Altman (1993). However, maximum value of Z-score indicates the existence of non-distressed or safe banks also. Mean value of 8.25% for CRAR indicates that not all listed PCBs are maintaining the minimum capital regulation set by Bangladesh Bank. Negative minimum value of 108.49% also documents the existence of banks with severe capital shortfall. In fact, a listed PCB namely ICB Islamic Bank Ltd has been operating with negative CRAR during the sample period. Average value of 107.11% of NIINE indicates that listed PCBs are efficient enough to generate income other than interest income to cover up the expenses other than interest expense. However, the minimum value of 17.90% of this ratio documents the existence of banks which are unable to cover up the other expenses through non-interest income. The mean percentage of NIIR is 22.59% meaning the earning ability of listed PCBs are good. There are variations in earning ability among listed PCBs as the ratio ranges from 4.91% to 46.36% with standard deviation of 8.99%. Mean value of TDTA is 91.36%. The average size measured by total assets, of the listed PCBs is 205079.90 million ranging from 12258 million to 1537375 million. The average GDP is 6.46% over the sample years. The minimum and maximum values of GDP are respectively 6% in 2013 and 7.10% in 2016 indicating GDP of Bangladesh is growing. The average mean value of inflation is 7.04% ranging between 5.90% in 2016 and 8.70% in 2012 meaning that the inflation rate is declining.

Table-3: Descriptive Statistics

Variables	Observations	Mean	Min	Max	Std. dev.
Z- score	140	0.3274	-5.5200	4.1500	1.3046
CRAR	140	0.0825	-1.0849	0.1540	0.1983
NIINE	140	1.0711	0.1790	2.8170	0.4790
NIIR	140	0.2259	0.0491	0.4636	0.0899
TDTA	140	0.9136	0.1931	1.8195	0.2107
SIZE (in millions)	140	205079.90	12258.00	1537375.00	157513.20
GDP	140	0.0646	0.0600	0.0710	0.0039
INF	140	0.0704	0.0590	0.0870	0.0097

The following Table-4 shows the pairwise correlation between control variables. The correlation analysis shows that no control variable is highly correlated with any other control variables included in the model except the high correlation of 0.7560 between CRAR and LNSIZE and NIINE and NIIR. However, this point is not larger than 0.80 that can cause multicollinearity problem in the regression analysis (Lewis-Beck, 1993; Gujarati, 2004). Additionally VIF test has also been conducted to test the multicollinearity problem. The mean VIF value found is less than 10 (Gujarati, 2004) which indicates the degree of co-linearity between the variables here will not create serious problem in the regression analysis. The result of VIF test has been included in the appendix section.

Table-4: Correlation Matrix

	CRAR	NIINE	NIIR	TDTA	LN(SIZE)	GDP	INF
CRAR	1.0000						
NIINE	0.3343	1.0000					
NIIR	-0.0308	-0.6530	1.0000				
TDTA	-0.7215	-0.3325	0.1102	1.0000			
LN(SIZE)	0.7560	0.2134	0.1604	-0.5260	1.0000		
GDP	-0.0018	-0.0839	0.2301	-0.0246	0.1438	1.0000	
INF	0.0084	0.0479	-0.0731	0.0110	-0.2073	-0.4074	1.0000

4.2 Results of Regression Analysis

Table-5 represents results of regression analysis using pooled OLS and Random Effect (RE) model. CRAR, NIINE and NIIR are found to have significant positive impact on FS. The relationships of these variables with Z-score are congruent with the hypotheses

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considered in the study. If CRAR, NIINE and NIIR increase, Z-score will increase which indicates stable financial situation. It is obvious that capital adequacy, efficiency and earning ability of banks are the prerequisite to prevent the banks from crisis.The results are in consistent with Sahut and Mili (2011), Zhen-Jia-Liu (2015) and Hossain et al., (2017). TDTA a measure of capital risk is found to have negative association and significant at 1% level in pooled OLS and significant at 10% level in RE model. Hilman (2014) also found TDTA as a significant determinant of FS.

Logarithmic form of bank size is found to have insignificant effect on FS in both models. Baklouti et al., (2016) also found insignificant effect of bank size on distress. GDP growth and inflation are negatively associated with FS. Pooled OLS shows insignificant relationship of these variables but when individual fixed effect and time variation considered in Random Effect model the relationships become significant. The negative relationship of GDP growth rate with Z-score is not same as hypothesized. Generally if GDP growth rate increases, it will have a positive contribution on banking sector as economy then will be in better condition. But this study reports negative impact of GDP growth rate on FS. The result matches with the actual scenario of Bangladesh. The banking sector of Bangladesh is now facing financial instability despite the increase in GDP growth. Thus the study can conclude that economic growth cannot ensure the financial stability of banks. Banks can face financial difficulties due to other reasons such as corruptions, irregularities, lack of governance and law enforcement that are nowwidespread in Bangladeshi banks. However, Inflation rate has the expected negative relation with FS. Demirgüç-Kunt and Detragiache (1997), Elbadri (2015), Zhen-Jia-Liu (2015) and Baklouti et al., (2016) also found similar results.

Table-5: OLS and Random Effect Estimation on Financial Stability

	Pooled OLS			RE		
	Coefficients	Robust Std. Error	t- statistic	Coefficients	Std. Error	Z-Statistic
Constant	4.2331	2.6697	1.59 (0.115)	3.7855	2.3824	1.59 (0.112)
CRAR	2.6826 ***	0.7434	3.61(0.000)	3.5513***	1.0231	3.47 (0.001)
NIINE	0.5279**	0.2214	2.38(0.019)	0.5216**	0.2412	2.16 (0.031)
NIIR	2.5909**	1.0018	2.59(0.011)	4.2248***	1.1242	3.76 (0.000)
TDTA	-2.0536***	0.7899	-2.60 (0.010)	-1.0838*	0.6337	-1.71 (0.087)
LN(SIZE)	-0.0788	0.1432	-0.55(0.583)	-0.1057	0.1783	-0.59 (0.553)
GDP	-27.7181	22.7981	-1.22 (0.226)	-35.2470***	12.3533	-2.85 (0.004)
INF	-9.3903	9.2763	-1.01 (0.313)	-10.2685**	5.0613	-2.03 (0.042)
R^2-overall	0.5339			0.5070		
R^2- within				0.2587		
R^2 -between				0.5460		
F- test	114.56***			-		
Wald Chi^2	-			67.06***		

Table-5 shows results of Pooled OLS and Random Effect (RE) method. Probability is presented in the parentheses (***significance at 1% level, **significance at 5% level, *significance at 10% level). F- Test and Wald x2 are the statistical significance test (Probability of less than 0.05 indicates significant model).

5. Conclusions

The study aims to find out the factors affecting FS in the listed PCBs in Dhaka Stock Exchange (DSE) based on panel data of 140 bank-year observations. Financial stability is measured by Altman's Z-score which is used as the dependent variable. A number of bank specific factors and macroeconomic variables such as capital to risk weighted assets (CRAR), non-interest income to non-interest expense (NIINE), net interest income to revenue (NIIR), total debt to total assets (TDTA), GDP and Inflation have been used as independent variables. The study found that maximum DSE listed PCBs are not financially stable as identified by Altman's Z-score. Also some listed banks are not maintaining capital adequacy ratio in line with Basel III guideline. This study raises concerns if the financial health of listed PCBs is this much poor then what about the other scheduled banks. Applying pooled OLS and Random Effect (RE) model, the study found that CRAR, NIINE, NIIR, TDTA, GDP and Inflation significantly affect financial stability of DSE listed PCBs in Bangladesh. Only log of bank size appeared to be insignificant. The research found that CRAR, NIINE, NIIR have positive contribution to maintain financial stability, and these are consistent with Sahut and Mili (2011), Zhen-Jia-Liu (2015) and Hossain et al., (2017). Research also observed that TDTA (consistent to Hilman, 2014), GDP and INF have negative effect on FS. Demirgüç-Kunt and Detragiache (1997), Elbadri (2015), Zhen-Jia-Liu (2015) and Baklouti et al., (2016) have found negative effect of INF on FS. The research also found insignificant effect of bank size on distress, similar with Baklouti et al.,(2016). The results support all the hypotheses except one considered in the study. The study reported negative sign of GDP with respect to financial stability of banks which is in contradiction of the hypothesis regarding impact of GDP. This depicts the actual but unexpected scenario that the banking sector of Bangladesh is now facing financial instability despite the increase in GDP growth. This study suggests listed PCBs and regulators to take proper care of CRAR, NIINE, NIIR and TDTA to maintain financial stability and reduce the probability of banks failure. This study couldn't account for the nonperforming loan or loan loss provision because of multicollinearity problem. So, further research can be done on this topic addressing the problem using advanced econometric tools. Moreover, it would be interesting to find out the impact of corporate governance and other qualitative factors on financial stability of banks.

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Appendix

1. List of Sample Banks

1. AB Bank Ltd	15. Mercantile Bank Ltd
2. Al ArafaIslami Bank Ltd	16. Mutual Trust Bank Ltd
3. Bank Asia Ltd	17. National Bank Ltd
4. Brac Bank Ltd	18. NCC Bank Ltd
5. City Bank Ltd	19. One Bank Ltd
6. Dhaka Bank Ltd	20. Premier Bank Ltd
7. Dutch Bangla Bank Ltd	21. Prime Bank Ltd
8. Eastern Bank Ltd	22.Pubali Bank Ltd
9. Exim Bank Ltd	23.Shahjalal Bank Ltd
10. First Security Islami Bank Ltd	24. Social Islami Bank Ltd
11. ICB Islamic Bank Ltd	25. Southeast Bank Ltd
12. IFIC Bank Ltd	26. Trust Bank Ltd
13.Islami Bank Ltd	27. United Commercial Bank Ltd
14.Jamuna Bank Ltd	28. Uttara Bank Ltd

2. Results of VIF test

Variable	VIF	1/VIF
CRAR	3.83	0.261200
NIINE	2.94	0.340648
NIIR	2.22	0.450689
TDTA	2.20	0.454012
LN(SIZE)	2.14	0.466718
GDP	1.31	0.761784
INF	1.28	0.761784
Mean VIF	2.27	

3.Results of Hausman test

Hausman Test for Fixed and Random Effect Model	
Chi^2	3.01
Prob>chi2	0.8841

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