The Effect of Credit Risk on the Banking Profitability: A Case on Bangladesh

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Abstract

The study aims to find the effect of credit risk on profitability of the banking sectors of Bangladesh. The study uses an unbalanced panel data and 172 observations from 18 private commercial banks from 2003 to 2013. The study uses NPLGL, LLRGL, LLRNPL and CAR as credit risk indicators and ROAA and ROAE and NIM as profitability indicators. Using OLS random effect model, GLS and system GMM the study finds a robust negative and significant effect of NPLGL, LLRGL on all profitability indicators. The analysis also finds a negative and significant effect of CAR on ROAE. As an additional analysis, the results reveal that the effect of the implementation of Basel II is significantly positive on NIM but significantly negative on ROAE. The analysis reveals some significant policy implications for increasing profitability and protecting banks from crisis.

Index terms—

1 Introduction

he role of commercial banks is alike blood arteries of human body in developing economies as it accounts for more than 90 percent of their financial assets (ADB, 2013) due to less borrowers' access to capital market (Felix Ayadi et al., 2008). Therefore, efficient intermediation of commercial banks is vital for developing economies in order to achieve high economic growth, while insolvency of them leads to economic crisis. However, intermediation function of commercial banks gives rise to different types of risks with different magnitudes and level of causes on bank performance such as credit risk, liquidity risk, market risk, operational risk etc ??Van Gestel & Baesens, 2008). Among the others Credit risk is found most important type of banking risk (Abu Hussain & Al-Ajmi, 2012;

Khalid & Amjad, 2012; A. Perera et al., 2014). As it accounts for 84.9 percent of total risk elements of a bank (Bangladesh ??ank, 2014) and more than 80 percent of Balance sheet items are also exposed to it ??Van Greuning & Bratanovic, 2009).

On the other hand, some recent studies ??Chaplinska, providing an extensive approach for managing this risk, the Basel Committee on Banking Supervision adopted the Basel I Accord in 1988, followed by the Basel II Accord in 2004 and in recently the Basel III accord by experiencing the loopholes of previous accords to deal credit risk during financial crisis (Jayadev, 2013;Ouamar, 2013).

Banking system of Bangladesh consists of 56 banks of which 4 state owned commercial banks, 4 development financial institutions, 39 private commercial banks and 9 foreign commercial banks with 8685 branches across the country. Here, banking plays a vibrant role for ensuring sustainable economic growth with continuously six percent plus gross domestic product in last decade by expanding its network to rural Bangladesh. Liberalization and globalization in the banking industry brought advancement in technical adoption, quality and quantity in banking operations in the country in recent years. Following the adoption of Basel accords and core risk management guidelines of Bangladesh Bank 1 , banking industry of Bangladesh could avoid the effect of global

financial crisis during 2007-2009. But, dependency of bank borrowing of the country has increased from 2010 due to capital market shock in recent years. As a consequence, aggregate nonperforming loan ratio 2 of banks has increased from 6.1 percent in 2011 to 13.2 percent in third quarter of 2013 and the ratio of bad loan to classified loan has also increased from 66.7 percent in 2012 to 78.7 percent in 2013 (Bangladesh Bank, 2013). This is the indication of degradation of lending quality and increase of the credit risk in the banking sector of Bangladesh which may adversely affect the profitability of the banks.

One of the most pioneer paper in banking profitability, Haslem (1968) identifies that bank management, time, location and size influence on bank's profitability. It remains a great interest among the researchers to investigate the effect of credit risk on profitability. For example, Berger (1995) surprisingly finds a strong positive relationship between capital adequacy ratio and profitability of US banks during 1980s however, he considered the relationship should be negative under certain situations. In another study Kosmidou et al. (2005) II.

2   Methodology of the Study a) Selection of variables and data

This study uses financial ratios for determining the effect of credit risk on profitability. The use of ratio in measuring credit risk and profitability performance is common in the literatures of finance and accounting practices which is evident from the previous studies such as among the others Athanasoglou et al. **??**2008); Francis (2013); Heffernan and Fu (2008); S. Perera et al. **??**2013). The greatest advantage for using ratio for measuring banks' performance is that it compensates bank disparities created by bank size **??**Samad, 2004). The study has considered the seven financial ratios of which four proxy credit risk and three proxy profitability of the banks which are explained below:

The previous study uses different proxies for measuring credit risk or lending decision quality of the banks such as (Berger & DeYoung, 1997 **??**2004). It measures the percentage of the reserve held against the non performing loan or impaired loan. Higher the ratio is the indication of the better asset management quality and low credit risk. Capital adequacy ratio (CAR) is recommended by Basel accord Basel (1998) for judging asset quality and prudent credit risk management. It is the ratio of total capital to risk adjusted assets of the bank. The higher the ratio is the indication of adequacy the bank's capital and better assets quality, therefore, low credit risk.

Numerous studies have been undertaken focusing on banking profitability specially internal and external determinants considering both cross country and single country. The first group includes Assets, henceforth, ROAA which is the ratio of net profit to average assets. It is also a good indicator of a bank's financial performance and managerial efficiency. The ratio is expressed as a percentage of total average assets. This ratio displays how efficiently a company is utilizing its assets and is also useful to aide comparison among peers in the same industry. Moreover, Masood and Ashraf (2012) considers Return on Average Equity, hence forth, ROAE which is the ratio of net profit to share holders average equity. This is also a good Higher the ratio is the indication of the better assets management quality for using the assets in profitable way.

3   b) Model Specification

In order to determine the effect of credit risk on profitability of the commercial banks in Bangladesh we use the following basic panel linear regression model: **??**——————————(?? ???? = ?? + ? ?? ?? ?? ???? + ?? i Basel II it + ?? ???? -

Where subscript i indicates individual bank and t indicates time period. The dependent variable Y indicates profitability of the banks. We consider three profit proxies based on the aforementioned literature review which are ROAA, ROAE and NIM. Moreover, the explanatory variable X is used for indicating credit risk where we also consider four proxies for credit risk which are NPLGL, LLRGL, LLRNPL and CAR based on identified previous literatures. We use a dummy variable with 1 for the years after the implementation of Basel II and 0 for the years before the implementation of Basel II accord in Bangladesh banking sector. In addition, c is constant, ?? and ?? are coefficient of the regressors. Finally, ? is the disturbance or error term, which expresses the effect of all other variables except for the independent variables on the dependent variable that we use in the function.

The ordinary least square (OLS) is primarily used in the study for identifying the relationship due to the advantage of yielding the best fit of coefficient for the future prediction provided that all the assumptions are met (Molyneux et al., 2013). Panel data involves two models which are OLS fixed effect and random effect. Where, Fixed effect model is used to control omitted variables that differ between cases but are constant over time and random effect is used where some omitted variables may be constant over time but vary between cases, others may be fixed between cases but vary over time. Hausman test is used in order to determine whether to use fixed effect or random effect in our analysis.

However, Most important econometric concerns in analyzing banking data are dynamic nature of bank competition and endogeneity of some exogenous variables (Liu et al., 2014; **??**chaeck & Cihák, 2014). Therefore, in order to handle the potential endogenity of explanatory variable we also use System GMM (Generalized Methods of Moments) as it considers econometric concerns for unobserved bank level heterogeneity, potential endogeneity and autoregressiveness in the data on the behavior of dependent variables (Cubillas & Suárez, 2013). We particularly use a two-step GMM system and specify the robust estimator of the variance-covariance matrix which is an alternative of GMM proposed by Arellano and Bond (1991) and developed by Arellano and Bond

(1991) and modified by Blundell and Bond (2000). We further use Generalized Least Square (GLS) for diagnostic checking of autoregressiveness and homogeneity of the data.

4 c) Data

In order to investigate the effect of credit risk on profitability of the commercial banks in Bangladesh we have collected the bank specific data from Bankscope data base from the period of 2003 to 2013. There are 56 banks in Bangladesh out of which 4 are state owned commercial banks, 4 development bank, 39 are private commercial bank and 9 are foreign banks as we mentioned earlier. But our sample consists of only 18 private commercial banks and can not consider other banks due to high missing value and unavailability of relevant data. Therefore, our study represents only commercial banks of Bangladesh.

We use econometric software package stata for processing our results. The nonperforming loan ratio among the private commercial banks in Bangladesh is varied from 0.15 percent to 25.55 percent with the mean and standard deviation 4.63 and 4.67 respectively which indicates the there is a high volatility among the banks' ability in credit risk management. There is also high variation among the banks in loan loss reserve ratios which is evident from high standard deviation of the ratio of loan loss reserve to nonperforming loan which is 91.26 percent. The minimum capital adequacy ratio is 6.78 percent with is lower than regulatory requirement of 10 percent which is the evidence of the noncompliance of a few banks regarding Basel II requirements.

5 III.

6 Analysis and Findings a) Descriptive Statistics

The mean of ROAA, ROAE and NIM are 1.48, 19.28 and 3.56 which indicates banks are competing among them for making profit however their standard deviations evident that their profit making capacity is divergent from each other.

To ensure the unbiased result it is needed to look at the correlation coefficient of independent variables to see whether there is any multicolinearity between two independent variables. If there is a multicolinearity between the independent variables, the result will be biased. The above table presents that the independent variables are not highly correlated as their correlation coefficient are less than 0.7.

As we discussed earlier we primarily use OLS model for investigating the effect of credit risk on the profitability of the commercial banks in Bangladesh. To identify to use between OLS fixed effect and random effect we run Hausman test with the null hypothesis of error terms are uncorrelated with regressors. From the Hausman test statistics 2.58 with P-value 0.7639 we cannot reject the null hypothesis, therefore we decided to use OLS random effect. We have also used system GMM in order to handle the presence of endogeneity of the banking variables as concerned by the earlier literatures. Besides, we further use, GLS for robustness of the result. we identified earlier we have considered non performing loan ratio (NPLGL), Loan loss reserve ratio based on gross loan and nonperforming loan (LLRGL) and (LLRNPL) and capital adequacy ratio (CAR) as credit risk indicators and return on assets average assets (ROAA), return on average equity (ROAE) and net interest margin ratio (NIM) as profitability ratio for investigating the effect of credit risk on the profitability of the commercial banks in Bangladesh. Furthermore, we use a dummy variable indicating the implementation of Basel II accord.

Table 3 reports that Wald test statistics is significant at 1 percent level at all models indicating the goodness of fit. GLS outputs show that the results are free from serial correlation and heteroscadisticity problem. GMM outputs also indicate the goodness of fit of the models which is evident from the lower instruments than observations, significance of AR(1) and Sargan test statistics and insignificance of AR(2) statistics.

As expected relationship between nonperforming loan ratio and profitability is found negative and significant in every models indicating that high non performing loan reduces the profitability and sound credit risk management is a precondition for ensuring the profitability of the banks. The results further show that one unit rise in non performing loan decreases return on average assets by 0.05 unit, return on average equity by 0.54 unit and net interest margin by 0.12 units respectively keeping other regressor constant which is consistent with Kolapo et al. **??**2012) and Ruziqa (2013). Therefore, improving the profitability indicators sound credit risk management is essential. The result is robust in all other specifications with GLS and GMM.

The effect of loan loss reserve to gross loan on profitability also negative as we find in the earlier literature such as (Kolapo et al., 2012; **??**ufian, 2009) indicating that profitability will be reduced as banks use more profit as buffer against their loan loss. Therefore, prudential credit management also required for reducing loan loss in order to reduce reserve ratio and increase the profitability. The beta coefficients of the ratio of loan loss reserve to gross loan indicate that one unit increase in the ratio decreases return on average assets by 0.1 unit, return on average equity by 1.25 units and net interest margin by 0.02 unit keeping other explanatory variables constant. However, the effect of loan loss reserve to gross loan on return on average equity is significant but the effect is insignificant on other two indicators which is not unusual as supported by Kosmidou et al. (2005). The result is also robust is all other specifications with GLS and GMM.

The effect of the ratio of loan loss reserve to non performing loan on profitability is mixed. It effects on return on average assets and return on average equity positively but on net interest margin negatively and significantly. The results reveal that the effect of the ratio is very little indicating that one unit increase in the ratio increases return on average assets by 0.001 unit and return on average equity by 0.004 units but decreases net interest

margin by -.01 unit keeping other explanatory variables constant. The results also found robust in alternative specification GLS and GMM.

Capital adequacy increases the strength of the bank which improves the solvency of the bank and capacity to absorb the loan loss and protect bank by run. The results show that capital adequacy ratio effects return on average assets and net interest margin heavily depends on the equity capital as the source of funding but it can not use it profitably due to the lack of fund management quality which is evident from the fall of return on average equity by 0.75 unit with the rise of capital adequacy by one unit keeping the other explanatory variables constant. The result also found robust in both GLS and GMM estimations.

We also investigate the effect of Basel II implementation on the profitability of the commercial banks in Bangladesh. In order to test it we use a dummy variable with one for the years from which Basel II has been implemented in Bangladesh and zero for the years indicating the years preceding the implementation of Basel II. The result indicates that Basel accords effects return on average assets and net interest margin positively but on return on average equity negatively and significantly. The possible explanation could be that as per Basel accords all commercial bank needs to maintain minimum 10 percent of the equity as buffer as precaution for credit risk and other shocks, therefore their credit creation capability may hamper which might effect on the inversely on return on average equity. This result also robust in GSL and GMM specifications.

7 IV. Conclusion and Policy Implication

Credit creation is the prime operation of the banks, but, it expose to credit risk for the bank due to the failure of the borrowers to fulfill the commitment with the banks. Moreover, banks need identify and manage the credit risk prudently because it may affect profitability and lead a bank to the banking crisis and economy to systematic crisis. In order to strengthen banks ability to handle and manage credit risk, Basel committee on banking supervision initiated Basel accords. Our study aims to investigate the effect of credit risk on profitability and also the effect of Basel II implementation effect on profitability of the banks in Bangladesh. We use an unbalance panel data of 172 observations from 18 private commercial banks from the period of 2003 to 2013. We use NPLGL, LLRGL, LLRNPL and CAR as credit risk indicator and ROAA, ROAE and NIM as profitability indicators. In the investigation process we use OLS random effect model based on the result of Houseman test. We further use GLS and GMM for checking robustness of our result. The results are found free from multicolinearity, heteroscadisticity and autocorrelation. The results reveal a robust significant negative relationship between NPLGL and LLRGL and all profitability indicators of the commercial banks in Bangladesh. More specifically it is found that that one unit rise in NPLGL decreases ROAA by 0.05 unit, ROAE by 0.54 unit and NIM by 0.12 units respectively keeping other regressors constant and one unit increases LLRGL decreases ROAA by 0.1 unit, ROAE by 1.25 units and NIM by 0.02 unit keeping other explanatory variables constant. The results further reveal that the effect of LLRNPL and CAR on profitability is mixed which is found robust in all specifications. It is worth noted that the effect of LLRNPL on different profit proxies is very little in spite of found negative and significant on NIM and positive and insignificant on both ROAA and ROAE. The effect of CAR is found negative and significant on ROAE but positive and significant on NIM while it affects ROAA positively and insignificantly. The results further show that implementation of Basel II accord increases NIM of of the commercial bank significantly but reduce ROAE significantly in all specifications. The analysis finds that credit risk effects profitability of the commercial banks negatively. Therefore, banks need to use prudent credit risk management procedure in order to ensure profitability and safe the bank form loss and crisis. [1] [2] [3]

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Figure 1:

for UK commercial banks during 2000-2005. Moreover, many studies also devote to investigate the relationship. Hosna et al. (2009) find a positive relationship between credit risk and profitability on four commercial banks in Sweden during 2000 to 2008. However, in another study Kithinji (2010) investigates the impact on profitability of credit risk on the Kenyan commercial banks but finds a neutral effect of credit risk on profitability. In addition, Kolapo et al. (2012) also find a negative relationship between credit risk and the profitability on 5 Nigerian commercial banks over 2000-2010. In another study, Ruziqa (2013) investigates the joint effect of credit risk and liquidity risk on the profitability of large banks of Indonesia and finds negative effect of credit risk and positive effect of liquidity risk on the profitability. The extent of research does not reach at any conclusive evidence regarding the effect of credit risk on profitability of the banks. Furthermore, most of the researches cover US, Europe and African countries and no study is found in the context of Bangladesh to the best of the knowledge of the researchers which reinforce us to investigate the effect of credit risk on profitability considering Bangladesh. Moreover, it has been a regulatory requirements among the banks in Bangladesh to imply with Basel II accords since January, 2010 (Shahabuddin et al., 2013); but it remains undiscovered whether implementation of Basel II has brought any influence on profitability which also need to be identified for regulatory policy reform. Therefore, in order to fulfill the literature gap the study warrants achieving two objectives which are the effect of credit risk on profitability and the effect of the implementation of Basel II on the profitability of the banking sector of Bangladesh.

Figure 2:

1

Figure 3: Table 1

1

Variable	Observation	Mean	Std. Dev.	Min	Max
NPLGL	159	4.63	4.67	0.15	25.55
LLRGL	151	3.06	1.84	0.77	12.44
LLRNPL	139	90.11	91.26	2.19	866.35
CAR	163	11.41	1.99	6.78	21

Figure 4: Table 1 :

2

Figure 5: Table 2 reports

2

Figure 6: Table 2 :

3

	banks in Bangladesh								
Model	OSL-Random effect				GLS		One step GMM System		
Dep. Variables	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM
Constant	1.73	35.81	3.11	1.48	36.11	2.98	1.49	36.45	2.98
	(.43)***	(5.13)***	(.65)***	(.41)***	(4.99)***	(.66)***	(.31)***	(3.80)***	(.44)***
NPLGL	-.05	-.54	-.12	-.04	-.49	-.10	-.04	-.49	-.10
	(.02)**	(.24)**	(.03)***	(.02)**	(.23)**	(.03)***	(.01)***	(.17)***	(.02)***
LLRGL	-.10	-1.25	-.02	-.11	-1.23	-.02	-.11	-1.24	-.02
	(.05)	(.59)**	(.07)	(.05)**	(.55)**	(.07)	(.03)***	(.412)***	(.05)
LLRNPL	001	.004	-.01	.001	.005	-.00	.00	.00	-.003
	(.001)	(.01)	(.001)**	(.001)	(.01)	(.001)***	(.00)	(.01)	(.001)***

Figure 7: Table 3 :

7   IV. CONCLUSION AND POLICY IMPLICATION

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