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Is There a Relationship between Liquidity and Profitability in the Banking Sector of Bangladesh: A Panel Data Analysis

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Abstract

By considering four types of banks (State-owned Commercial Banks, Private Commercial Banks, Foreign Commercial Banks and Development Financial Institutions) and using fixed effects model (FEM) for the period from1997 to 2014, this paper investigates the relationship between banks' liquidity and profitability. The paper finds that the expenditure-income ratio, nonperforming loans (NPLs) negatively impact banks' profitability (ROA) while profitability is defined as return on asset (ROA). Finally, the paper concludes that profitability is more sensitive to NPLs and expenditure-income ratio than to liquidity. The negative relationship between NPLs and banks' profitability is an important concern for the policymakers.

JEL Classification:G21, C23.

Keywords: Liquidity, profitability banking industry and Bangladesh economy.

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1. Introduction

In recent years, banking industry has face two challenges, i.e., ample liquidity and declining profit. The management of these two factors is very important for financial stability. For example, the liquid assets and excess liquidity as percent of total asset were 20.6 percent and 9.0 percent respectively in 2009 which increased to 26.5 percent and 15.7 percent in 2015. Profitability as measured by return on asset (ROA), on the other hand, declined from 1.8 percent in 2010 to 0.8 percent in 2015 (Annual Report 2015-2016, Bangladesh Bank). Commercial banks in Bangladesh need to maintaining balance between liquidity and profitability for maximizing their profit.

Against this background, the paper examines the relationship between liquidity and profitability in the commercial banks in Bangladesh by using panel data and apply fixed effect model (FEM). In the study four types of banks (SCBs, PCBs, FCBs and DFIs) were taken into consideration for the period 1997-2014. We consider the time period upto 2014, as because, in 2015, the definition of bank group has been changed. The paper finds a negative relationship between expenditure-income ratio, nonperforming loans and bank's profitability. The remainder of the paper is organized as follows: Following the introduction in section I, review of literature is given in section II. Section III gives a detailed scenario of liquidity and profitability in the commercial banks in Bangladesh and section IV analysis model specification, data and methodology. Section V describes the estimated results. Finally, section VI gives the conclusion.

2. Review of Literature

Literature indicates that many studies have analyzed on the relationship between liquidity and profitability in the banking industry. These studies show that the relationship between liquidity and profitability is not conclusive. Some papers find no significant relationship between liquidity and profitability, some have positive relationship and some have negative relationship. These include Junaidu et al (2014) for Nigeria for the period 2003-2012 and Afia et al (2014) for Bangladesh for the period 2006-2011, Wambu (2013) for Kenya during 2008-2012, Andrew et al (2013) for Nigeria during 2012, Begum (2016) for Bangladesh.

Junaidu et al. (2014) examine the impact of liquidity on the profitability of Nigerian banks for the period 2003-2012. They find a positive relationship between ROA and cash and bank balances to total liabilities and return on equity (ROE) and cash and bank balances to total liabilities. The main findings of the study suggest that there is no significant impact between liquidity and profitability among the listed banking firms in Nigeria. Afia et al. (2014) examine the liquidity-profitability relationships for the banking industry of Bangladesh by using yearly data from 2006-2011. They also find no significant relationship between liquidity and profitability in this industry (government bank, Islamic bank, private commercial bank, and multinational bank). They use only two variable liquidity (current ratio) and profitability (ROA), therefore their results suffer from omitted variable bias.

Wambu (2013) explores the relationship between profitability and liquidity of 44 commercial banks in Kenya during 2008-2012. He concludes that profitability and liquidity have a positive relationship and that liquidity is not a significant determinant of commercial bank’s profitability but one of the determinants of it. Andrew et al. (2013) examine the efficacy of liquidity management and banking performance in Nigeria. The research was survey based for the year 2012. They find that there is a significant relationship between efficient liquidity management and banking performance and that efficient liquidity management enhances the soundness of banks. The study concludes that there exist a strong positive relationship between efficient liquidity management and profitability.

Begum (2016) examines the relationship between liquidity and profitability in the banking industry as a whole during 1997-2014 for Bangladesh. The paper examines the impact of liquidity on banks profitability by applying ordinary least square method (OLS). The paper finds that the excess liquidity impact banks' profitability in a negative fashion. The present paper different from the earlier version in terms of methodology of estimation and desegregated level data of the banking industry. The paper has taken four types of banks - SCBs, PCBs, FCBs and DFIs and has used panel data model. The result shows that there is a negative relationship between expenditure-income (EI) ratio and bank's profitability. The result also finds a negative relation between NPLs and profitability.

The above mentioned studies explain the relationship between liquidity and profitability in the banking sector in different countries. However, there is a dearth of studies examining this issue in the context of Bangladesh. To fill this gap I have undertaken this empirical study. In Bangladesh the recent financial scam (Hall Mark and BASIC Bank) and huge loan default erodes the asset quality which impact on profit earnings of the banking sector**.** Besides, it not only impacts profit earnings but also banking sectors resilience and stability. Maintaining stability and profitability of the banking sector are now the major concern for the policy makers. The findings of the econometric exercise give some policy indications to the policy maker.

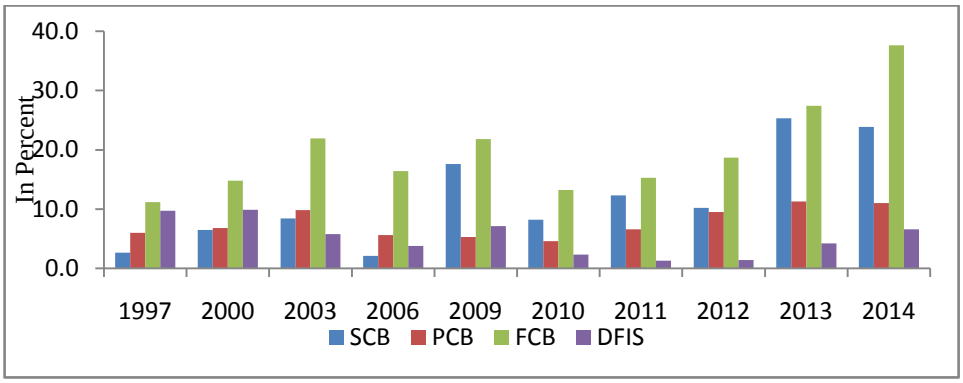
3. Liquidity and Profitability Scenario in Commercial Banks

The banking sector is the dominant sector in the financial system of Bangladesh. Banking system of Bangladesh comprises of four categories of scheduled Bank, i.e., state-owned commercial banks (SCBs), state-owned development financial institutions (DFIs), private commercial banks (PCBs), and foreign commercial banks (FCBs). Presently, six SCBs, two DFIs, thirty nine PCBs, and nine FCBS are operating in Bangladesh through 9131 branches with total number of banks 56.

Measurement and Indicator of Liquidity: Bank liquidity means the ability to meet cash, cheques, other withdrawals obligations immediately and legitimate new loan demand while abiding by existing reserve requirements (Obilor Ibe 2013). Maintaining sound liquidity position is one of the significant indicators of better performance of a bank. Without ensuring adequate liquidity the banking sector will fail to mobilize its resources for earnings profit.

Figure- 1 shows that during 1997-2009 excess liquidity ratio demonstrate mixed trend for all groups of banks (Excess liquidity ratio=percent of excess liquidity in total liquidity). In case of DFIs excess liquidity was lowest during 2010-2012. All other three groups exhibit upward trend after 2010 may be due to BB has taken some measures to improve liquidity position in the banking sector. It is also observed that FCB hold the highest liquidity ratios followed by the SCBs in 2014.

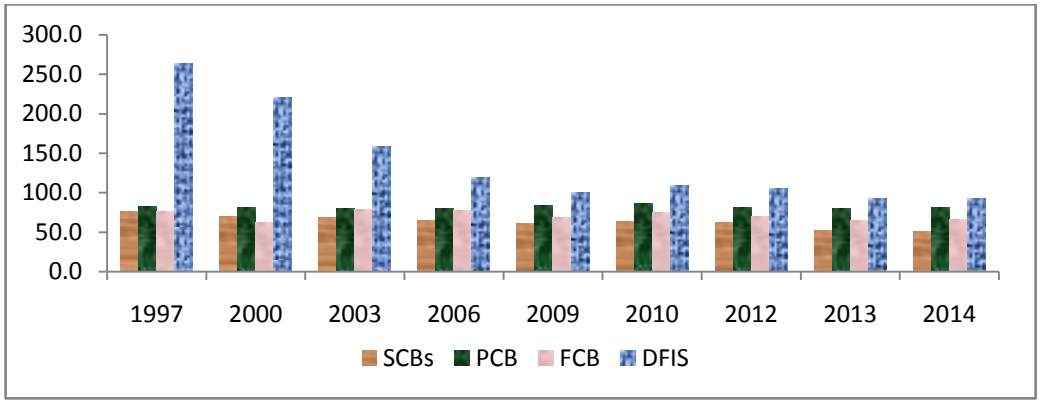
Figure-1 Trends of Excess liquidity Ratio during 1997-2014



Source: Annual Report, Bangladesh Bank (1997-2014).

The advance-deposit ratio (ADR) is one of the most useful indicators of adequacy of banks' liquidity. The higher ratio of ADR indicates a stress in the banking system and a low level of liquidity to respond to shocks (Evans et al. 2000). The lower ratio of ADR indicates an increasing ability of the banking system to mobilize deposits to meet credit demand**.** Banks may earn higher profit by increasing the ADR although it indicates lower liquidity. Bangladesh Bank is currently measuring the ADR ratio as a gross measure to calculate the liquidity condition prevailing in the banking sector. Figure- 2 shows that ADR of DFIs demonstrate downward trend after 1998-2014. The ADR of PCB shows more or less same during 1997-2014. On the other hand, ADR of FCB and SCBs showed mixed trend during 1997-2010, afterwards, it demonstrated a declining trend till 2014. It may be noted that the Investment-Deposit Ratio (IDR) of all Islami banks was 82.9 percent in 2014, whereas the ADR of the overall banking industry was 71.0 percent.

Figure- 2 Trends of ADR by Types of Banks during 1997-2014



Source: Scheduled Banks Statistics, Bangladesh bank (1997-2014).

Measurement of Profitability: A bank will be profitable when its total revenues exceed its relevant expenses (Niresh, 2012). Strong earnings and profitability profile of a bank reflect its ability to support present and future sound operation, absorb future contingent shocks and strengthen resilience capacity. A low profit would suggest ineffective management and investors would be hesitant to invest in the bank. More specifically, strong earnings influence the capacity to absorb losses by building an adequate capital base, finance its expansion and pay adequate dividends to its shareholders.

There are various indicators to measure profitability in the banking industry. The common indicators are return on asset (ROA), return on equity (ROE), and net interest margin (NIM) . ROA is primarily an indicators of managerial efficiency and it indicates how capable the management of the banks has been converting the institution's asset into net earnings. ROE measures the rate of return flowing to the bank's shareholder. The NIM measures how large a spread between interest revenues and interest costs management able to achieve by close control over the bank's earning assets and the pursuit of the cheapest sources of funding.

Table-1 reveals that ROA of the state owned commercial bank (SCBs) was less than banking industry average. During 2008-2011, it showed increasing trend, but it declined to -0.6 percent in 2012 due to huge net loss. In 2013 ROA of SCBs increased and became positive at 0.60 but eventually turned into negative at the end of 2014 . The DFIs situation is not getting better due to persistent operating losses incurred by Bangladesh Krishi Bank (BKB) and Rajshai Krishi Unnayan Bank (RAKUB). ROA of DFIs deteriorated more scoring negative (-0.7 percent) in 2014. ROA of PCBs showed a consistently strong position up to 2010, but it slightly dropped in 2011 and 2014 due to a decrease of net profit. It may be point out that the ROA of Islami banking industry was 0.8 percent compared to the overall banking industry of 0.7 percent in 2014, indicating an

efficient use of assets by the Shari'ah compliant banks compared with conventional banks. Though ROA of foreign banks (FCBs') has been consistently strong during the last couple of years, it decreased slightly in 2013 and again increased in 2014. The recent rising in NPLs also impact on ROA because high NPLs gives huge stress in the banks to earn profit (Appendix Table A-3).

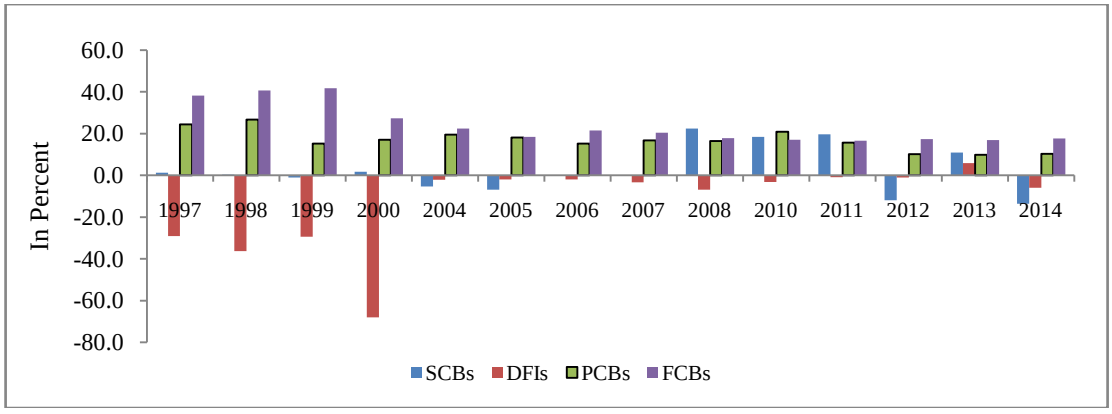
Table-1 Trend in Return on Assets (ROA) by Types of Banks
(in percent)

Year/Bank Type	SCBs	DFIs	PCBs	FCBs
1997	0.00	-2.10	1.10	4.80
1998	0.00	-2.80	1.20	4.70
2000	0.10	-3.70	0.80	2.70
2004	-0.10	-0.20	1.20	3.20
2005	-0.10	-0.10	1.10	3.10
2006*	0.00	-0.20	1.10	2.20
2007*	0.00	-0.30	1.30	3.10
2008	0.70	-0.60	1.40	2.90
2010	1.10	0.20	2.10	2.90
2011	1.30	0.10	1.60	3.20
2012	-0.60	0.10	0.90	3.30
2013	0.60	-0.40	1.0	3.0
2014	-0.55	-0.68	0.99	3.4

* Due to provision shortfall NIAPT (net income after provision and taxes) of 4 SCBs are administratively set at zero. Therefore, ROA for the 4 SCBs are zero.
Source: Annual Report (1997-2014), BB and Bangladesh Bank Quarterly.

Figure-3 demonstrate that ROE of SCBs and DFIs was not so good compared to PCBs and FCBs. ROE of SCBs was negative of 13.6 percent in 2014 due to huge loss incurred by BASIC bank. On the other hand, ROE of PCBs showed positive but decreasing trend. ROE of FCBs was better position.

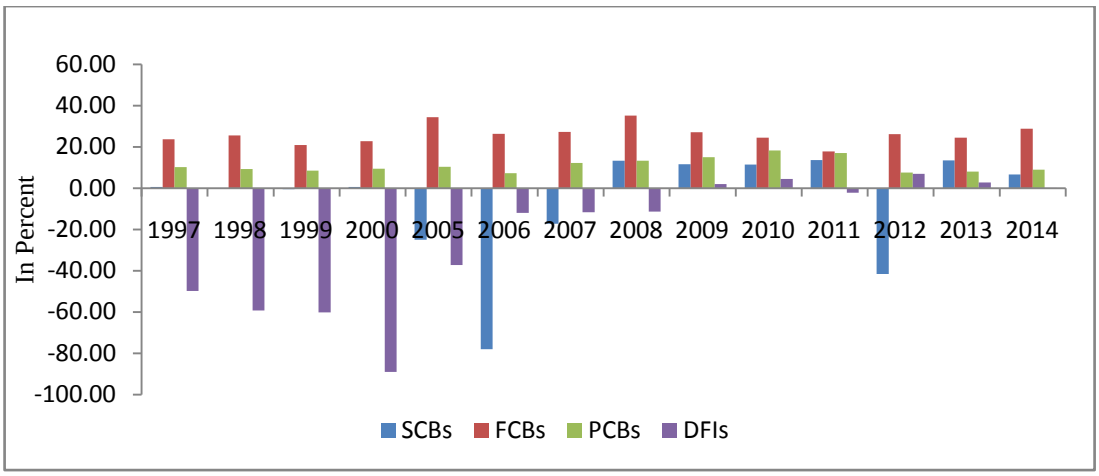
Figure- 3 Trends of ROE by Types of Banks during 1997-2014



Source: Annual Report, Bangladesh Bank (1997-2014).

Figure-4 represents the aggregate net interest margin (net income after tax/total income) of the SCBs was a negative from 2004-2007 and it turned to positive in 2008. Since 2008, SCBs have been able to increase their net interest margin (NIM) by reducing their cost of fund up to 2011. In 2012, the NIM of SCBs was negative and in 2013 again it turned to positive. This increase in NIM was mainly due to investment income was taken into account in the interest income from this year and structural change in bank group. The performance of DFIs is not well in terms of NIM. The NIM of the FCBs has been incredibly high over the period whereas NIM of PCBs was fluctuating moderately. The trend of NIM indicates that the interest spread of PCBs and FCBs is higher (Appendix Table A-1) than that of SCBs and DFIs (Bangladesh Bank, Annual Report).

Figure- 4 Trends of NIM by type of Banks during 1997-2014



Source: Monthly Economic Trends, Bangladesh Bank (1997-2014).

4. Model Specification and Methodology:

a. Model Specification

Since the paper examines the relationship between liquidity and profitability of the commercial banks in Bangladesh, we employ the following empirical model:

$$Y_t=\beta_0 + \beta i\ Xi_t + \varepsilon i_t \text{ ---------- (1)}$$

Where Yt denotes bank group-wise profitability (ROA), Xi includes a set of bank specific control variables (excess liquidity ratio, expenditure-income ratio, interest rate spread, nonperforming loans). β_0 is intercept and βi is the parameters and εi is the error term. In my paper I used ROA as profitability indicator rather than ROE and NIM. I believe that ROA is the best indicator for measuring the profitability in Bangladesh due to availability and accuracy of data. In addition, it is mentioned in the BB Annual Report 2014-2015 is that the most representative and widely used indicator of profitability is ROA which is supplemented by ROE and NIM. Although macroeconomic variables like GDP and inflation impact on bank's profitability, we excluded those variable in the model because, these variables are same for all groups of banks and do not support estimating FE model in panel data. This is one of the limitation of the study.

b. Data and Methodology

In our study four types of banks (SCBs, PCBs, FCBs and DFIs) were taken into consideration. The study uses secondary data for the period 1997-2014. The yearly data have been collected from Economic Trend, Annual Report, Bangladesh Bank Quarterly, Financial Stability Report, Scheduled Banks Statistics, Major Economic Indicator of Bangladesh Bank and Bangladesh Economic Review, Ministry of Finance. The paper uses panel data to test the model.A test was developed by Hausmann (1978) can be used to decide between FEM and REM which to be estimated. The null hypothesis underlying the test is that the FEM and REM estimators do not differ substantially. The test statistic developed by Hausman has an asymptotic $\chi 2$ distribution. If the null hypothesis is rejected (significant), the conclusion is that REM is not appropriate and that we may be better off using FEM. In present study chi square (X^2) is significant at 1% level as the paper uses FEM for investigate the relationship.

5. Analysis of the Estimated Results

Table-2 represents the descriptive statistic of the all variables. The mean of all variables show a historical trend value during the period 1997-2014. Standard deviations, measures the volatility, showed a variation during the period 1997-2014. It is observed that standard deviation for expenditure-income ratio is 23.86 which show more volatile than other variables. A volatility of expenditure-income ratio raises portfolio risk and erodes capital base of the banks which affects banks profitability. Moreover, volatility is observed in NPL and excess- liquidity ratio which also impact on banks profitability.

Table-2 Descriptive statistics of all variables

Variable	Mean	S. D
Excess liquidity Ratio	10.61	7.50
Expenditure- income ratio	88.64	23.86
Interest rate spread	5.8	1.97
Non performing Loans	21.10	18.35
Return on Asset	0.98	1.60

Source: Annual Report, Bangladesh Bank, Economic trends, Bangladesh Bank, (1997-2014) and authors' calculation.

Table-3 gives a picture of the correlation between explained and explanatory variables. The table exhibits that correlation of ROA with expenditure-income ratio, NPL and interest rate spread is significant. The significant and negative correlation between ROA and NPL implies that high NPL decrease ROA. The estimated result also shows that correlation between expenditure-income ratio and ROA is -0.88 which indicates that prevailing high expenditure-income ratio reduce ROA.

Table-3 Estimate result of Correlation among ROA and bank specific variables

	Variable	Correlation	t-Statistic
ROA	Excess liquidity Ratio	0.56	5.62
ROA	Interest rate spread	0.66	7.30
ROA	Expenditure income ratio	-0.88	-14.57
ROA	Non performing Loans	-0.81	-11.47

Source: Annual Report, Bangladesh Bank, Economic trends, Bangladesh Bank, (1997-2014) and authors' calculation.

Table-4 shows the estimated results of the relationship between banks liquidity and profitability on the basis of FEM. I estimate four models for the period 1997-2014. In model-1, the explanatory variables are excess liquidity ratio and expenditure-income ratio. Estimated result show that the banking sector profitability is affected by expenditure-income ratio. The coefficients of expenditure-income ratio are statistically significant with expected sign. The coefficient of expenditure-income ratio is -0.05 which implies that if expenditure-income ratio increases one unit, ROA decrease by 0.05 unit. On the other hand, the coefficient of excess liquidity ratio is negative but insignificant. By adding NPLs in model-2, the estimated result show that the banking sector profitability is affected by expenditure-income ratio and NPLs. The coefficient of NPL is -0.02, this denotes that if NPLs increase by 1 unit, ROA decrease by 0.02 unit.

Afterward I include interest rate spread in model-3. The estimated result also shows that the banking sector profitability is affected by expenditure-income ratio. In model-4 I include only two explanatory variables (excess liquidity ratio and NPLs). The result demonstrates that the coefficient of excess liquidity ratio significant with unexpected sign, conversely, the coefficient of NPL is -0.07, this denotes that if NPLs increase by 1 unit, ROA decrease by 0.07 unit. I also estimate above four models for ROE and NIM as dependent variables. The estimated result show the same findings which indicates that NPLs and expenditure-income ratio are more sensitive with banks profitability than excess liquidity ratio.

Table-4 Results of the Panel Regression Model:
Dependent variable ROA (Fixed effect Model)

Variable/Model	**coefficient**			
	Model-1	**Model-2**	**Model-3**	**Model-4**
Expenditure income ratio	-0.05*** (-11.61)	-0.04*** (-10.85)	-0.04*** (-11.00)	
Excess liquidity ratio	-0.01 (-.46)	-0.00 (0.07)	-0.01 (-0.61)	0.07*** (4.11)
Nonperforming Loans		-0.02** (-2.70)	-0.01 (0.49)	-0.07*** (-10.35)
Interest rate spread			-0.14 (-1.64)	
Hausman Test (H_0: No differences in coeffients)	Chi^2= 75.01 Prob (0.000)			
Number of observation	72			
Adjusted R^2	0.94	0.95	0.823	0.757
F Statistic	50.17 [0.000]	54.46 [0.000]	0.95 [0.000]	12.67 [0.000]
Fixed Effects	Cross section			

Note:*** implies significant at the 1% level. ** implies significant at the 5% level.
Figure in parenthesis indicates t-statistic and figure in[ ] indicates probability of F statistic.
Source: Annual Report, Economic trends, Bangladesh Bank, (1997-2014)
and author's calculation.

6. Conclusion

The main objective of this paper is to examine the relationship between banks' liquidity and profitability. Four types of banks (SCBs, PCBs, FCBs and DFIs) were taken into consideration in the study for the sample period 1997-2014. By using panel data model the paper find a negative relationship between expenditure-income (EI) ratio and bank's profitability. Thus commercial banks should give attention to reduce the expenditure. Available data show that EI ratio of the DFIs was the highest (Appendix Table A-2). The EI ratio of SCBs also high, which may possibly mainly be high administrative and operating expenses.

Accordingly, the result also shows a negative relation between NPLs and profitability. So commercial banks need to be careful while giving loan and reduce NPLs to increase profitability. The recent rising in NPLs is concerned for overall banking stability because high NPLs give huge stress in the banks to earn profit. It is observed that the percentage share of NPLs to total loans has reduced dramatically from 1997 to 2011. The gross NPL ratio for all banks declined to 6.20 percent in 2011 from the peak 37.5 percent in 1997. The ratio again increased during the previous two years due to sharp increase in NPL of SCBs (Appendix Table A-3). Finally, the paper concludes that NPLs and EI ratio are more sensitive with banks profitability than excess liquidity ratio. However, the analyses of the paper is bank group-wise which is the another limitation of the study. Further research will be left on the same area extensively by using individual bank's data.

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APPENDIX

Table A-1 Movements in Interest Rate Spread

Year	SCBs	DFIs	PCBs	FCBs
2001	6.03	5.06	7.55	8.23
2003	5.77	4.71	6.55	7.32
2004	4.87	3.7	5.54	7.45
2006	5.63	3.18	5.44	8.12
2007	5.95	2.95	5.7	8.83
2009	3.47	2.7	5.29	9.26
2010	4.18	2.26	5.38	8.82
2012	4.06	2.73	5.51	8.76
2013	3.66	3.06	5.34	8.59
2014	3.71	1.68	5.94	7.92

Source: Scheduled Banks Statistics, BB (1997-2014).

Table A-2 Movements of expenditure-income ratio

Year	SCBs	DFIs	PCBs	FCBs
1997	99.4	145.2	86.0	59.7
1999	100.5	89.1	90.4	67.4
2000	99.4	95.9	90.8	77.7
2002	98.5	101.1	91.9	78.3
2004	102.3	103.9	87.1	76.3
2005	101.9	103.5	89.3	70.8
2007	100.0	103.7	88.8	72.9
2008	89.6	103.7	88.4	75.8
2010	80.7	87.8	67.6	64.7
2011	62.7	88.6	71.7	47.3
2012	73.2	91.2	76.0	49.6
2013	84.1	94.8	77.9	50.4
2014	83.3	112.0	75.8	46.5

Source: Annual Report, BB (1997-2014).

Table A-3 NPLs (%) of the Banking Sector by types of Banks

Types of Banks	1997	2000	2003	2006	2009	2010	2011	2012	2013	2014
SCBs	36.57	38.56	29	22.9	21.4	15.7	11.3	23.9	19.8	22.23
DFIs	65.72	62.56	47.4	33.7	25.9	24.2	24.6	26.8	26.8	32.8
PCBs	31.42	22.01	12.4	5.5	3.9	3.2	3	4.6	4.5	5.0
FCBs	3.58	3.38	2.7	0.8	2.3	3	3	3.5	5.5	7.3
Total	37.5	34.9	22.1	13.2	9.2	7.1	6.2	10	8.9	10.8

Note: NPLs= gross nonperforming loans to total loans. Annual Report, BB (1997-2014).