

Nexus between Bank's Liquidity and Profitability in Bangladesh: An Overview

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Abstract

The main objectives of the paper are to investigate the relationship between banks' liquidity and profitability, and the impact of liquidity on bank's profitability. The paper applies Ordinary Least Square (OLS) method for the sample period 1997-2014 to examine the impact of liquidity on banks' profitability. The paper finds that advance-deposit ratio which measures liquidity positively impacts banks' profitability. Call money rates, non performing loans (NPL) and excess liquidity- negatively impacts banks' profitability. The negative relationship between NPL and return on asset (ROA) is a major concern of the policymakers of the banking industry of Bangladesh.

Keywords: Liquidity, Profitability and Banking Industry.

Introduction

In the recent time, banking industry faces two challenges, i.e., pressure of huge liquidity and declining of earning profit. The management of these two factors are very important for healthily growing of banking business. 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 27.4 percent and 17.3 percent in 2014 in the banking sector. Profitability as measured by return on asset(ROA), on the other hand, declined from 1.4 percent in 2009 to 0.6 percent in 2014 (Annual Report 2013-2014, BB). The findings of the present study has relevancy of policy implication in the management of liquidity to maintain profitability in banking industry of Bangladesh.

The trade-off between banks' liquidity and profitability depends on the demand and supply of liquidity in the banking sector. Banks have to maintain adequate liquidity to meet the

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demand of funds at the time needed at a reasonable cost. When the banks' demand for liquidity is higher than the supply then bank either sell its liquid asset or borrow funds to meet the deficit which impacts on profitability of the bank². On the other hand, when the bank's supply of liquidity exceeds its demand bank loss some earnings which also impact on bank's profitability. That is excess liquidity indicates idle funds that don't fetch any profit. On the other hand, insufficient liquidity might deteriorate bank's credit that would lead to forced liquidation of banks assets. Therefore, Bank's liquidity plays an important role for the bank's profitability. In this regard, it is important to find out the relationship between liquidity and profitability in the banking sector of Bangladesh.

Although there are various indicators of earnings and profitability, the most representative and widely used indicator is return on assets (ROA), which is supplemented by return on equity (ROE) and net interest margin (NIM)³. The profitability of the banking sector, as measured by which was declining up to 2000 and after 2005 it increasing up to 2010. Afterwards, it again declined till 2013. The advance-deposit ratio (ADR) is one of the most useful indicator for banks' liquidity adequacy. The higher ratio of ADR may indicate a stress in the banking system and a low level of liquidity to respond to shocks. The lower ratio of ADR, on the other hand, indicates an increasing ability of the banking system to mobilize deposit to meet credit demand. The ratio was above 84 percent during 1997-1999. Afterwards, it showed a downward trend and it reached 71 percent in 2013.

On the other hand, it is observed that deposit and credit⁴ growth exhibited more or less a steady upward trend during 1997-2011. After 2011 both trends reveal downward trend. Deposit may be downward due to slower rates of increase in deposit from the households due to high inflationary pressure (10.62 percent). The dropping in credit was due to the fact that in 2011, BB instructed banks to maintain their ADR within a certain level by June 2011, because the interbank money market faced some liquidity stress at the end of 2010 which continue throughout the year 2011. Thus, it is important for the policy makers to understand the relationship between liquidity and profitability in the banking sector in Bangladesh so that they can formulate the appropriate liquidity management policy for commercial banks.

Commercial banks in Bangladesh maximize their profit by managing assets and liabilities efficiently. Though banks' objective is to maximize profits, they are concerned about banks liquidity and safety. Banks earn profits for their shareholders and at the same time satisfy the withdrawal needs of its customers and meet the demand of regulatory requirement (i.e.,

2 Rose (2002) describes the essence of the liquidity management problem in two succinct statements. The two statements are: (1) it rarely matches the demand for and supply of liquidity of bank at any particular time, (2) there is a trade-off between bank liquidity and profitability.

3 ROA=net income after taxes/total asset ROE=net income after taxes/total equity capital NIM=net income after taxes/total income

4 Credit= advances + bills + Investment (excluding interbank).

maintain CRR and SLR set by the Bangladesh Bank). However, banks' day to day required liquidity can be decided within their demand-supply framework (Annexure Table-1). Hence, it is very difficult for a bank to achieve the goal of the profitability and also keep an adequate liquidity at the same time.

Against this background, the main objective of the paper is to investigate the relationship between liquidity and profitability as well as the impact of liquidity on banks' profitability of banking industry as a whole. The paper examines the impact of liquidity on banks profitability by applying ordinary least square method (OLS). The study uses secondary dataset for the analysis. The annual data have been collected from the Economic Trends of Bangladesh Bank, Annual Report of Bangladesh Bank, Bangladesh Bank Quarterly, Financial Stability Report of Bangladesh Bank and Bangladesh Economic Review, Ministry of Finance. The yearly data has been used for the period from 1997 to 2014. The rationale for using this period is that after the expiry of Financial Sector Reform Project (FSRP) in 1996, the Government of Bangladesh formed the Banking Reform Committee to evaluate the situation in the banking sector. Besides, in 1997, Commercial Bank Restructuring Project (CBRP) has been undertaken to take progress on key issues and urgent actions were needed for the development of commercial banks. Meanwhile, an international standard-based audit of the loan portfolio, assets / liabilities and capital adequacy had to be formed in all banks in order to make full and proper disclosure of their financial position.

The paper finds a positive relationship between advance deposit ratio and profitability. The call money rate varies negatively with banks' profit which- indicates that banks meet their liquidity deficit with higher cost. As a results, higher cost of funds impact banks profit inversely. Accordingly, the estimated result shows a negative relation between -NPL and profitability, and excess liquidity and profitability.

The remainder of the paper is organized as follows: Following the introduction in section I, review of the literature is given in section II. Section III highlights the measurement and determinant of liquidity and profitability. Section IV gives a details scenario of liquidity and profitability in the banking sector of Bangladesh. Section V analyses model specification, variable definition and methodology. Section VI describes the estimated results , and finally section VII gives the conclusion.

Section II: Review of Literature

Hossain (2012) investigates the liquidity and profitability of the banking sector of Bangladesh. He finds that the overall banking industry of Bangladesh is maintaining excess liquidity during 2002 to 2010. He also finds that foreign commercial banks (FCBs) are more profitable than private commercial banks (PCBs) and state-owned commercial banks (SCBs). The reasons behind higher profitability of FCBs are: i) their weighted average net interest spread is higher, ii) non-performing assets are much less than others, and iii) their non interest income is higher than SCBs and PCBs. This paper only reveals the liquidity

and profitability position of the banking industry, but nothing is highlighted regarding the management of the liquidity.

Afia et al (2014) examine the liquidity-profitability relationship in the Bangladesh banking industry by using yearly data during 2006-2011. They considered twelve banks in four different sectors (Government banks, Islami banks, multinational banks and private commercial banks) by using linear regression model. They use only two variables i.e., liquidity (current ratio= $\text{current asset}/\text{current liabilities}$) and profitability (return on asset-ROA). They find that individually all the sectors show no significant relationship between liquidity and profitability at 10 % level of significant. Even the overall banking industry also shows the same result.

Junaidu et al. (2014) check the impact of liquidity on the profitability of Nigerian banks for the period 2003-2012. Five banks were selected as the sample size to cover the period of the study. They used ROA and ROE as dependent variable. On the other hand bank liquidity is measured using loans and advances to total assets, and cash and bank advances to total liabilities, which they use as independent variable. Linear regression were used in the analysis. They find that there is a positive relationship between ROA and cash and bank balances to total liabilities (CBTOTL) and return on equity (ROE) and cash and bank balances to total liabilities but negative relationship between ROE and Loans and advances to total assets (LATOTA). Finally, they find that there is no significant impact between liquidity and profitability among the listed banking firms in Nigeria.

Wambu (2013) explores the relationship between profitability and liquidity of 44 commercial banks in Kenya during 2008-2012. The study used descriptive statistics and regression analysis to establish the relationship. In the regression analysis the paper use current ratio and CBK liquidity ratio which is the percentage of net liquid assets as a proportion of net deposit liabilities as independent variable. The paper concludes that profitability and liquidity have a positive relationship but liquidity is not a significant determinant of commercial bank's profitability but one of the determinants of it.

Munther et al. (2013) investigate whether liquidity through quick ratio has significant impact on Jordanian banks profitability through return on asset (ROA) for the period 2005-2011 of 15 Jordanian banks listed at Amman Stock Exchange (ASE). They use simple regression model for the analysis. The study revealed that there is significant impact of independent variable quick ratio ($\text{Cash} + \text{Short-term marketable investments} + \text{Receivables} / \text{Current liabilities} / \text{Current liabilities}$) on dependent variable return on asset (ROA) at 5% level of significant.

The above mentioned studies explain the relationship between liquidity and profitability in the banking sector in different countries. Most of these paper use only two variables, but there are numerous variables (bank specific and macroeconomic) those can influence the relationship. To fill up this gap we have taken this empirical study. We use bank specific variables as well as macroeconomic variables for the analysis. In Bangladesh 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. We think that the findings of the paper gives some thought to the policy maker.

Section III: Measurement and Determinant of Liquidity and Profitability

A. Measurement and Determinant of liquidity

The measurement of liquidity and its management are very important for earning profit. If any bank holds more liquid asset, it fall in strong liquidity holding bank categories. Among the most popular liquid assets for banks are Treasury Bills, government bond, call money loans, and deposits held with other bank etc. A bank is liquid only if it has access, at reasonable cost, to liquid funds in exactly the amounts required at the time they are needed (Rose, 2002). There is a opportunity cost to storing liquidity in asset when those assets must be sold in order to raise cash. Besides, liquid assets generally carry the lowest rates of return of all financial assets.

Maintaining a sound and appropriate liquidity position is one of the significant indicators of a bank's performance. Without ensuring the adequate liquidity the banking sector will fail to mobilize its resources for earnings profit. The sources and uses of funds method show that bank liquidity rises as deposits increase and loans decrease. On the other hand bank liquidity decline when deposits decrease and loans increase. Regarding this, the advance-deposit ratio (ADR) is one of the most useful indicators of adequacy of banks' liquidity⁶. The higher ratio of ADR indicate 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 deposit to meet credit demand. Banks may earn higher profit by increasing the ADR although it indicates lower liquidity. Bangladesh Bank (BB) is currently measuring the ADR ratio as a gross measure to calculate the liquidity condition prevailing in the banking sector⁷.

The credit and deposits growth play an important role in liquidity in the banking industry. The demand of credit or loan (advances) depends on many factors, i.e., expected GDP growth, corporate earnings, inflation rate, interest rate of lending, and money supply target by the monetary authority. Accordingly, deposits growth also depends on many factors, i.e., expected personal income (per capita income), trend of yield in money market deposits, and inflation.

- 5 The kingpin of the country's biggest banking scam, Hallmark Group, has embezzled around Tk 1,492 crore from Ruposhi Bangla Hotel branch of Sonali Bank by creating 804 letters of credit in a single day. Another scam was Basic Bank approved loans of Tk 4,500 crore, mostly without proper documents and scrutiny.
- 6 Deposit are the main sources of funding for the banking sector in Bangladesh in addition to the capital, reserves and borrowings. Banks mainly use their funds to provide loans and invest in debt securities. The ADR, is, therefore, a useful indicator of banks' liquidity in Bangladesh.
- 7 ADR is the ratio of total advance to total deposits, where advance comprise all banking advance except interbank advances and inland and foreign bill purchases when these bills are funded.

Sometimes fiscal performance also influences liquidity in banking industry. If government heavily borrow from banking system for deficit financing then banking system faces pressure of liquidity. So, government borrowing from the banking system is another indicator of liquidity situation. Government borrowing from the banking system would create an extra burden to the banking sector by creating liquidity shortage. On the other hand, banks borrowing from central bank often reflects liquidity situation in the financial system. Besides, interbank call money rate is an important indicator for evaluating liquidity position in the banking sector. The reduction in call money borrowing and investment and a stable call money rates within the lower ranges indicated that the banks were able to ease down from their earlier condition of liquidity stress. Another very important market to assess the liquidity scenario is the interbank repo market. The interbank repo rates more accurately indicates the money market conditions, because the rates are determined based on the demand and supply orientations in the money market.

B. Measurement and Determinant of Profitability

There are various indicators to measure profitability in the banking industry. The common indicators are return on asset (ROA), return on equity(ROE), non interest margin, and net interest margin (NIM)⁸. The ROA is derived as banks net income divided by its total asset. Thus 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. The ROE is derived as banks net income divided by its total equity capital. It 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. The non interest margin measures the amount of non interest revenue stemming from deposit services charges other service fees the bank has been able to collect relative to non interest costs.

A bank will be profitable when its total' revenues exceeds 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 common determinants which influences bank's profitability such as cost, size,

8 ROA=net income after taxes/total asset. It indicates how capably the management of the bank has been converting the institutions' assets into net earnings. ROE=net income after taxes/total equity capital. It measure the rate of return flowing to the banks' shareholders. NIM=net income after taxes/total income. It indicates how well management and staff have been able to keep the growth of revenues ahead of rising costs.

capital, liquidity, non-performing loan, management efficiency and credit risk etc. Bank size is generally used to capture potential economies or diseconomies of scale in the banking sector. This variable controls for cost differences and product and risk diversification according to the size of the credit institution. The impact of a bank's size on its profitability is not uniform. The first factor could lead to a positive relationship between size and bank profitability, if there are significant economies of scale, while the second to a negative one, if increased diversification leads to lower credit risk and thus lower returns.

Operating costs of a bank as a percentage of its profits are expected to have a negative correlation with profitability. In the literature, the level of operating expenses is viewed as an indicator of the management's efficiency. On the other hand, banks with higher levels of capital perform better than their undercapitalized peers. Bank profits provide an important source of equity especially if re-invested into the business. Besides, Insufficient liquidity is one of the major reasons of bank failures. However, holding liquid assets has an opportunity cost of higher returns. In addition, changes in credit risk may reflect changes in the health of a bank's loan portfolio, which may affect the performance of the institution.

Another group of variables impacting bank profitability are macroeconomic control variables such as GDP, interest rates and inflation. GDP is one of the most common measures of the total economic activity within a country. In the literature, the growth of GDP has significant positive effect on the profitability of the financial sector. Inflation is often cited to be a significant determinant of bank profitability (Weersainghe and Perera, 2013).

Section IV: Liquidity and profitability Scenario in the Banking Sector in Bangladesh

A. Liquidity:

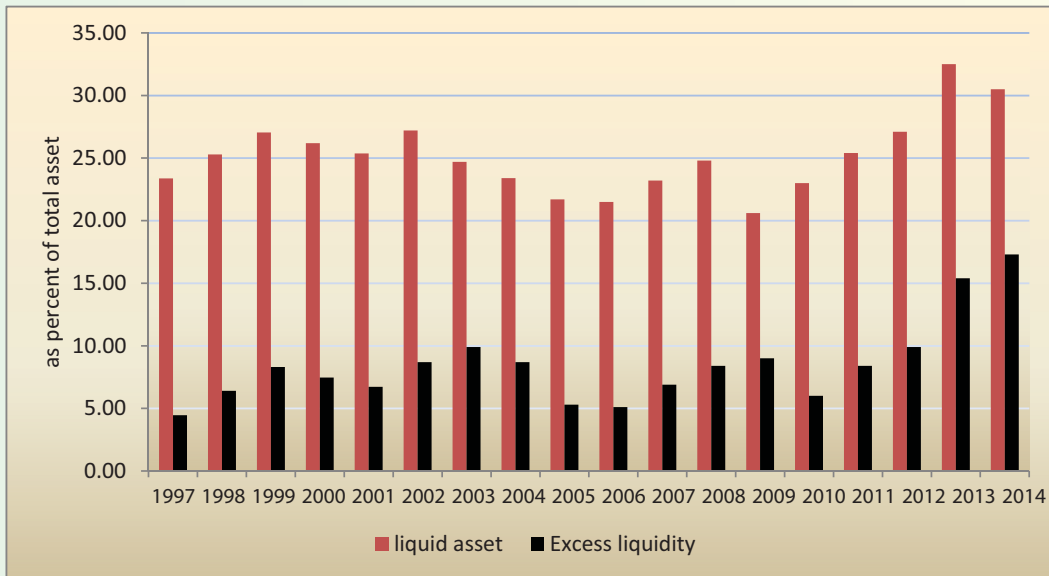
Figure-1 demonstrates that liquidity showed a mixed trend during 1997-2009⁹. After 2009, it showed an increasing trend due to BB's measures to improve liquidity position in the banking sector¹⁰. Accordingly, excess liquidity shows an upward trend during 2007-2014 (except 2010 when banking sector faced liquidity crisis). During 1997-2014, total liquid

9 Bangladesh Bank defines liquidity position of the scheduled banks as total liquidity = Cash in tills + balance with Sonali bank + balance with BB + investment in unencumbered approved securities. Excess liquidity = total liquid asset- required liquid asset (CRR +SLR).

10 In order to maintain ensuring good corporate governance in banks for overcoming liquidity and solvency problems caused by poor governance, BB initiated two Basel III-liquidity standards, namely the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) to the banks as a reporting requirement in 2011. In addition, BB introduced a liquidity monitoring tool named 'Interbank Transaction Matrix' covering all the banks and NBFIs with a view to assessing the risk arising from the liquidity interdependence and placements among the institutions in the banking system.

asset of the banking sector was on average 24.73 percent of total asset and excess liquidity was on average about 7.82 percent¹¹.

Figure 1: Trend in Liquidity: sample period 1997-2014

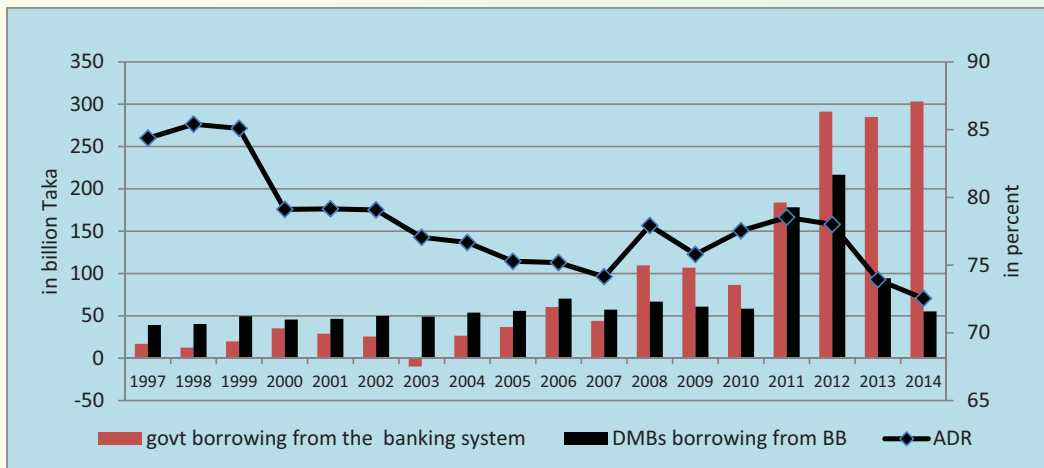


During 1997-2014, the ADR showed a mixed trend. The ratio was above 84 percent during 1997-1999. Afterwards, it showed a downward trend till 2009 and again it increased during the 2010-2012 period (Figure-2). The higher growth in advances may be attributed to increase in business activities due to recovery from the global financial crisis. The interbank money market faced liquidity stress at the end of 2010 and it continued throughout the year 2011, which was due to high government borrowings and a slower rates of increase in savings from the households due to high inflationary pressure. However, activities quickly turned to a business-as-usual situation with supportive measures taken by the BB and prudent policies of the financial institutions. The ADR started declining from 81.1 percent in January, 2012 to 73.18 percent in December 2013 and reached 72.54 percent in 2014. This dropping of ADR was due to the fact that the growth in deposits was higher than that of credit in 2013. Banking sector deposit and credit growth were 16.26 percent and 7.41 percent respectively in 2013. A volatile political environment that discouraged credit growth due to reduced business confidence also partially explains the scenario.¹²

11 Liquid asset=percent of liquid asset in total asset Excess liquidity=percent of excess liquidity in total liquidity.

12 Bangladesh has experienced a political turmoil during October to December, 2013 when non-stop blockade and continuing general strikes (*hartal*) accompanied with significant violence, afflicted considerable losses of the economy, which severely disrupted day-to-day economic activities resulting reduce the business confidence and bank credit.

Figure 2: Trend in Liquidity Indicator in the Banking System: sample period 1997-2014



Source: (1) Annual Report, BB, (2) Economic Trends, BB, (3) Bangladesh Economic Review, Ministry of Finance.

The overall ADR also influenced by the government borrowing from banking system. Government borrowing from the banking system would create an extra burden to the banking sector by creating liquidity shortage. It is envisaged from Figure-2 that government borrowing from the banking system was started to increase from 2008 (except 2010 due to prevailing liquidity crisis in the banking sector) and after 2010, it increased significantly. Consequently there was huge liquidity crisis in the banking sector. A rising trend of credit to the Government by the banking system may create strain on the lending capacity of scheduled banks.

It is observed that banks borrowing from BB showed a mixed trend during 1997-2014. An increasing trend was exhibited from 1997 to 2006. It declined from 2007 and started to increase significantly in 2011 and 2012 which indicates a liquidity crisis in the banking sector. It decreased substantially in 2013 and 2014 (Figure-2).

Interbank money market is an important indicator for evaluating liquidity position in the banking sector. It is observed that investment in call money market decreased by 11.61 percent while, borrowings increased by 30.96 percent in 2010 from its previous year (Table-1). It is mentioned that the interbank money market faced some liquidity stress at the end of 2010. BB's instruction to increase the Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR) in December 2010, along with rising import payments and diversion of cash to the stock market, created some temporary pressures in the interbank liquidity market. However, investment in call money market increased dramatically by 191.5 percent while, borrowings from call money market increased by only 41.5 percent in 2011 compared to that of 2010. It is noteworthy that the interbank money market faced liquidity

stress throughout the year 2011 and the banking sector ADR demonstrated a surge at the beginning of 2011. The stress was released in 2012 as more banks improved their ADR.

The call money rates declined from the early part of 2013 until June 2013, after which it increased slightly and fluctuated marginally during the rest of the year. This low call money rates and reduced amount of call money borrowings indicated that the banks were able to ease down from their earlier condition of liquidity stress. In 2013, call money borrowing also decreased substantially and slightly increased in 2014. The reduction in call money borrowing and investment and a stable call money rates within the lower ranges indicated that the banks were able to ease down from their earlier condition of liquidity stress (Table-1).

Another very important market to assess the liquidity scenario is the interbank repo market. The interbank repo rates more accurately indicates the money market conditions, because the rates are determined based on the demand and supply orientations in the money market. From 2011 the volume and rates for repo increased substantially which also indicates liquidity stress. In 2013 the repo turnover decreased, and then increased a little during the latter half of the year, but the repo rates decreased continuously which again suggest adequate liquidity in the banking system. The relatively higher turnover might be due to fund management strategies of the banks. The prevailing very low ADR, decreasing call money rates and repo rates indicates that banking industry is currently having substantial liquidity.

Table-1: Trends in the interbank money market developments.

	CY09	CY10	CY11	CY12	CY13	CY14
Borrowings (in billion Taka)	121.98	159.75	226.2	316.0	221.6	244.9
Investment (in billion taka)	49.70	43.93	128.1	66.8	46.5	63.32
Call money rate	4.39	8.06	11.16	12.82	7.78	7.93
Repo rate	4.5	5.5	7.25	7.75	7.25	7.36

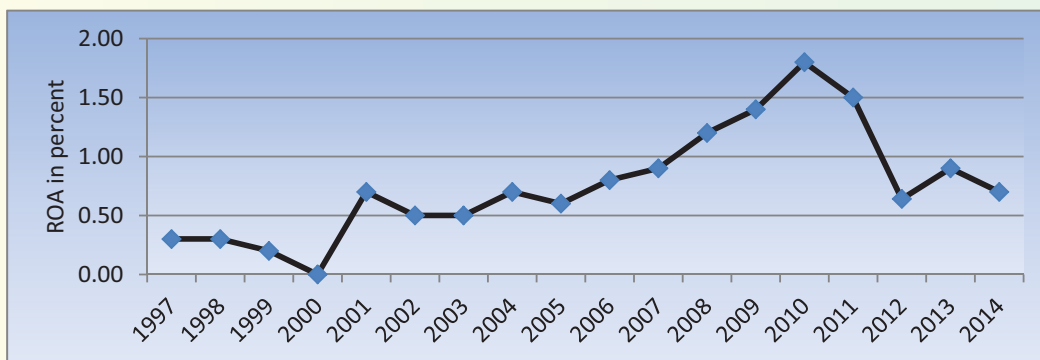
Source: Financial Stability Report (various issue), BB. Note: CY= calendar year

B. Profitability:

Figure-3 shows that the profitability of the banking sector, as measured by return on asset (ROA), showed a mixed trend during the period from 1997 to 2005. It has a declining trend up to 2000. During 2001-2004 it showed mixed trend and after 2005 it exhibited upward trend and picked in the year 2010. This may be due to increased in credit growth which is attributed to increase in business activities due to recovery of global financial crisis. Besides, non- performing loans were 7.1 and 6.2 in 2010 and 2011 respectively which was 34.9 percent in 2000 (Annexure, table-4). After 2010 ROA exhibited downward trend. BB instructed the banks to maintain their advance deposit

ratio (ADR) within a certain level (for conventional banks up to 85 percent and for Islamic shariah based banks up to 90 percent) by June 2011¹³. In addition, after 2011, non - performing loan also increased and stood at 10.8 percent in 2014. As a result, credit as well as ROA showed downward trend.

Figure 3: Trend in profitability: sample period 1997-2014



Source: Annual Report, BB

Table-2 exhibit the bank group wise ROA. The ROA in the banking industry increased gradually to 1.80 percent in 2010 from 0.70 percent in 2001. Afterwards, it declined to 0.6 percent in 2012. An analysis of the indicator reveals that the ROA of the state owned commercial bank (SCBs) was less than banking industry average. During 2008-2011, it showed an increasing trend, but it declined to -0.6 percent in 2012 due to financial scam and a huge default loan which incurred a big net loss. In 2013 the ROA of SCBs increased and became positive at 0.60. The DFIs situation is not better due to persistent operating losses incurred by Bangladesh Krishi Bank (BKB) and Rajshai Krishi Unnayan Bank (RAKUB). The ROA of DFIs deteriorated (0.4 percent) in 2013. The ROA of the PCBs showed a consistently strong position until 2010, but it slightly dropped in 2011 and 2012 due to a decrease of net profit during the period. In 2013, it didn't drop from the previous year. 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 (Table-2).

13 BB is currently measuring the ADR (advance deposit ratio) as a gross measure to calculate the liquidity condition prevailing in the banking sector.

Table-2: Trend in Return on Assets (ROA) by Types of Banks

Year/Bank Type	SCBs	DFIs	PCBs	FCBs	Total
1997	0.00	-2.10	1.10	4.80	0.30
1998	0.00	-2.80	1.20	4.70	0.30
1999	0.00	-1.60	0.80	3.50	0.20
2000	0.10	-3.70	0.80	2.70	0.00
2001	0.10	0.70	1.10	2.80	0.70
2002	0.10	0.30	0.80	2.40	0.50
2003	0.10	0.00	0.70	2.60	0.50
2004	-0.10	-0.20	1.20	3.20	0.70
2005	-0.10	-0.10	1.10	3.10	0.60
2006*	0.00	-0.20	1.10	2.20	0.80
2007*	0.00	-0.30	1.30	3.10	0.90
2008	0.70	-0.60	1.40	2.90	1.20
2009	1.00	0.40	1.60	3.20	1.40
2010	1.10	0.20	2.10	2.90	1.80
2011	1.30	0.10	1.60	3.20	1.50
2012	-0.60	0.10	0.90	3.30	0.60
2013	0.60	-0.40	1.0	3.0	0.90
2014	-0.55	-0.68	0.99	3.38	0.60

Source: Annual Report & Bangladesh Bank Quarterly (various issues), BB. * 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.

Aggregate net interest income (NII) of the industry has increased constantly from Taka 6.3 billion in 1997 to Taka 153.8 billion in 2012. In 2013, NII fell down to Taka 132.3 billion reflecting mainly in the negative NII of Taka 5.4 billion by the SCBs (Table -3). The NII of the SCBs was a negative amount of Taka 1.2 billion in 2000 and it turned to positive Taka 7.7 billion in 2005. In 2001, the NII of SCBs was Taka 14.9 billion. Since 2005, SCBs have been able to increase their net interest income (NII) by reducing their cost of fund up to 2011. In 2012, the NII of SCBs dropped and in 2013 it was negative due to high interest expenses which grew faster than interest earnings. The DFIs had a positive trend since 2000 and it was Taka 4.7 billion in 2012 but afterwards it showed a decreasing trend. The NII of the PCBs has been incredibly high over the period from 2003 through 2013. The trend of NII indicates that the interest spread of PCBs and FCBs is higher (Annexure

Table-2) than that of SCBs and DFIs (BB, Annual Report)¹⁴.

Table -3 Net Interest Income (NII) by type of Banks (in billion Taka).

YEAR	SCBs	DFIs	PCBs	FCBs	TOTAL
1997	2.7	-0.1	1.7	2	6.3
1998	2.2	0.5	2.3	2.2	7.1
1999	3.1	-0.1	3	1.8	7.8
2000	-1.2	1	6.1	2.5	8.4
2001	-1.8	2.7	9.2	3.3	13.4
2002	-1.5	1.4	10.2	3.4	13.5
2003	-0.3	1.3	12	3.6	16.6
2004	-1.1	1.8	13.7	4.2	18.3
2005	7.7	1.0	21	5.6	35.3
2006	9	1.7	25.4	8.2	44.3
2007	7.4	1.4	36.1	9.9	54.8
2008	7.9	1.9	48.5	12.6	70.9
2009	12.1	1.9	56.7	10.7	81.5
2010	19.8	6.2	82.8	13.0	121.9
2011	34.3	4.9	91.4	16.1	146.7
2012	14.9	4.7	114.7	19.6	153.8
2013	-5.4	3.8	118.2	15.8	132.3
2014	39.7	2.1	205.8	26.6	274.0

Source: Annual Report (various issues), BB.

Commercial banks in Bangladesh continuously monitor their balance sheet (assets and liabilities) for balancing liquidity and risk to maximize their profitability. Banking sector aggregate balance sheet data are given in Annexure Table-3.

Section V: Model Specification Variable Definition and Methodology

a. Model Specification

Since the paper examines the impact of liquidity on profitability of the banking sector in Bangladesh, we employ the following empirical model:

$$Y_t = \beta_0 + \beta_i X_{it} + \varepsilon_t \quad \text{..... (1)}$$

Where Y_t denotes profitability (return on asset) of bank, X_i includes a set of bank specific control variables (advanced-deposit ratio, excess liquidity ratio, lending rates, non-performing loans, call money rates). X_i also include some macroeconomic variables

¹⁴ NII is the difference between (a) interest payments the bank receives on loans outstanding and (b) interest payments the bank makes to customers on their deposits.

(inflation, GDP) those are also concern for banks liquidity as well as profitability. β_i is the parameters which to be estimated. β_0 is the intercept and ϵ_i is the error term. We use aggregate banking industry's data.

b. Variable Definition

Return on asset (ROA): ROA is net income after taxes/total asset. It indicates how capably the management of the bank has been converting its assets into net earnings.

Advanced-deposit Ratio (ADR): ADR is the ratio of total advance to total deposits. The relationship between advances-deposit ratio and profitability is expected to be positive.

Lending rates : Weighted average lending rates in the banking system are taken for analysis. The relationship between profitability and lending interest rate may be positive or negative.

Call money rates: Interbank investment/borrowing rate indicates liquidity situation in the overall banking system. The relationship between call money rate and profitability may be positive or negative.

Excess liquidity-ratio: Percent of excess liquidity in total liquidity. It is expected to be negative relationship with profitability.

Non-performing loans (NPL): gross NPL to total loan. High NPL signify high non-earnings asset which expected to be negative relationship with profitability.

Liquidity-deposit ratio: Ratio of total liquidity to total deposit. It is expected to be negative relationship with profitability.

Inflation: Expected to be negative relationship with profitability.

GDP growth : Expected to be positive relationship with profitability.

c. Data and Methodology

To verify the impact of liquidity on profitability of the banking sector in Bangladesh, the paper uses the ordinary least square estimation method (OLS). The study takes secondary data for the period 1997-2014. This period (18 years) may not be enough to draw better result. The sample size of the study is small due to data unavailability in the aggregate level of banking industry which is the limitation of the study. The yearly data have been collected from (1) Monthly Economic Trend, Bangladesh Bank, (2) Annual Report Bangladesh Bank, (3) Bangladesh Bank Quarterly, Bangladesh Bank, (4) Financial Stability Report, Bangladesh Bank (5) Scheduled Banks Statistics, Bangladesh Bank (6) Major Economic Indicator, Bangladesh Bank and (7) Bangladesh Economic Review, Ministry of Finance.

VI. Analysis of the Estimated Results

Table-4 represent the descriptive statistic of the all variables. The mean of all variables which indicate a historical trend value during the period 1997-2014, are realistic. Standard deviations, measures the volatility, showed a variation during the period 1997-2014. It

It is observed that mean and standard deviation for NPL are 19.81 and 12.37 respectively which show more volatile than other variables. A high mean value and volatility of NPL raises portfolio risk and erodes capital base of the banks which affects banks profitability. Volatility is also observed in advance-deposit ratio and excess-liquidity ratio during 1997-2014 which also related with banks profitability.

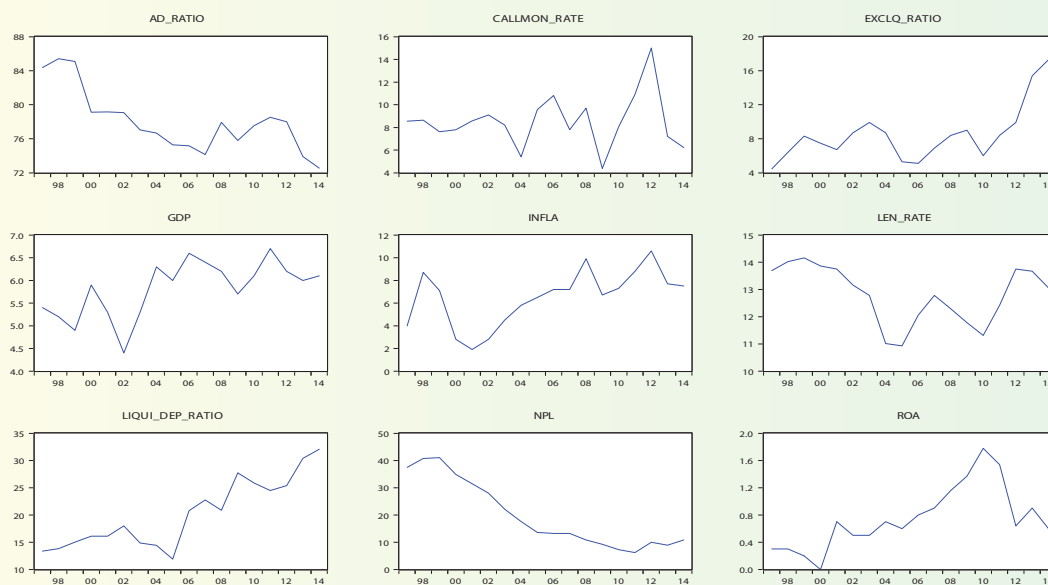
Table-4: Descriptive statistics of all variables

Variable	Mean	S. D
Advance Deposit Ratio	78.04	3.71
Call money Rate	8.52	2.32
Excess liquidity Ratio	7.82	3.29
Liquidity Deposit Ratio	19.52	5.71
GDP	5.81	0.61
Inflation	6.5	2.45
Lending rate	12.80	1.08
Non Performing Loan	19.81	12.37
Return on Asset	0.74	0.46

Source: Authors’ own calculation.

Plots of the variables (Figure-4) show that all variables are stationary at level.

Figure-4 Plots of the variables used in OLS



Source: Economic Trends, BB & Annual Report, BB.

To test whether the variable used in the model are stationary or non-stationary, I used the Augmented Dickey-Fuller Test (ADF) and Phillips–Perron (PP) tests. The both tests show that all variables are stationary i.e., I(0) at level .

Table-5 : Phillips-Perron unit root tests

Variables	Model A			Model B		
	Test statistics	5% critical value	Integration	test statistics	5% critical value	Integration
A_D_R	4.47	3.06	I(0)	4.38	3.73	I(0)
INFLA	4.56	3.07	I(0)	4.41	3.73	I(0)
GDP	4.97	3.08	I(0)	4.91	3.76	I(0)
NPL	4.75	3.08	I(0)	5.00	3.76	I(0)
CLM_R	4.46	3.08	I(0)	4.09	3.12	I(0)
LN-R	3.63	3.08	I(0)	3.87	3.82	I(0)
EXLQ_R	5.23	3.12	I(0)	5.12	3.88	I(0)
LQ_DEP_R	4.80	3.06	I(0)	4.80	3.73	I(0)
ROA	4.32	3.06	I(0)	4.35	3.73	I(0)

Note: Model A includes intercept and Model B includes both intercept and trend.

Source: Monthly Economic Trends, BB, Annual Report of BB. A_D_R=advance deposit ratio, INFLA= inflation, GDP= real GDP growth rate, NPL=non performing loan to total loan, CLM_r=call money rate, LN_R=lending rate, EXLQ_R= excess liquidity ratio, LQ_DP_R= liquidity deposit ratio.

Table-6 gives a picture of the correlation between explained and explanatory variables. The table exhibit that correlation of ROA with GDP, lending rates, liquidity-deposit ratio and NPL 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 lending rates and ROA is -0.59 which indicates that prevailing high lending rate distress ROA due lower credit demand. An estimated result of correlation coefficient between ROA and GDP is 0.51 which indicates that GDP positively impact on banks profitability.

Table-6: Estimate result of Correlation among ROA and bank specific & macro economic variables

	Variable	Correlation	t-Statistic
ROA	AD_RATIO	-0.42	-1.86
ROA	CALLMON_RATE	-0.01	-0.07
ROA	EXCLQ_RATIO	0.02	0.08
ROA	LIQUI- DEPOSIT-RATIO	0.70	3.87
ROA	GDP	0.51	2.37
ROA	INFLA	0.41	1.83
ROA	LEN_RATE	-0.59	-2.94
ROA	NPL	-0.78	-4.98

Source: Authors' own calculation.

Table-7 reveals the empirical evidence regarding the impact of liquidity on banking sector profitability. I estimate six models for the period 1997-2014 by applying ordinary least square method (OLS). In model-1, the explanatory variables are ADR, GDP and inflation. The result of model-1 reveals that ROA elasticity with respect to all variables are statistically insignificant implies that GDP, inflation and ADR do not influence banks profitability. In model-2 when we add NPL the estimated result show that the banking sector profitability is affected by the advance-deposit ratio and NPL. It indicates that NPL and ADR more sensitive to vary banks profitability rather than macroeconomic variables.

Then we add call money rates, lending rates, excess liquidity ratio, liquidity deposit ratio in model-3-6 respectively. Estimated result show that the banking sector profitability is affected by advance-deposit ratio, excess liquidity ratio and call money rates. The coefficients of call money rates, advance-deposit ratio and excess liquidity ratio are statistically significant with expected sign. On the other hand, lending rate and liquidity-deposit ratio are statistically insignificant.

Table-7 Results of the regression model: Dependent variable ROA.

Variable	coefficient					
	Model-1	Model-2	Model-3	Model-4	Model-5	Model-6
C	2.03 (0.55)	-6.96 (-2.79)	-8.12 (-3.65)	-8.65 (-3.09)	-6.49 (-2.55)	-5.86 (-2.15)
A_D_R	-0.033 (-0.94)	0.12 (3.81)	0.14 (4.87)	0.14 (4.54)	0.11 (3.72)	0.11 (3.41)
INFLA	0.050 (0.993)	-0.07 (-2.19)	-0.06 (-2.24)	0.07 (-2.14)	-0.04 (-1.40)	-0.04 (-1.39)
GDP	-0.165 (0.667)	-0.02 (-0.18)	-0.00 (0.06)	-0.02 (0.13)	-0.09 (-0.82)	-0.09 (-0.71)
NPL		-0.07 (-5.91)	-0.07 (-7.11)	-0.07 (-5.95)	-0.08 (-7.39)	-0.07 (-3.55)
CLM_R			-0.05 (-2.31)	-0.06 (-2.20)	-0.09 (-3.45)	-0.09 (-2.05)
LN_R				0.02 (0.34)	0.16 (1.93)	0.08 (0.61)
EXLQ_R					-0.06 (-2.31)	-0.06 (-2.23)
LQ_DEP_R						0.02 (0.75)
R ²	0.332	0.819	0.875	0.876	0.919	0.924
Adj. R ²	0.188	0.763	0.823	0.808	0.863	0.856
F	2.32 [0.119]	14.71 [0.000]	16.81 [0.000]	13.00 [0.000]	16.30 [0.000]	13.71 [0.000]
D_W	1.033	1.87	1.84	1.84	2.42	2.56

A_D_R=advance deposit ratio, INFLA= inflation, GDP= real GDP growth rate, NPL=non performing loan to total loan, CLM_r=call money rate, LN_R=lending rate, EXLQ_R= excess liquidity ratio, LQ_DP_R= liquidity deposit ratio. Note: Figure in parenthesis indicates t-statistic and figure in [] indicates probability of F statistic.

According to the estimated result in models 2- 6 the coefficient of advance-deposit ratio lie between 0.11-0.14 and significant at 1% level of significant which imply that if advance-deposit ratio increase 1unit ROA increase by 0.14 unit. Estimated result also demonstrate that in all model (2-6) the coefficient of NPL is significant and vary between -0.07 to -0.08. That is if NPL increases by 1unit ROA decrease by 0.08 unit. On the other hand, ROA elasticity with respect to call money rates range between -0.05 to -0.09 which indicate that

if call money rates increase 1 percentage point banks' profit decrease by 0.08 unit which implies higher call money rate indicates higher demand from interbank borrowing show a sign of lower profit as well as liquidity stress in the banking industry. The coefficient of excess liquidity ratio is -0.06 with expected sign. This denotes that if excess liquidity increase by 1 unit, profit decrease by 0.06 unit. So, there is a trade-off between bank liquidity and profitability. Breusch-Pagan-Godfrey test shows that there is no heteroskedasticity in the residuals of all estimated equations (1-6 model). It implies that estimated results are robust.

Section VII: Conclusion

The main objectives of the paper were to examine the relationship between liquidity and profitability, and the impact of liquidity on banks' profitability. The paper uses Ordinary Least Square estimation method (OLS) method for the sample period 1997-2014. The analysis of estimated results show that the high ratio of advance-deposit indicates the lower liquidity and higher profit. However, too low ADR indicate inefficiency of the banks to use the funds, or simply a lack of profitable investment opportunities.

The call money rates varies negatively with banks' profit which indicates that banks meet their liquidity deficit with higher cost. As a result, higher cost of funds impact banks profit inversely. Accordingly, the estimated result shows a negative relation between NPL and profitability. So commercial banks need to be careful while giving loan and reduce NPL to increase profitability.

The recent rising in NPL is concerned for overall banking stability because high NPL gives huge stress in the banks to earn profit. It is observed (Annexure Table-4) that the percentage share of NPL 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.

Based on the above analysis we can conclude that there exist a negative relationship between liquidity and profitability. So banks authority should focus more on liquidity management for the bank's profitability. Moreover, careful consideration and planning of liquidity management is needed to improve efficiency of liquidity management. In addition, commercial banks should not solely concentrate on the profit maximization but should also adopt measures how to achieve the optimal liquidity level.

It mentioned that BB has introduced an 'Integrated Supervision System (ISS), through launching a software in October 2013, with an aim to facilitate quicker financial analysis of all aspects of banking activity, especially to lower the risk of fraud and forgery in the country's banking sector. BB also strengthened the monitoring and supervision strategies for the four state-owned commercial banks (The Sonali Bank Ltd., the Janata bank Ltd., the Agrani Bank Ltd. and the Rupali bank Ltd.) to improve their financial health. To this end, BB revised and signed fresh memoranda of understandings (MoU) in 2013. Moreover, a fresh MoU was signed with a government owned specialized bank (The Basic Bank Ltd) to improve its governance in 2013.

However, the analysis of the relationship between liquidity and profitability is in an aggregate level data of banking industry with small sample size which is a major limitation of the paper. Further research is left for future on the same area by using a wider disaggregate level data.

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Annexure

Table-1 Sources of Demand and Supply for Liquidity within the Bank

Supplies of Liquid Funds Come From:	Demands for Bank Liquidity Typically Arise From:
Incoming customer deposits	Customer deposit withdrawals
Revenues from the sale of nondeposit services	Credit requests from quality loan customers
Customer loan repayments	Repayment of nondeposit borrowings
Sales of bank assets	Operating expenses and taxes incurred in producing and selling services
Borrowing from the money market	Payment of stockholder cash dividends

Source: Commercial Bank Management, Peter S. Rose, 2002.

Table-2 Movements in Interest Rate Spread

Period	SCBs	DFIs	PCBs	FCBs
2001	6.03	5.06	7.55	8.23
2002	6.15	5.92	7.05	7.4
2003	5.77	4.71	6.55	7.32
2004	4.87	3.7	5.54	7.45
2005	5.41	3.66	5.07	7.87
2006	5.63	3.18	5.44	8.12
2007	5.95	2.95	5.7	8.83
2008	3.96	3.12	4.7	9.33
2009	3.47	2.7	5.29	9.26
2010	4.18	2.26	5.38	8.82
2011	5.01	2.16	5.37	8.89
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, Statistics Department, BB.

Table-3 Banking sector aggregate balance sheet in Bangladesh (in billion Tk)

Particulars	Change (%)					
	2011	2012	2013	2014	2012 to 2013	2013 to 2014
Property & Assets						
Cash in hand (including FC)	59.7	81.1	102.7	91.1	26.7%	-11.33%
Balance with BB & SB (including FC)	399.5	450.8	479.3	572.8	6.3%	19.5%
Balance with other banks & FIs	155.9	244.7	347.9	409.7	42.2%	17.8%
Money at call & short notice	128.1	66.8	46.5	54.2	-30.4%	16.4%
Investments						
Government	662.1	607.6	841.2	977.6	38.5%	16.2%
Others	131.3	505.9	730.0	855.5	44.3%	17.2%
Total Investment	793.4	1113.5	1571.2	1833.1	41.1%	16.7%
Loans & advances						
Loans, CC, OD ect.	3525.1	4098.4	4443.5	5147.2	8.4%	15.8%
Bills purchased & Disct.	267.5	288.2	276.6	245.7	-4.0%	-11.2%
Total Loans & advances	3792.5	4386.7	4720.1	5392.9	7.6%	14.3%
Fixed assets	143.7	162.1	198.2	216.7	22.3%	9.4%
Other assets	401.1	488.1	532.5	570.7	9.1%	7.2%
Non-banking assets	1.2	36.9	1.7	1.9	-95.4%	11.6%
Total Assets	5874.9	7030.7	8000.2	9143.0	13.8%	14.3%
Liabilities						
Borrowings from other banks/FIs/ Agents	226.3	316.0	221.6	313.0	-29.9%	41.3%
Deposits & Other Accounts						
Current Deposit	992.9	989.6	1091.0	1295.3	10.3%	18.7%
Savings Deposits	933.7	972.6	1047.7	1225.6	7.7%	17.0%
Fixed/Term Deposit	2583.2	2985.6	3622.3	3931.1	21.3%	8.5%
Other Deposits	-	474.4	533.3	688.6	12.4%	29.1%
Total Deposits	4509.8	5422.2	6294.3	7140.6	16.1%	13.4%
Bill payable	65.3	76.0	68.9	87.8	-9.3%	27.5%
Other liabilities	546.4	640.6	737.2	860.2	15.1%	16.7%
Total Liabilities	5347.8	6454.7	7321.9	8401.7	13.4%	14.7%
Capital /Shareholders' equity	527.1	575.9	678.3	741.3	17.8%	9.3%
Total liabilities & Shareholders' Equity	5874.9	7030.7	8000.2	9143.0	13.8%	14.3%
Off-balance sheet items	1814.6	1871.3	2153.1	2360.95	15.1%	9.7%

Source: FSR, BB, 2014.

Table-4 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	22.2
DFIs	65.72	62.56	47.4	33.7	25.9	24.2	24.6	26.8	26.8	32.1
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	9.7

Note: NPLs= gross nonperforming loans to total loans

Source: Annual Report, BB.