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**FINANCIAL LIBERALISATION, BANK
EXCESS LIQUIDITY AND LENDING:
A BANK-LEVEL STUDY FOR THE ECONOMY
OF BANGLADESH**



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**Submitted in fulfillment of the requirements for the Degree of
Doctor of Philosophy in Economics**

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Abstract

One of the main aims of financial liberalisation was to increase banking sector competition. Different policies were prescribed for this with one of the ultimate objectives being that banks would be able to lend without any constraint. If banks are able to lend their deposits fully then there will be no excess liquidity in the banking sector; even a significant increase of lending will imply reduction in excess liquidity. However, it is observed that although the process of financial liberalisation started around the early 1990s for most of the developing economies, still there is substantial excess liquidity problem in the banking sector in these countries, including Bangladesh. This study examined the possible reasons for excess liquidity and lending in Bangladesh using bank-level data of 37 banks for the period of 1997-2011 applying panel estimation methods. The first empirical chapter analysed how financial liberalisation affected the excess liquidity situation in banks. The second chapter examined how excess liquidity was related with business cycle and the recent financial crisis. The final empirical chapter looked at how financial liberalisation was related to lending. One key contribution of this study is that it applied an index of financial liberalisation to identify the process and its effect more comprehensively. Another important contribution of this research is to see if there were any definite patterns for different bank typologies. To address this, four bank-specific characteristics of ownership, size, mode of operation and age were used. Financial liberalisation was found to have significant positive relationship with excess liquidity as well as for lending for all types of banks. It was also observed that business cycle had a significant positive impact on excess liquidity. However less significant relationship between the financial crisis and excess liquidity showed the resilience of the banking sector in Bangladesh during the crisis. When bank-specific characteristics were analysed, the results showed that public banks had higher growth of excess liquidity and lower lending than private banks and new banks had lower growth of excess liquidity and higher lending than old banks. No definite differences could be observed between Islamic and conventional banks. It was also observed that public banks acted less procyclically than the private banks while large and new banks acted more procyclically than their counterparts. For the recent financial crisis, it is concluded that large and new banks had more excess liquidity than their counterparts while other typologies were found to be indifferent. Analysis of significant positive impact of financial liberalisation on both lending and excess liquidity suggested that prudent lending by banks to avoid loan default in the face of increased risk was a key for this parallel movement. Differences in interest rate according to bank-specific characteristics are found to be influential for the significant variations according to bank typologies.

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Dedication

To

My Mother

**Who left this world just two days before my submission
on 9 September 2014**

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Qamarullah Bin Tariq Islam
December 17, 2015

Declaration

I declare that, except where explicit reference is made to the contribution of others, this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Signature



Printed name

Qamarullah Bin Tariq Islam

LIST OF ABBREVIATIONS

2SLS	Two-Stage Least Squares
AR(1)	First-order autoregressive process
AR(2)	Second-order autoregressive process
BASIC	Bank of Small Industries and Commerce
BB	Bangladesh Bank
BBS	Bangladesh Bureau of Statistics
BC	Business Cycle
BDBL	Bangladesh Development Bank Limited
BIDS	Bangladesh Institute of Development Studies
BIS	Bank of International Settlement
BK	Baxter-King
BRC	Banking Restructuring Committee
BSRS	Bangladesh Shilpa Rin Sangstha
BT	Bank Typologies
CAR	Capital Adequacy Ratio
CEE	Central and East European
CEEC	Central and East European Countries
CEMAC	Communaute Economique et Monetaire de l'Afrique Centrale (Central African Economic and Monetary Community)
CF	Christiano-Fitzgerald
CPI	Consumer Price Index
CRR	Cash Reserve Ratio
DFI	Development Financial Institution
EL	Excess Liquidity
EU	European Union
FBCCI	Federation of Bangladesh Chambers of Commerce and Industry
FC	Financial Crisis
FCB	Foreign Commercial Bank
FE	Fixed Effects
FSRP	Financial Sector Reform Programme
FV	Fair Value
GDP	Gross Domestic Product
GLS	Generalised Least Squares
GMM	Generalised Method of Moments
HP	Hodrick-Prescott
ICB	International Commercial Bank
IFS	International Finance Statistics
IMF	International Monetary Fund
InM	Institute of Microfinance
IRS	Interest Rate Spread
L/C	Letter of Credit
LDCs	Less-Developed Countries
LSDV	Least Square Dummy Variable
MCD	Months for Cyclical Dominance
MDFA	Multivariate Direct Filter Approach
MDG	Millennium Development Goal
MFI	Micro-Finance Institution
ML	Maximum Likelihood

MOF	Ministry of Finance
MWW	Mann-Whitney-Wilcoxon
NBER	National Bureau of Economic Research
NCB	Nationalised Commercial Bank
NPL	Non-Performing Loans
NRB	Non Resident Bangladeshi
OLS	Ordinary Least Squares
PAT	Phase-Average Trend
PCB	Private Commercial Banks
RAKUB	Rajshahi Krishi Unnayan Bank
RE	Random Effects
ROA	Return on Assets
ROE	Return on Equity
SCB	State-Owned Commercial Bank
SLR	Statutory Liquidity Reserve
UNCTAD	United Nations Conference on Trade and Development
VAR	Vector Autoregressive
WCF	Working Capital Financing
WDI	World Development Indicator
WG	Within Group

CHAPTER 1

BACKGROUND AND JUSTIFICATION FOR THE STUDY

1.1 INTRODUCTION

The setting of financial prices by central banks, especially in developing countries, was a fairly common practice in the 1950s and 1960s. The soundness of this approach was challenged by Goldsmith (1969) in the late 1960s, and by McKinnon (1973) and Shaw (1973) in the early 1970s. They ascribed the poor performance of investment and growth in developing countries to interest rate ceilings, high reserve requirements and quantitative restrictions in the credit allocation mechanism.

According to them, these restrictions were sources of ‘financial repression’, the main symptoms of which were low savings, credit rationing and low investment. They argued that financial repression would restrain savings by deliberately maintaining interest rates below their natural level. As a result, growth would remain below its potential even when investment opportunities are abundant (McKinnon, 1973; Shaw, 1973; Fry, 1989). In summary, the low rates of savings and investment that characterised developing economies are assumed to be the results of government intervention in the financial sector.

They proposed the theory of financial liberalisation, also known as the McKinnon-Shaw hypothesis, according to which investment and savings are repressed by a combination of controlled and low interest rates, insufficient competition, high reserve requirements and government allocation of credit. So the countries needed to deregulate interest rates, lower the reserve requirements, dismantle any credit allocation schemes and privatise as well as liberalise bank licensing in order to increase competition. The rise of interest rates would then increase the incentive to save and the resulting higher financial savings would lead to an augmentation of investment levels. The increase in interest rates should also weed out less productive investment, thereby leading to an increase in

the quality of investment. Judicious private bankers, without the constraints of credit controls, would allocate funds to the most productive users. Furthermore, increased competition would lower the spread between savings and loan rates, thereby increasing the efficiency of the financial system.

Therefore, according to this, there would be a higher rate of savings, which would generate more investment and stimulate economic growth, which in turn would augment savings, thereby creating a virtuous circle. However, the key is to ensure that interest rates are market-determined as well as banks are privately owned and operated so that bankers can make decisions without political constraints. Moreover, sufficient number of bank licenses must be made available to enhance competition while avoiding too much deposit insurance and its associated problems of moral hazard (encouraging risky behaviour) and adverse selection (leading to poorly run banks).

1.2 MOTIVATION FOR THIS STUDY

As mentioned above, one of the expected outcomes of financial liberalisation is a reduction in the level of excess liquidity. However, even a cursory glance at media reports on banking would tell one that often one can find significant levels of excess liquidity to exist. This is disturbing, particularly when it coexists with an unmet demand for loans.

Therefore, it is interesting to study the dynamics of excess liquidity. Why does it exist? Has financial liberalisation been able to have any impact on it? What are the effects of other factors? Which of them are significant? What effect has the recent financial crisis had on excess liquidity in banks? Similarly, what are the effects of business cycle etc.?

Furthermore, as it will be discussed in greater detail in the literature survey, after periods of extensive cross-country studies, a new approach that has been introduced, but yet to be applied in great detail is that of bank-level studies. These allow a closer look at how different types of

banks respond to a variety of factors. No such study exists for Bangladesh, and such studies are still to address the issue of excess liquidity. How do different banks behave regarding excess liquidity? Do they show any differences? What policy measures could be introduced to address the issue and in that case what aspects of bank typology should policymakers take into consideration?

1.2.1 Different Strands of Studies

Over the years from when the financial liberalisation hypothesis was first proposed, hundreds of empirical studies have been done on this topic. The nature of these studies evolved over time with initial studies focusing on the effects of financial repression followed by studies that examined possible impacts of financial liberalisation while probable destabilising implications of this process were analysed later on. A very eloquent discussion on this can be found in the work of Gemech and Struthers (2003).

The main strand of studies on the impact of financial liberalisation was mainly done on its relationship with economic growth. From the early 1990s, empirical studies using large cross-section datasets with a particular focus on the empirics of the finance-growth relationship started. A detailed discussion of this cannot be presented here since it is not the aim of this study but the following papers, among others, contain comprehensive reviews on this aspect: King and Levine (1993), Hermes and Lensink (1996), Arestis and Demetriades (1997), Levine (1997), Demirguc-Kunt and Levine (2001), World Bank (2001), Green and Kirkpatrick (2002), Goodhart (2004), Mavrotas and Son (2006) and Mavrotas (2008).

Another strand of literature on the effects of financial liberalisation examined the follow-up link between financial liberalisation and poverty reduction. Research on this area increased even more with the emergence of the Millennium Development Goals (MDGs). Among others, the works of Beck et al. (2004), Honohan (2004), Green et al. (2005) and Claessens and Feijen (2006) shed important light on this area.

Researchers also started examining the impact of financial liberalisation through different possible channels rather than looking at its direct impact on economic growth and poverty. It was observed that financial liberalisation works through increased savings with a positive correlation by means of interest rate and thereby increasing investment to foster economic growth (Levine, 1997). Although the conclusion in this regard is still inconclusive¹, there is a better consensus from the empirical studies on the point that economic growth is positively related with moderately positive real interest rate (Roubini and Sala-i-Martin, 1992; Bandiera et al., 2000).

Institutional factors are also identified as one of the reasons for positively helping the impact of financial liberalisation (Kayizzi-Mugerwa, 2003). It is observed that good and well-functioning institutions are a key for sustainable growth (Levine, 2003; Rodrik et al., 2004; Acemoglu et al., 2005).

1.2.2 Alternative Possible Scenarios of the Impacts of Financial Liberalisation

Financial liberalisation started in the late 1980s and in the early 1990s around the world. The process of financial liberalisation is a multi-dimensional and multi-faceted process, sometimes involving reversals (Bandiera et al., 2000). Importance of country-specific studies was also mentioned since they can be very useful tool to examine the effect of financial liberalisation in depth (Guha-Khasnobis and Mavrotas, 2008).

One important area of the effect of financial liberalisation is bank lending. From the discussion above, particularly in section 1.1, it can be observed that one of the main aims of financial liberalisation was to increase the banking sector competition. To attain this objective, countries will deregulate interest rates, privatise and liberalise bank licensing, lower the reserve requirements and dismantle any credit allocation schemes. Moreover, astute private bankers, without the constraints of credit

¹ See Fry, 1997, for a survey.

controls, will allocate funds to the most productive users. These two together will mean that banks will be able to lend more. Banks' ability to supply more credit should imply that, keeping other things constant, there will be significantly less or no excess liquidity in the banking sectors. In other words, financial liberalisation should be able to sufficiently increase lending to reduce or remove excess liquidity problem.

In this regard, possible effects of financial liberalisation can be classified into various groups. One possible effect describes the positive impacts of financial liberalisation on banking and how it can increase lending and banking profitability. While the other scenario describes the probable negative effect that financial liberalisation brings with it. Another possibility states an in-between scenario where banks will be inclined to lend more because of financial liberalisation but at the same time will take into consideration the risks involved in it due to increased fragility associated with the banking sector with this process. Therefore, banks will only lend when they receive a minimum rate that will compensate risks and other costs.

According to the first possibility, banking profitability increases in the short run after the financial liberalisation. This is mainly due to the fact that liberalisation includes the process of financial opening which ultimately accumulates liquidity and thereby favours investment. Another reason for increased profitability of the banking sector is attributed to reduced control and supervision. This enables banks to lend in more risky projects with higher returns.

The second possibility is that financial liberalisation can also lead to banking fragility. The process of higher profit and return gradually involve banks in lending to more risky projects, obviously with higher returns, but also with probability of higher default. In addition, banks may also depend on speculation when lending due to asymmetric information. Moreover, there can be lack of proper institutional framework. All these together can lead to deterioration of the financial situation of banks and lead to banking

fragility. This is evident from the experiences of both developed and developing countries (Caprio and Kliengebiel, 1995; Lindgren et al., 1996). This highlights the importance of analysing the benefits of liberalisation carefully against the cost of the fragility and uncertainty that may come along with this process. This has also led to the advocacy of some sort of regulation in economies, particularly where the liberalisation is premature (Caprio and Summers, 1993; Stiglitz, 1994).

Another alternative probability, proposed by Khemraj (2010), suggested that in a relatively normal circumstance, there can still be excess liquidity problem if banks decide to lend only when they receive a minimum interest rate. This minimum rate should at least compensate the risks involved, marginal transaction costs and the rate of return on a safe foreign asset. If the borrower is unwilling or unable to take loan at this rate, then banks will accumulate excess liquidity. On the other hand, banks can also increase their lending rate to avoid risky loans. Thus, in the loan market, loans and this non-remunerative excess liquidity can be perfect substitutes². It would be interesting to see which of these above possible excess liquidity scenarios of the impact of financial liberalisation hold for the banking sector in Bangladesh.

1.2.3 Excess Liquidity and Lending

Banks need to keep some part of their deposits as a reserve in the central bank. In Bangladesh, this is called the cash reserve ratio (CRR). The Bangladesh Bank (BB) which is the central bank of Bangladesh, has set a percentage of demand and time liabilities which all banks need to keep avoiding any sudden cash shortage. This is called statutory liquidity reserve (SLR) which also includes the CRR. If banks hold more reserve than the SLR, then it is said that banks have excess liquidity. The opportunity cost of holding reserves at the central bank, where they earn very little or no interest, increases the economic cost of funds above the recorded interest expenses that banks tend to shift to its customers. In a study on CEMAC

² This is observed to be reliable in an oligopolistic loan market following the industrial organisation banking model of Klein (1971) and Freixas and Rochet (1999).

(Communaute Economique et Monetaire de l’Afrique Centrale, which represents Central African Economic and Monetary Community) countries, Saxegaard (2006) observed that there are no remunerative alternatives for excess liquidity.

Bank lending and excess liquidity are two very closely related aspects (Alper et al., 2012) of the banking sector. Heeboll-Christensen (2011) used the US data from 1987 to 2010 and found that “mechanisms of credit growth and excess liquidity are found to be closely related.”

Given deposit, D , the amount $D(1 - SLR)$ is available for lending/investment. If the actual lending is L , one may write:

$$EL = D(1 - SLR) - L \quad (1.1)$$

Therefore generally it may be said that higher lending implies lower excess liquidity. However, when one looks at how excess liquidity changes over time with lending, one needs to take into account the fact that the deposit is also changing over time. Thus taking differences:

$$\Delta EL = \Delta D(1 - SLR) - \Delta L \quad (1.2)$$

$$\text{i.e. } EL_t - EL_{t-1} = (D_t - D_{t-1})(1 - SLR) - (L_t - L_{t-1}) \quad (1.3)$$

where, for simplicity it has been assumed that SLR does not change. It should be obvious that if lending does not in(de)crease by the same amount as the in(de)crease in deposit the excess liquidity will in(de)crease. However, it is quite possible that lending increases but cannot keep pace with the increase of deposit. In this case excess liquidity will also increase. This is why empirical studies have found mixed relationships between lending and excess liquidity.

Therefore, relationship between lending and deposit can lead to various possible relationships between lending and excess liquidity. The relationship is not so simple when deposit also increases. It will reverse depending on whether growth in lending is larger or smaller than deposit increase. There is difference of opinion about whether deposit is required

for lending. While the neoclassical view states that deposit is required for lending, according to the post-Keynesian view, deposit is not a prerequisite for lending. Assuming that all possibilities can occur, all the different situations are discussed here. When lending increases more than deposit increase (it can happen when deposit is not a prerequisite for lending or when banks have liquid funds from previous periods), then excess liquidity will fall, implying negative relationship. But if increase in lending is less than increase in deposit, then excess liquidity will rise (irrespective of whether deposit is a prerequisite or not). Thus, among the two scenarios of lending rise, the first scenario of ($\Delta L \uparrow > \Delta D \uparrow$) will lead to a negative relationship between lending and excess liquidity while the second scenario ($\Delta L \uparrow < \Delta D \uparrow$) will lead to a positive relationship between the two. The third scenario of fall in lending will lead to increase in excess liquidity (again irrespective of whether deposit is a prerequisite for it). For Bangladesh, the second scenario is observed to be true where lending increased less than deposit increase during the study period of 1997-2011.

For Fiji, Jayaraman and Choong (2012) found that excess liquidity and lending were inversely related. The Bank of England also noted that the available excess liquidity could be used to support lending (The Telegraph, 26 June 2013). Heider et al. (2009) described similar relationships but from the alternative perspective as they concluded that illiquidity can reduce the amount of lending. Saxegaard (2006) observed that excess liquidity in the case of Sub-Saharan Africa could be due to deficient lending.

However, the above relationship where excess liquidity can act as an increased amount of lending or vice versa is not always true. It has been found that in Liberia, many banks have excess liquidity although there is huge unmet demand for loans. Similar findings were also observed for Bangladesh, where businessmen struggled to get loan but banks were flooded with excess liquidity. Former President of the Federation of Bangladesh Chambers of Commerce and Industry (FBCCI) Hossain commented that though all the credit demand is not fulfilled, there is

excess liquidity. He stated, “Though the BB³ says there is no liquidity crisis, as a borrower I face it” (The Daily Star, 21 June 2011). Similarly, Pontes and Murta (2012) observed for Cape Verde that although there was excess liquidity in the economy, still the lending rate was high, which should have been low with high excess liquidity.

Of the above two paragraphs, the first one clearly shows how lending is expected and generally observed to be inversely related with excess liquidity while the second paragraph suggests that despite possibly being related they may not always follow a certain pattern of negative relationship. Hence, the aim of this work is to study excess liquidity and its relationship with financial liberalisation at bank-level. Relationship of excess liquidity with business cycle and the recent financial crisis will also be seen. Finally, the relationship between lending and financial liberalisation will be examined to have a better understanding of the overall situation.

Normally one would expect any funds available to banks will be lent for profit. However, as exemplified in the thesis, excess liquidity seems to be a widely observed phenomenon even where the demand for lending is unmet. Financial liberalisation, for example, would be considered a factor that facilitates lending. Part of the motivation of this study is to understand the banks’ behaviour regarding excess liquidity. What factors affect their lending pattern and hence excess liquidity? How do they respond to policy actions such as financial liberalisation, or other external factors such as financial crises, business cycles etc.? How do these responses vary across the various types of banks that exist? These are some of the questions that are addressed in this work (and again analysed in Section 7.2 of the concluding chapter).

1.2.4 Practical Experiences of Excess Liquidity in Different Countries

Excess liquidity in Bangladesh is a constant phenomenon and frequently mentioned by the central bank as well as by different businessmen and also

³ Bangladesh Bank, the central bank of Bangladesh.

reported in various newspapers. One senior official of the central bank stated that, “banks in Bangladesh are flooded with excess liquidity” (Reuters, Dhaka, 12 April 2009). This phenomenon is not only true overall, but also true across banks. In the BB Annual Report (2009), it is written that, “all the banks had excess liquidity.”

A detailed discussion of the excess liquidity situation in Bangladesh is presented in Chapter 2 but it should be mentioned here that Bangladesh experienced a dramatic rise in excess liquidity over the last 25 years both in nominal and in real terms. Moreover, an increasing trend can be observed even when it is expressed as a ratio of required liquid assets.

Excess liquidity is a problem not only in Bangladesh but also in many other countries. Therefore, a detailed analysis of the situation in Bangladesh will shed important light on the issues causing excess liquidity and how to deal with it in Bangladesh as well as for other countries facing the similar problem.

Researchers have found that excess liquidity is present in many countries. For example, different studies on Africa and Caribbean countries have observed persistent excess liquidity problem. Among others, Saxegaard (2006) observed it for the CEMAC region, Nigeria and Uganda; Fielding and Shortland (2005) found it for Egypt; while Khemraj (2006) had similar observations for the Caribbean country of Guyana.

Similarly, it is also observed for the Asian countries where Agenor et al. (2004) found this existent in Thailand, Eggertsson and Ostry (2005) in Japan, Zhang and Pang (2008) in China. For the South Asian countries, Mohan (2006) observed it for India while Majumder (2007) along with Bhattacharya and Khan (2009) found it for Bangladesh.

It is obvious from the studies above that excess liquidity still remains a major problem for most, if not all, of the developing economies. The situation is also observed in the developed countries (e.g. Eggertsson and

Ostry, 2005; observed it for Japan) but since this study is related to a developing economy and also because of similarities of the fact that financial liberalisation was carried out in these countries, the literature discussed were mainly those that focused on developing economies.

1.3 EMPIRICAL CHAPTERS OF THE THESIS

There will be three empirical chapters in this thesis. The first chapter will discuss the relationship between financial liberalisation and excess liquidity while the second will examine how excess liquidity is related with business cycle and the recent financial crisis. The link between lending and financial liberalisation will be analysed in the final empirical chapter.

1.3.1 Financial Liberalisation and Excess Liquidity

Most of the studies on the excess liquidity problem were done on a specific country (e.g. Agenor et al., 2004; Fielding and Shortland, 2005; Aikaeli, 2006; Chen, 2008; Khemraj, 2008; Zhang, 2009; Yang, 2010). Only a few studies (Saxegaard, 2006; Khemraj, 2010) examined this problem at a cross-country level. These cross-country level studies were generally done on Africa. According to our knowledge, there has been no study on excess liquidity carried out at bank-level. In this respect, a study at bank-level specifically on an Asian country like Bangladesh can shed important light for the persistent excess liquidity in this region. It can also help in giving further insight on excess liquidity prevailing in similar developing countries.

Therefore, the first empirical chapter of this study will aim to see the probable effect of the possible determinants used in earlier studies of excess liquidity along with an attempt to examine some additional concepts. This will enable to explain better the stubbornly high excess liquidity in these countries even after the financial liberalisation took place and the possible reasoning for this excessive liquidity. An index of financial liberalisation will be applied which is crucial due to the fact that the process of financial liberalisation is a multi-faceted process (Bandiera et al., 2000). This will help in avoiding misleading results when a dummy variable or only a single variable is used to represent this versatile process.

Various bank-typologies will be applied to see if there are any differences in excess liquidity according to bank-specific characteristics of ownership, size, mode of operation and age. Thus the main questions that will be examined in this study are as follows: (i) what is/are the reason(s) for the prevalent excess liquidity even after the financial liberalisation took place? (ii) how is financial liberalisation related with the excess liquidity situation for the economy of Bangladesh? (iii) is it only due to the usual and traditional factors that are discussed in different previous studies or is there any other factor(s) which is/are normally ignored in the studies of excess liquidity or is it a combination of both of these factors? (iv) what is the relationship between excess liquidity and financial liberalisation for different bank typologies?

1.3.2 Business Cycle, the Financial Crisis and Excess Liquidity

There have been several studies on the lending behaviour with differences in bank ownerships in terms of business cycle. It has been observed that public banks have a different lending pattern than private banks over the business cycle with the general trend of public banks behaving procyclically. But sometimes they behave counter-cyclically while sometimes they are also found to behave acyclically. However, there is a gap in the existing literature of studies on how other bank-specific characteristics play a role in lending. Moreover, there was no study according to our knowledge on business cycle and excess liquidity. Based on the earlier discussion on relationship between lending and excess liquidity, this study will analyse the difference in bank excess liquidity related to business cycle using some additional typologies of banking. This will include bank size (based on bank assets), banking mode of operation (Islamic versus conventional banks) and bank age (based on year of establishment) in addition to bank ownership (public versus private banks).⁴

Another interesting and related topic which may also affect lending behavior of banks is crisis time. Generally it is observed that public banks

⁴Another classification of ownership based on whether a bank is domestic or foreign. This is due to the inavailability of data in Bankscope for foreign banks in Bangladesh. Bankscope authority was also contacted in this regard.

are less efficient than private banks in non-crisis times. Nevertheless, during the recent financial crisis of 2008-09, public banks were found to play a positive role for the economy by either acting counter-cyclically or less procyclically than private banks.

The objective of the second empirical chapter (Chapter 5) will be to fill these gaps in this strand of literature with the main contributions including: (i) examining the relationship between business cycle and excess liquidity using bank-level data; (ii) investigating if there were any differences in the relationship between business cycle and excess liquidity according to bank typologies; (iii) examining the relationship between the financial crisis and excess liquidity using bank-level data; (iv) investigating if there were any differences in the relationship of the financial crisis and excess liquidity according to bank typologies.

1.3.3 Financial Liberalisation and Lending

In relation to lending, the following three aspects of financial liberalisation can be identified: (i) it reduces credit constraints of households engaged in smoothing consumption when income growth is expected; (ii) it reduces deposits required of first-time buyers of housing; and (iii) it increases the availability of collateral-backed loans for households which already possess collateral.

Most of the earlier works on lending were at an aggregate level. This was mainly due to the fact that data were not easily available at disaggregated levels (Gattin-Turkalj et al., 2007). Lack of sufficiently long historical data at sector level was another reason for the lack of these types of studies (De Nederlandsche Bank, 2000). It is also suggested that with more data availability, future area of research should focus on breakdown (Calza et al., 2001).

The related works between financial liberalisation and lending can be broadly divided into three categories. The first category of studies tried to investigate the effect of the financial liberalisation on lending but they

were done at an aggregate level and not at bank-level (Boissey et al., 2005; Egert et al., 2006). The second category of works used bank-level data to see the effect of some other phenomenon on lending pattern. For instance, Cull and Peria (2012) used bank-level data for some countries in Eastern Europe and Latin America but their main aim was to see if the lending changed along with the process of the financial crisis of 2008-09. The third category of research used some classifications of banking to see how they are related to changes in the monetary policy. For example, Lang and Krznar (2004) used the bank characteristics of ownership, capitalisation, liquidity and size typologies of the banks to see how they differ in their reaction to changes in the monetary policy in Croatia.

The aim of this work is to fill some of the gaps in the existing literature of the above categories of studies and conduct a comprehensive study on bank lending across banks applying different bank-specific characteristics to see how they affected the lending pattern of the banking sector. The process of the financial liberalisation will also be included to examine its effect on these relationships.

The main objectives of this chapter of the thesis will be as follows: (i) examining the relationship between financial liberalisation and lending using bank-level data; (ii) investigating if there were any differences in the relationship between financial liberalisation and lending according to different bank typologies of ownership, size, mode of operation and age.

1.4 DATA SOURCES

The study will use bank-level data of 37 banks for the period of 1997 to 2011. The main source of data in this study will be the Bankscope database which has data at bank-level. Some additional sources of data will also be used. These include various issues of the Bangladesh Bank Annual Report (the annual publication of the central bank in Bangladesh) and the Statistical Yearbook, published by the Bangladesh Bureau of Statistics (BBS). Moreover, data from international sources will also be taken which include the World Bank database of World Development Indicator (WDI), the

International Monetary Fund (IMF) database of International Finance Statistics (IFS). Some data from other published sources will also be used.

1.5 METHODOLOGY

The methodological and analytical basis for this study will be drawn from the empirical literature focusing on financial liberalisation, excess liquidity and lending. Moreover, literature related to business cycle and financial crisis will also be studied. Descriptive statistics and econometric techniques will be used to derive the results in this study and panel estimation methods will be applied for estimations. Graphs and tables will be provided when necessary to illustrate data and results of this study.

1.6 STRUCTURE OF THE STUDY

This study is organised into seven chapters. Chapter One, which is this chapter, provides introductory background and motivation for this study. Chapter Two will give an overview of the banking sector in Bangladesh, specifically highlighting excess liquidity and lending situations.

Chapter Three will make a review of the relevant literature. This will be done in two parts. In the first part, literature on excess liquidity will be provided and in the second part, the review will discuss the determinants of lending studied in various earlier works. Both theoretical and empirical studies will be taken into account. This is very important as this will ultimately help to specify the standard control variables of this study.

The relationship between excess liquidity and financial liberalisation in Bangladesh will be empirically examined in Chapter Four. This relationship will be investigated applying the standard control variables from earlier studies on excess liquidity. Moreover, some key variables of interest will also be investigated along with the reasoning for them to be included in this study. Due to the complex nature of financial liberalisation, an index of financial liberalisation will be used to comprehensively see the impact of this liberalisation process. As this study will be at bank-level, hence different bank-specific characteristics of ownership, size, mode of

operation and age will be included to see if there is any bank-level difference of excess liquidity according to these characteristics.

Chapter Five will examine if and how the bank-specific characteristics, used in this study, differ in terms of business cycle. Moreover, the effect of business cycle on excess liquidity will also be examined. Since the period of this study covers the recent financial crisis, popularly known as the 'Great Recession', this chapter will also examine if and how this crisis impacted the excess liquidity situation in Bangladesh. Moreover, the diversity of this relationship in terms of ownership, size, mode of operation and age will also be examined.

In the final empirical chapter (Chapter Six), lending pattern of the banking sector in Bangladesh will be investigated. Following a similar classification from the earlier empirical chapters, the effect of financial liberalisation will be seen on lending as well as if there were any significant variations across bank-typologies in the banking sector in Bangladesh.

Chapter Seven will present the conclusions of the thesis. This will include the summary findings of the three empirical chapters, some policy recommendations and the concluding remarks.

CHAPTER 2

THE BANKING SECTOR IN BANGLADESH, EXCESS LIQUIDITY AND LENDING

2.1 AN INTRODUCTION OF THE BANKING SECTOR IN BANGLADESH

Bangladesh got independence on 16 December 1971. Soon after the independence, the government of Bangladesh established the central bank of Bangladesh, named the Bangladesh Bank⁵. Moreover, the government also nationalised all the domestic banks of that time⁶. The foreign banks were also permitted to continue and thus the banking sector of Bangladesh started its journey.

2.1.1 Different Stages of the Banking Sector

As mentioned above, the banking sector in Bangladesh began its journey with two Acts immediately after independence in 1971. One was related with the central bank while the other was related with the nationalisation of the domestic banks. Foreign banks were also permitted to continue their operation independently. The main reasonings for the nationalisation of all banks at that time were:

- a) Branch expansion for providing services to the rural people;
- b) Mobilisation of domestic savings, specially rural savings more effectively;
- c) Providing credit to the priority sector such as agriculture, small scale and cottage industries etc;
- d) Ensuring balanced regional development and removal of control on banks by few individuals.

Later in the 1980s, the government decided to start privatising the commercial banking sector. As a result, there were some privatisations of the existing commercial banks while some new private commercial banks

⁵According to the Bangladesh Bank Order, 1972 (P.O. No. 127 of 1972) with effect from 16 December 1971.

⁶By Presidential Order No. 26 titled Bangladesh Banks Nationalization Order, 1972.

were also established at that time. The first private commercial bank, The Arab Bangladesh Bank, was established in 1981-82.

By the mid-1980s, the government made a committee named 'Money, Banking and Credit' headed by the then finance minister. It started implementing the financial liberalisation which was termed as the 'Financial Sector Reform Programme (FSRP)'. This process involved many steps that included classifying overdue loans, restructuring the state-owned commercial banks (SCBs)⁷ and private commercial banks (PCBs) as well as fixing the interest rates on deposits and advances (Task Force Report, 1991).

The objectives of these steps taken at that time were to increase market oriented incentive for priority sector lending, removing gradually the distortions in the interest rate structure with a view to improving the allocation of resources, adopting appropriate monetary tools to control inflation, establishing appropriate accounting policies and modes of recapitalisation, improving debt recovery process and strengthening the capital market. Along with these, they also brought together some manuals for operation and guidance of reporting system which were: lending risk analysis, financial spread sheet, performance planning system, large loan reporting system and new loan ledger card.

When the FSRP was ending, the government formed another committee named 'Banking Restructuring Committee (BRC)' which suggested some further steps for improvement in the banking sector. These steps included an aggressive institutional renewal programme for Bangladesh Bank, fundamental reforms of SCBs, better internal governance both in SCBs and PCBs, penalties for imprudent lending, compliance with capital standards, hiring of auditors of valuation audits of SCBs, special recovery efforts, formation of a Bank Supervision Committee, strengthening the legal process and institution of expending recovery of debt.

⁷ This type of bank is also called NCBs (nationalised commercial banks). Hence, NCBs and SCBs are used interchangeably.

They also took the following steps to improve the situation of the banking sector in Bangladesh:

- a) The amendment of Bangladesh Bank Order, 1972, to give Bangladesh Bank legal autonomy over its affairs;
- b) Reforms of supervision system of Bangladesh Bank to bring back financial discipline;
- c) Reforms of Bangladesh Banks (Nationalization) Order, 1972, to give autonomy to SCBs' boards so that SCBs could run on commercial consideration;
- d) Deposit insurance scheme to protect depositors' interest;
- e) Amendments to Bank Company Act, 1991, to effectively handle problem banks;
- f) Precluding crony (insider) lending and ensuring credit discipline.

All these were done to attain two major goals. Firstly, to attain an effective legal system, good management and an effective central bank, which were the three pillars of banking. Secondly, to shift focus from the peripheral aspects of privatisation to the core aspects of dominance of market forces, competition among banks, financial discipline through broad based legal as well as regulatory base and operational efficiency.

2.1.2 The Financial System in Bangladesh

Before discussing in detail about the financial system in Bangladesh, a brief description of the central bank of Bangladesh (the Bangladesh Bank), is provided here. After independence, the Bangladesh Bank was established in 1972. It had nine different branches around the country. Of them, two were in the capital, two were in the Rajshahi division and the rest were in the other five divisions.

The rest of the banking system in Bangladesh is broadly divided into two broad categories: the scheduled banks and the non-scheduled banks. The scheduled banks worked according to the Bank Company Act 1991 (amended in 2003). The non-scheduled banks cannot perform all the

functions of the scheduled banks and were set up for some specific purposes.

2.1.3 The Scheduled Banks in Bangladesh

The scheduled banks in Bangladesh can be broadly divided into four categories: the state-owned commercial banks, the development financial institutions (DFIs), the private commercial banks and the foreign commercial banks (FCBs). At the moment, there are 57 scheduled banks in Bangladesh. Of these, there are 4 SCBs, 5 DFIs, 42 PCBs of which 6 are Non Resident Bangladeshi (NRB) banks and 9 FCBs.

State-owned Commercial Banks: After independence, the government of Bangladesh nationalised all the commercial banks, except the foreign banks. As a result, there were 6 SCBs at that time. They were: Sonali Bank, Rupali Bank, Agrani Bank, Janata Bank, Pubali Bank and Uttara Bank. When the government decided to start privatisation in the banking sector in the early 1980s, Pubali Bank and Uttara Bank were privatised in 1985. Then in 1986, the government transformed Rupali Bank as a public limited company. In 2007, the government also made the remaining three banks, Sonali Bank, Agrani Bank and Janata Bank, as public limited company. As a result, currently there are 4 SCBs in Bangladesh, which are working as public limited companies.

Development Financial Institutions: Like the commercial banks, two existing specialised banks were also nationalised. They were Bangladesh Krishi Bank and Bangladesh Shilpa Bank. The first one was established for the agricultural sector and the second one was for the industrial sector. These banks were also called specialised banks as they were established with specific objectives to attain. As Rajshahi Division was very prominent in agriculture but distantly located from the capital, the Bangladesh Krishi Bank was divided into two parts in 1987 to facilitate the agricultural activities in this region. As a result, the Rajshahi Krishi Unnayan Bank (RAKUB) was established to look after and develop the agricultural activities in the Rajshahi division while the Bangladesh Krishi Bank

monitored agriculture for other parts of the country. To look after and help promote the need of small and medium scale enterprises, the Bank of Small Industries and Commerce (BASIC) was established in 1988. Later on the government made it a specialised bank in 1993 and took control of it. In 2010, the government merged the Bangladesh Shilpa Bank with the Bangladesh Shilpa Rin Sangstha (BSRS) and renamed it as the Bangladesh Development Bank Limited (BDBL).

Private Commercial Banks: The PCBs started their operation in the early 1980s as privatisation of the banking sector started through Nationalization (Amendment) Ordinance 1977. The Arab Bangladesh Bank was the first private commercial bank which was established in 1982. Soon after it, quite a few banks were established in the 1980s. These were IFIC Bank Limited, National Bank Limited, Islami Bank Limited, City Bank Limited, United Commercial Bank Limited and ICB (International Commercial Bank) Islami Bank Limited. Along with these, two of the nationalised banks, Uttara Bank Limited and Pubali Bank Limited, were privatised in 1983. The main aims were to stop the continuous loss of these public enterprises, increasing competition, improving their efficiency as well as customer service and thereby increasing the flow of credit to all sectors of the economy.

In the second stage, some more private commercial banks were established between 1990 and 2000. This was the period when different measures of the financial liberalisation were taking place. During this period, a very large number of banks, 18 to be precise, were established. These are also called the 'Second Generation Banks'.

In the third stage (after 2000), some more banks were established. These are called the 'Third Generation Banks'. These banks used more of modern technologies like online banking, debit and credit cards and ATM (automated teller machine) booths which was also followed by 'Second Generation' and other banks (more detail on all these banks along with year of their establishment are provided in the appendix). Recently, 10

more banks were established after a long interval. Of these, 6 were PCBs, 3 were NRBs and 1 was a specialised bank.

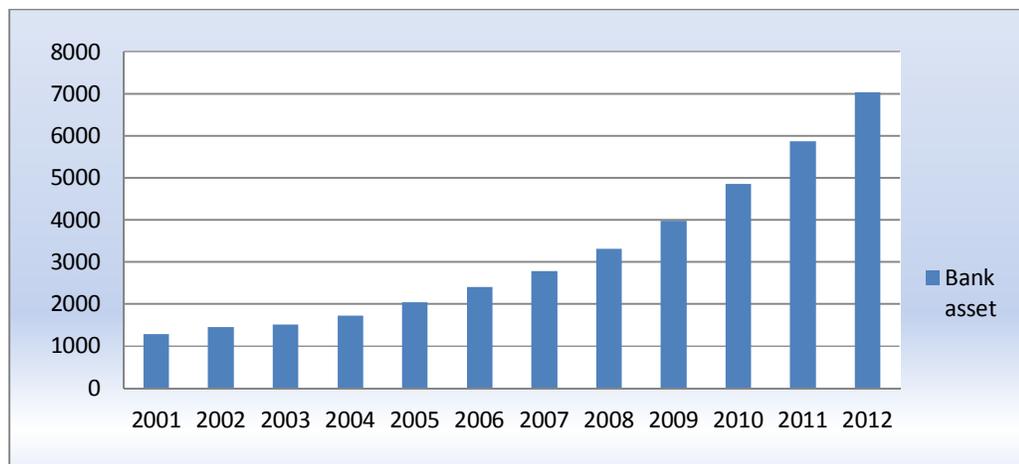
Foreign Commercial Banks: The foreign banks were always allowed to operate in Bangladesh. Even when the government decided to nationalise all the commercial banks, they only did it for the domestic banks. The foreign banks were allowed to carry on their activities as independent institutions. Currently there are 9 FCBs in Bangladesh. These are: City Bank NA, HSBC, Standard Chartered Bank, Commercial Bank of Ceylon, State Bank of India, Habib Bank Limited, National Bank of Pakistan, Woori Bank and Bank Al-Falah.

2.1.4 Growth of the Banking Sector in Bangladesh

The banking sector in Bangladesh achieved a very steady and robust growth over the years ranging from its increase in terms of assets to number of branches and as well as in terms of amount of deposit and lending. Recently, some new banks have been given permission to start their operation for further growth of this sector and meet the increasing demand.

Bank Asset: Banking sector in Bangladesh went through a very rapid growth from various directions.

Figure 2.1: Bank assets (in billion taka)

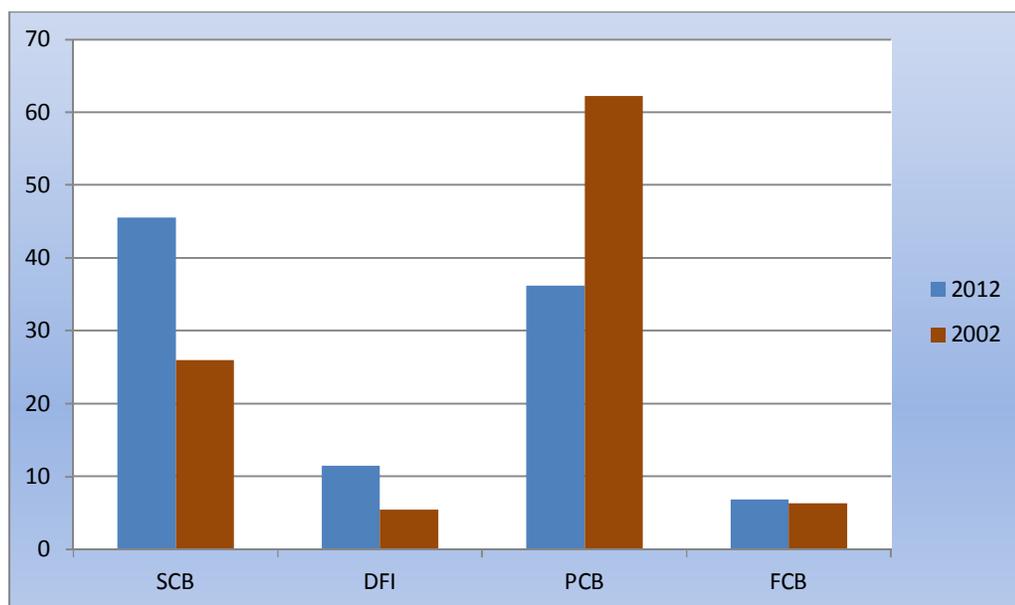


Source: Bangladesh Bank Annual Report, various issues.

Total asset was 1280.31 billion taka in 2001. It then almost doubled and reached 2406.7 billion taka in 2007. In the next 5 years, it almost tripled and reached a mammoth 7030.7 billion taka.

On the basis of the traditional classification of banks (i.e. SCBs, DFIs, PCBs and FCBs), a shift in the percentage of assets can be observed between the SCBs and the PCBs while it remained much more stable for the FCBs. In 2002, the asset of the DFIs as a ratio of total assets was 11.47 while it was 6.8 for FCB. The highest ratio in 2002 was for the SCBs with 45.56 per cent. The PCBs had a share of 36.16 per cent.

Figure 2.2: Bank asset as a ratio of total asset (in per cent)

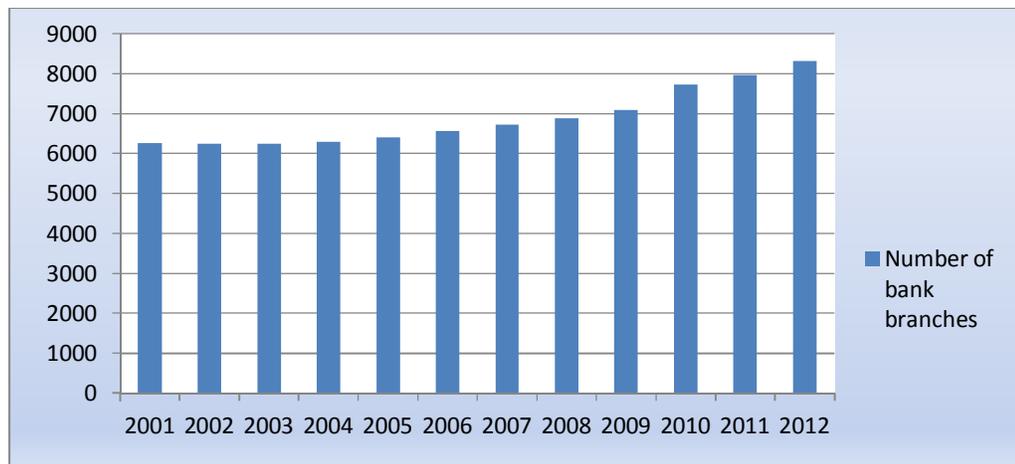


Source: Bangladesh Bank Annual Report, various issues.

Over the next ten years, PCBs achieved significant growth and their share of assets rose from 36.16 per cent to 62.18 in 2012. The share of the FCBs almost remained stagnant, marginally increasing from 6.28 to 6.80 per cent in this period. Both the SCBs and the DFIs experienced significant decline and reduced to almost half of their shares of 2002. The SCBs share fell to 26.06 from 45.56 while the share of DFIs reduced to 5.48 from 11.47 in these ten years.

Number of Branches: The banking sector also achieved significant progress in establishing new branches all around the country. This is shown below.

Figure 2.3: Number of bank branches



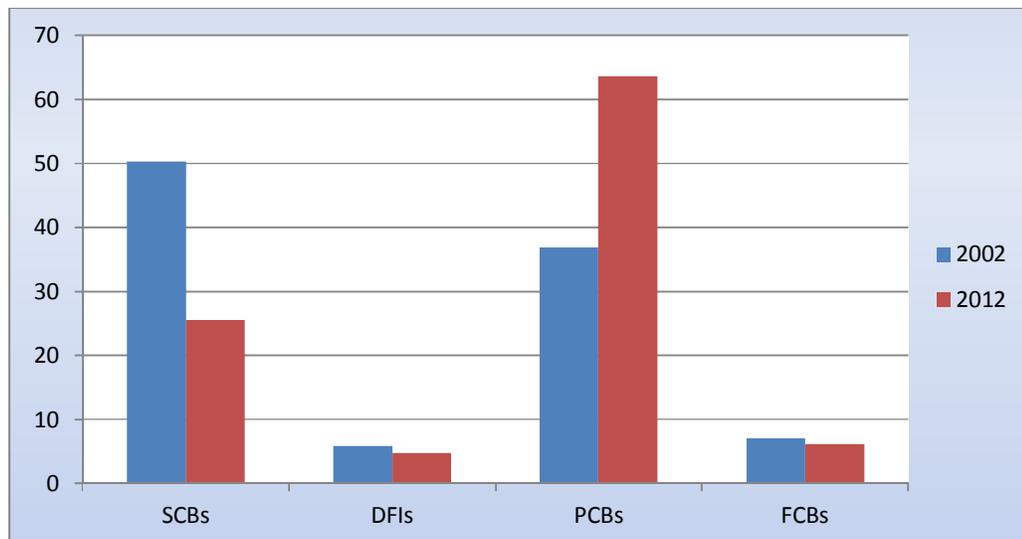
Source: Bangladesh Bank Annual Report, various issues.

It can be seen that number of branches increased steadily, particularly from 2005. This not only helped in reaching more people who were not previously under the coverage of banking facilities but also increased competition among the banks in places where there were not enough branches previously. The number of bank branches was 6271 in 2001. It then increased to 6562 in 2007. In the next 5 years it increased and reached 8322.

Deposit: The amount of deposit also went through sharp increase in the last few years. In 2001, the amount of bank deposit was 956.28 billion taka. By 2007, it increased and almost doubled to reach 1860.6 billion taka. In the next 5 years, it almost tripled to 5396.0 billion taka. It can be noticed that the rate of change in the deposit was quite similar to the rate of change in assets. Following the traditional classification, it could be observed that there was a shift towards private banks in terms of deposits. In 2002, the deposit as a ratio of the total deposit for the SCBs was 50.32 per cent in 2002 but fell to 25.50 by the year 2012. The deposit of the DFIs as a ratio of total deposits gradually decreased in this period from 5.82 to 4.80. For the FCBs, it was 7.02 in 2002 and became 6.10 in 2012. On the

contrary, the PCBs experienced significant growth rising from a share of 36.84 in 2002 to 63.60 per cent in 2012.

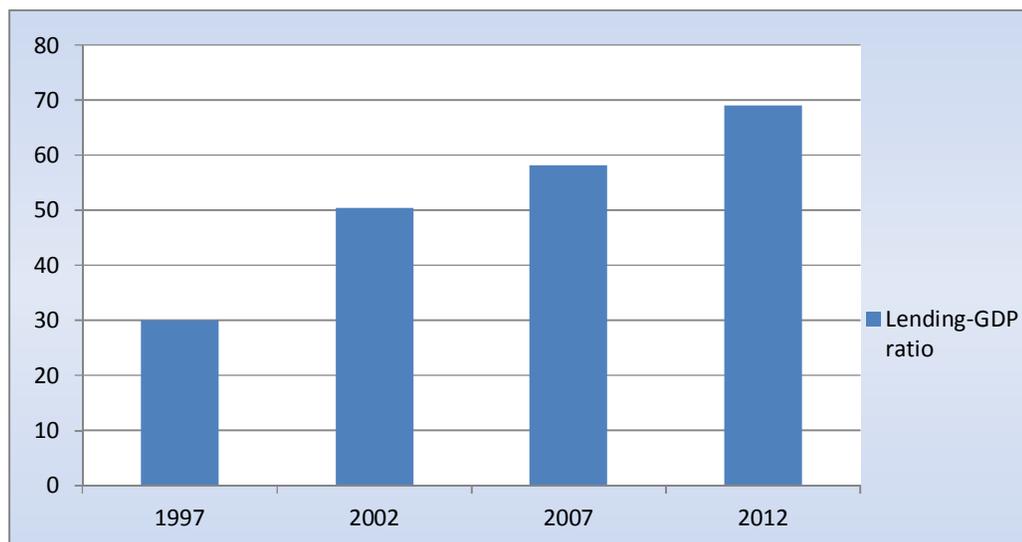
Figure 2.4: Bank deposit as a ratio of total deposit (in per cent)



Source: Bangladesh Bank Annual Report, various issues.

Lending: Lending by banks, which was a key for increased investment, and thereby growth, not only increased at gross level but it also rose as a ratio of gross domestic product (GDP). This was estimated as domestic credit provided by financial sector (% of GDP).

Figure 2.5: Bank lending as a ratio of GDP



Source: Bangladesh Bank Annual Report, various issues.

This ratio was 29.94 per cent in 1997. In the next five years, it increased dramatically to 50.44 per cent. The growth slowed down a bit but continued and by the year 2007, it reached 58.21 per cent. This growth picked up again in 2012 and became 68.98 per cent.

Recent Approvals for New Banks: There was a recent surge of approvals for banks in Bangladesh. From 2012 onwards, 10 new banks were given approval. This made the total number of banks reaching 57. The main aim of these new approvals was aimed at strengthening the financial inclusion of the unbanked people in the country. The previous time before this when bank licenses was approved happened in 2000-01. Hence, expansion in this sector was needed to address the current increased demand, particularly in the face of the continuous economic growth that Bangladesh achieved over the years as well as fulfilling the future banking requirements.

These new approvals were also required since population per branch was 21065 and the ratio of loan accounts per 1000 adults was only 42 (as of 2012). The situation was better in the neighbouring countries of India (with a population of 14485 per branch and 124 loan accounts per 1000 adults) and Pakistan (20340 and 47 respectively). Furthermore, a recent survey by the Institute of Microfinance (InM) observed that only 45 per cent of the surveyed people (based on nearly 9000 households) had access to banks and micro-finance institutions (MFIs) for loans⁸.

The newly established banks consisted of one specialised bank and nine commercial banks, of which six were PCBs and the remaining three were NRB banks. A brief description about these new banks, established from 2012 onwards, is given below. However, they were not included in this study due to their data unavailability for this study period.

Remittance was a major source of foreign exchange earnings and need special attention. To address this, the Probashi Kallyan Bank, was

⁸ The central bank also took other measures to bring unbanked people under banking facilities. One of these initiatives was to provide banking account facility with a very nominal amount of deposit.

established to facilitate the financial transactions of the migrants. This specialised bank is particularly related to remittance transfer, migration and investment opportunities.

The newly established six PCBs were Union Bank Limited, Modhumoti Bank Limited, Farmers Bank Limited, Meghna Bank Limited, Midland Bank Limited and South Bangla Agriculture and Commerce Bank Limited while the three new NRBs are NRB Commercial Bank Limited, NRB Bank Limited and NRB Global Bank Limited.

It was made mandatory that these new banks would have to deposit 4 billion taka to the central bank of their paid-up capital before starting their operation. Moreover, they need to maintain the 1:1 ratio when opening branches in rural and urban areas. This was mainly to reach the unbanked people who were mostly located in rural areas.

The NRBs will also need to deposit 4 billion taka to the central bank of paid-up capital. Of these, 50 per cent will be from their sponsors while the rest will be from the public offerings. Moreover, each shareholder must hold at least shares worth 100 million taka while the maximum stake of bank's total paid-up capital for a shareholder can be 10 per cent.

2.2 EXCESS LIQUIDITY IN BANGLADESH: SOME STYLISED FACTS

Excess liquidity in Bangladesh was a constant phenomenon. This was mentioned by the central bank, businessmen and was also reported in newspapers. In the Bangladesh Bank Annual Report 2008-09, it was written that, "Liquidity indicators measured as percentage (BB) of demand and time liabilities (excluding inter-bank items) of the banks indicate that all the banks had excess liquidity."

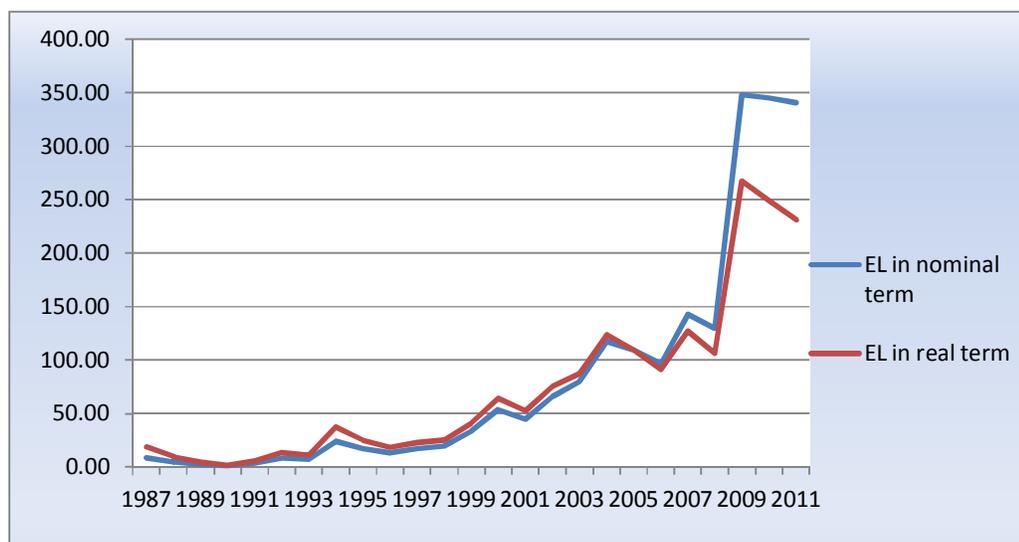
When a bank holds reserves over and above the level sufficient to finance its statutory required minimum reserves, deposit outflows and short-term maturing obligations, it is reckoned as holding excess liquidity. The opportunity cost of holding reserves at the central bank increases the

economic cost of funds above the recorded interest expenses that banks tend to shift to customers.

If banks hold more reserve than the SLR, then it is said that banks have excess liquidity. The data of nominal excess liquidity, real excess liquidity and excess liquidity as a percentage of required liquid assets are given in Figures 2.6 and 2.7. The real excess liquidity and excess liquidity as a percentage of required liquid assets are given to have a real view of the excess liquidity scenario in the economy.

It can be observed from Figure 2.6 that excess liquidity (EL) in nominal terms did not change much around the late 1980s and early 1990s. Then it experienced significant rise followed by a stable condition over the next few years (particularly from 1994 to 1998). It then started to rise again and continued with some exception (e.g. 2001, 2005 and 2006). It increased dramatically in 2009 to reach an all time high.

Figure 2.6: EL in nominal and real term (in billion taka)



Source: Based on various issues of Bangladesh Bank Annual Reports and author's own calculation.

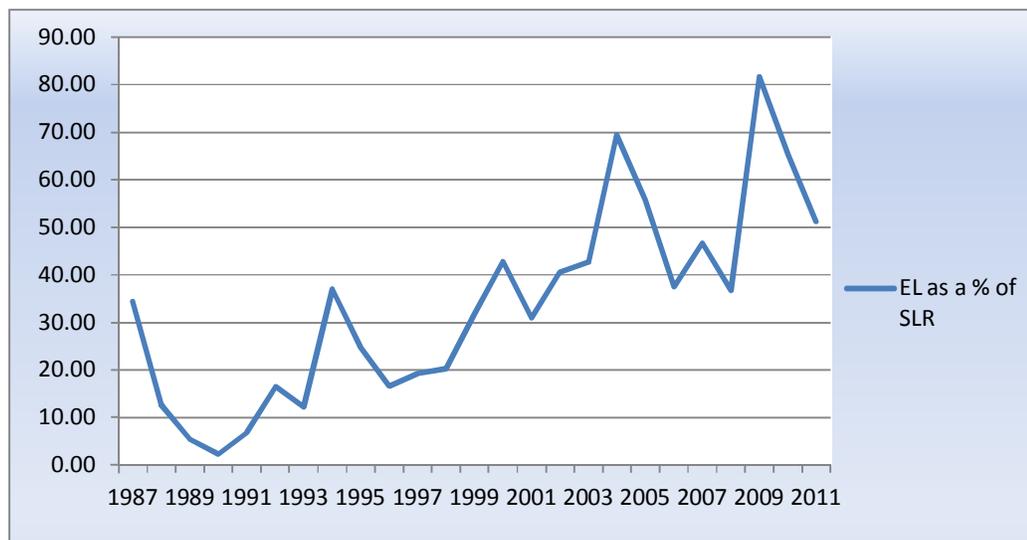
The real excess liquidity of Bangladesh also saw a dramatic rise in the last 25 years. It was 18.71 billion taka in 1987. Then it fell over the next 3 years before increasing again.

It hovered around 20 billion taka till 1997. Then it increased till 2004 with the exception of 2001. Though it fluctuated in the next few years but it crossed the 100 billion mark in 2007 and reached a record high in 2009, reaching a mammoth 267.09 billion taka. This came with a big jump in the year 2009.

Even when excess liquidity data was given in real terms, it could be argued that the rise in excess liquidity was due to increase in number of banks and their branches leading to a rise in the total amount of deposit. To address this, another figure is presented where excess liquidity is expressed as a percentage of the required liquid assets, SLR.

It can be observed that changes in excess liquidity (as % of required liquid assets) also followed an increasing pattern like nominal and real excess liquidity though to a lesser extent. Although it went through fluctuations but there was a growing trend in the long-run.

Figure 2.7: Excess liquidity as a ratio of required liquid assets (SLR)



Source: Based on various issues of Bangladesh Bank Annual Reports and author's own calculation.

Excess liquidity as a percentage of the required liquid assets was 34.4 in 1987. It then fell in the next few years but then increased with some fluctuations after 1991. From 1999, even with some fluctuation, the ratio

substantially increased. It reached a huge 81.66 in 2009 which was also the year when the amount of excess liquidity was all time high for Bangladesh. But after 2009, it started falling again. Even after significant decrease in the next two years, it was still quite high at 51.24 in June 2011.

The continuous rise of excess liquidity, as observed above, puts forward the need for a study which can explain the reasons for it. This can be due to factors that have been used in earlier studies of excess liquidity or can be some other factors or it can be a combination of both. Nevertheless, it is worth an effort to see why excess liquidity is so high and still increasing in Bangladesh.

One point that needs to be noted is that excess liquidity fell before the financial liberalisation programme (which was initiated in Bangladesh in the early 1980s) but surprisingly it increased, with some exceptions, after it. As mentioned before, the excess liquidity reached a record high of 267.09 billion taka (in real terms) in 2009.

Trying to explain the reason for this very high excess liquidity in 2009 it was mentioned that “Bankers and experts attribute the build-up of the excess liquidity in the banking system to poor investment situation, mainly triggered by the on-going global meltdown” (The Financial Express, 5 August, 2009). A similar notion was mentioned in another newspaper, “Economists and bankers think the investment flow is not picking up because of the ongoing global recession” (The Daily Star, 13 July 2009).

According to former BB Chief Economist and currently Director General of the Bangladesh Institute of Development Studies (BIDS) Mujeri:

“Credit to the private sector has declined in recent months due mainly to lower import orders for capital machinery as well as falling trend of major commodities prices in the global market” (The Financial Express, 5 August 2009).

All possible reasons of this disproportionate excess liquidity in 2009 were summarised very nicely by Bhattacharya and Khan (2009) in the following words:

“The excess liquidity situation has been compounded by several factors. Firstly, this fall in investment demand has been exacerbated by import and export slowdown as a large share of the bank credit in Bangladesh goes towards Letter of Credit (L/C) opening. Further, fall in prices of majority of commodities in the global market implies lower money demand for financing imports. Secondly, because of the financial crisis the business community has been prone to taking conservative steps with regard to business decisions. This is evident through the decline of L/C opening for capital machineries. Thirdly, credit requirement of the government for financing of fiscal deficit has also been moderate.”

2.2.1 Excess Liquidity Situation According to Traditional Classification of Banks

With the recent establishment of 10 new banks, there are 57 scheduled banks in Bangladesh. However, the description below is only for 47 scheduled banks as data for the new ones are not available for the period under discussion. These 47 banks are generally divided into the following four groups: nationalised, specialised, private and foreign.

The Islami banks maintain lower SLR instead of the existing one for the conventional scheduled banks because of insufficient availability of Shariah based approved securities. In other words, the Islami banks cannot purchase treasury bills and bonds that involve receipt of interest, as the Shariah rules ban payment or receipt of interest by any individual or institution. The specialised banks (except BASIC Bank Limited) are exempted from maintaining SLR fully because they were established for specific objectives like agricultural or industrial development.

According to the Bangladesh Bank Annual Report of 2010-11:

“the commercial banks’ demand and time liabilities are at present subject to a statutory liquidity requirement (SLR) of 19.0 percent inclusive of average 6.0 percent (at least 5.5 percent in any day) cash reserve ratio (CRR) on bi-weekly basis. The CRR is to be kept with the BB and the remainder as qualifying secured assets under the SLR, either in cash or in Government securities. SLR for the banks operating under the Islamic Shariah is 11.5 percent. The specialised banks (except Basic Bank Ltd.) are exempted from maintaining the SLR. Liquidity indicators measured as percentage of demand and time liabilities (excluding inter-bank items).”

Excess liquidity situation for banks are given in the following table:

Table 2.1: Excess liquidity according to different types of banks (in per cent)

Year	NCBs	DFIs	PCBs	FCBs
1997	2.7	9.7	6.0	11.2
1998	4.4	9.2	6.7	19.9
1999	5.2	8.7	8.0	31.4
2000	6.5	9.9	6.8	14.8
2001	5.7	8.9	6.2	14.3
2002	7.3	6.9	8.5	21.8
2003	8.4	5.8	9.8	21.9
2004	6.8	4.7	8.8	21.9
2005	2.0	6.2	5.1	23.6
2006	2.1	3.8	5.6	16.4
2007	6.9	5.6	6.4	11.2
2008	14.9	4.9	4.7	13.3
2009	17.6	7.1	5.3	21.8
2010	8.2	2.3	4.6	13.2

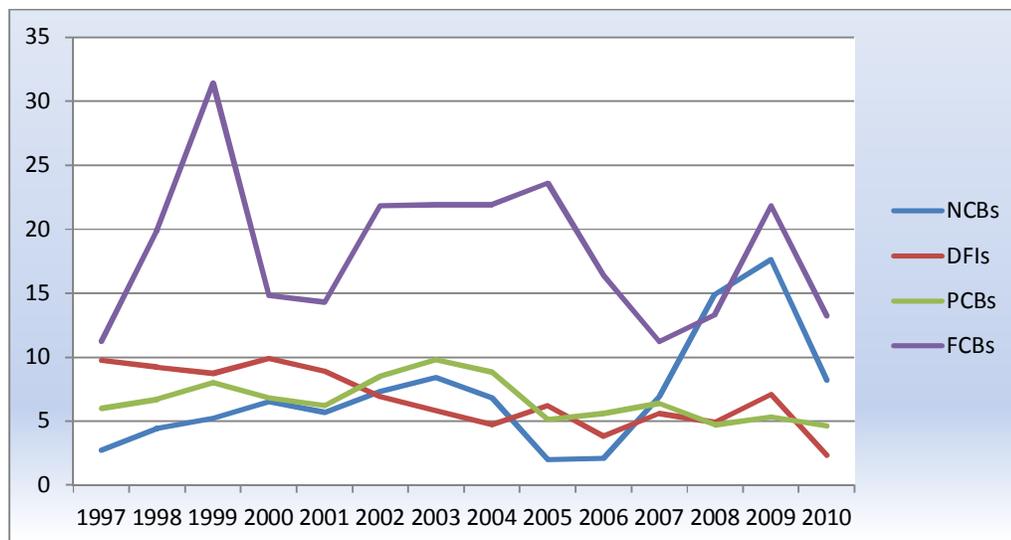
Source: Bangladesh Bank Annual Report, various issues.

NCBs = Nationalised commercial banks, DFIs = State-owned development financial institutions, PCBs = Private commercial banks, FCBs = Foreign commercial banks.

For the nationalised commercial banks, the excess liquidity in per cent was only 2.7 in 1997. With few exceptions, it gradually increased to 8.2 per cent in 2010. It reached its peak of 17.6 per cent in 2009.

For the specialised banks, the situation was almost the opposite. It had 9.7 per cent excess liquidity in 1997 and then gradually decreased to 2.3 per cent in 2010. In case of the private commercial banks, it could be seen that excess liquidity hovered around 6 per cent for most of the years.

Figure 2.8: Excess liquidity according to different types of banks (in per cent)



Source: Based on Table 2.1.

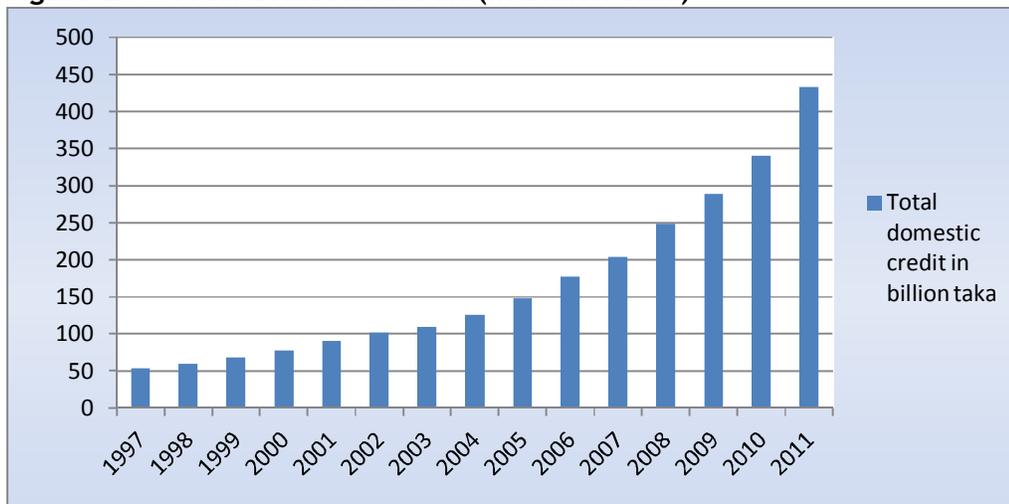
The scenario of excess liquidity in the foreign commercial banks had always been different. It remained very high in relation to other types of banks except in 2008 (when excess liquidity in NCBs were highest).

2.3 CREDIT IN BANGLADESH: SOME STYLISED FACTS

Credit in Bangladesh went through a very steady growth. It is worthwhile to have a look at the lending pattern from different angles. Therefore, a brief description is presented here both at aggregate and disaggregate levels. Domestic bank credit is discussed first for total, public and private sector. Then bank advances classified by major economic purpose are described.

2.3.1 Domestic Credit at Public and Private Sectors

Total domestic credit was 53.09 billion taka in 1997, increased to 101.40 in the next five years, doubled to 204.27 in 2007 and rose to 433.53 in 2011.

Figure 2.9: Total domestic credit (in billion taka)

Source: Bangladesh Bank Annual Report, various issues.

Gross credit to the private sector in 1997 was 38.95 billion taka, rose to 73.56 in 2002, more than doubled in the next five years reaching 150.77 and the growth continued reaching 340.71 by 2011. Credit to the public sector followed a similar trend and reached 92.81 billion taka in 2011 from 14.14 in 1997. Of the credit to the public sector, net credit to government increased sharply from 8.02 billion taka in 1997 to 73.44 in 2011 while credit to other public sector rose from 6.12 in 1997 to 19.38 billion taka in 2011.

Total credit, credit to the private sector and credit to the public sector increased by around eight-fold during this 15 year period with credit to the private sector increasing slightly more than the public sector. However, within the public sector, net credit to government increased by more than nine-fold while credit to other public sector only tripled during this time.

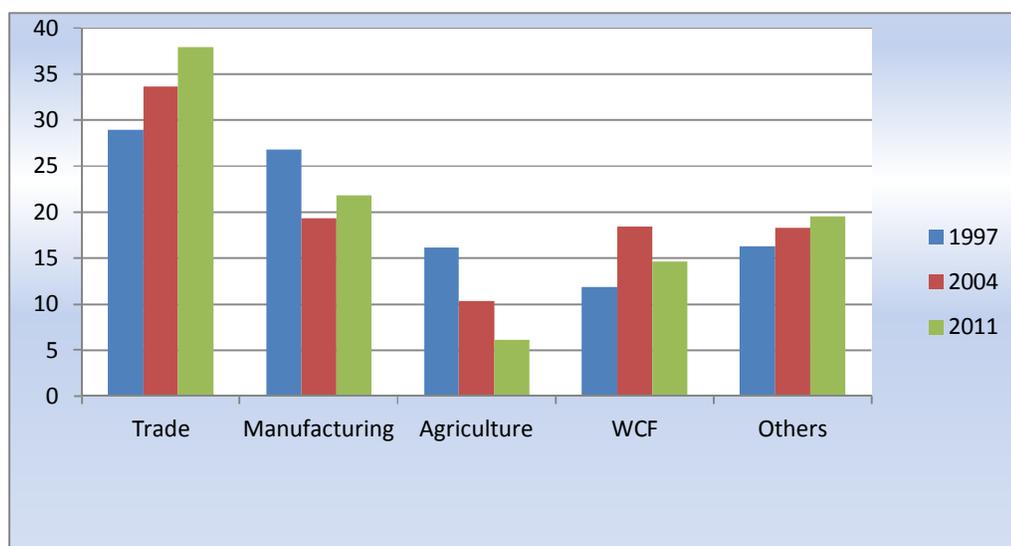
2.3.2 Bank Advances by Economic Purposes

Trade was and still remains as the highest area of bank advances over the years. It received 12.08 billion taka in 1997, which almost doubled in the next five years. By 2007, it reached 48.62 billion and in 2011, it received 121.68 billion taka. The second highest area of bank advance was manufacturing (excluding the working capital financing). It received 11.17

billion taka in 1997, increased to 17.85 in 2002, almost doubled in the next five years. By 2011, it reached 70.05 billion taka.

The third major area of bank advance in 1997 was agriculture (including forestry and fisheries). It received 6.74 in 1997 which rose to 9.65 in 2002. It remained stagnant in the next five years receiving 10.90 in 2007. However, this sector experienced significant increase reaching 19.65 in 2011. Working capital for manufacturing was the fourth highest area of receiving credit in 1997 (4.95). However, it rose dramatically over the years and surpassed the advance received by agriculture (including forestry and fisheries) in the next five years. The growth continued and reached 28.51 in 2007. By the year 2011, it received 47.06 billion taka.

Figure 2.10: Bank advances by economic purposes (in per cent)



Source: Bangladesh Bank Annual Report, various issues.

Note: Manufacturing is estimated excluding working capital financing (WCF) which is given separately. Agriculture is estimated including forestry & fisheries.

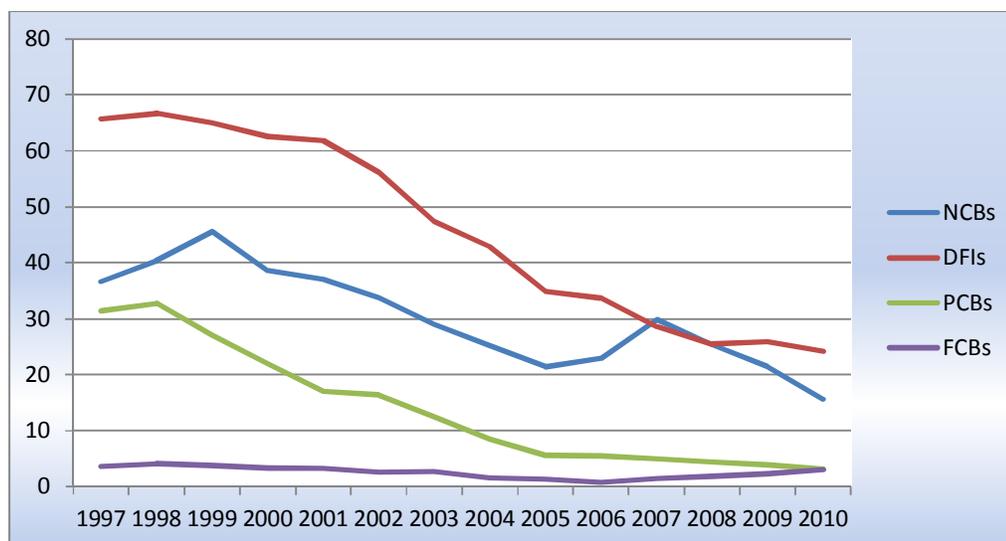
It can be observed from the graph above that among the major sectors, trade, working capital financing and others grew in terms of percentage while agriculture and manufacturing (excluding WCF) fell. The growth in the 'others' category can be mainly attributed to the growth in the construction sector which was a mere 2.42 billion taka in 1997 but rose rapidly to reach a significant amount of 24.19 in 2011, thus even surpassing the advances made to the agricultural sector. Overall, this showed a

structural shift away from agriculture. This is a noteworthy change for a country where most of the people are still reliant on agriculture for employment.

2.3.3 Ratio of NPL to Total Loans by Different Types of Banks

In Figure 2.11, the data for ratio of gross non-performing loans (NPL) to total loans are provided. It showed the ratio for different types of banks.

Figure 2.11: Ratio of gross NPL to total loans by type of banks (in per cent)



Source: Bangladesh Bank Annual Report, various issues.

A similar trend of decrease can be observed for almost all types of banks except the foreign ones which were very low in the beginning and it remained so throughout. For the nationalised banks, it decreased from 36.60 per cent in 1997 to 15.70 in 2010.

For the DFIs, it fell from a huge 65.70 per cent to 24.20 during this period. The decrease for the PCBs was the most dramatic as it fell by almost ten times from 31.40 per cent in 1997 to only 3.20 per cent in 2010. As mentioned before, it was always low for the foreign banks with the highest of only 4.10 per cent in 1998.

APPENDIX 2.1: Generation of PCBs in Bangladesh

Table 2A.1: Generation of PCBs in Bangladesh

Sl. No.	Name of PCB	Year of Foundation/ Denationalisation*	Generation of Banking Sector
1	Arab Bangladesh Bank Limited	1982	First
2	IFIC Bank Limited	1983	First
3	Uttara Bank Limited	1983*	First
4	Pubali Bank Limited	1983*	First
5	National Bank Limited	1983	First
6	Islami Bank Bangladesh Limited	1983	First
7	The City Bank Limited	1983	First
8	United Commercial Bank Limited	1983	First
9	ICB Islami Bank Limited	1987	First
10	Eastern Bank Limited	1992	Second
11	NCC Bank Limited	1993	Second
12	Prime Bank Limited	1995	Second
13	Dhaka Bank Limited	1995	Second
14	Al-Arafah Islami Bank Limited	1995	Second
15	Southeast Bank Limited	1995	Second
16	Social Islami Bank Ltd	1995	Second
17	Dutch-Bangla Bank Limited	1996	Second
18	Trust Bank Limited	1999	Second
19	Bank Asia Limited	1999	Second
20	EXIM Bank Limited	1999	Second
21	First Security Islami Bank	1999	Second
22	Mutual Trust Bank	1999	Second
23	Mercantile Bank Limited	1999	Second
24	ONE Bank Limited	1999	Second
25	The Premier Bank Limited	1999	Second
26	Standard Bank Limited	1999	Second
27	Bangladesh Commerce Bank	1999	Second
28	BRAC Bank Limited	2001	Third
29	Jamuna Bank Limited	2001	Third
30	Shahjalal Islami Bank Limited	2001	Third

Source: Bangladesh Bank Annual Report, various issues.

*Uttara Bank and Pubali Bank were denationalised to operate as private commercial bank

APPENDIX 2.2: Banking structure in Bangladesh**Table 2A.2: Banking structure in Bangladesh**

Bank Types	Number of Banks	Number of Branches	% of Branches	Total Assets (Crore Tk.)	% of Industry Assets	Deposits (Crore Tk.)	% of Deposits
SCBs	4	3437	43.17	1629.2	27.8	1235.6	27.4
DFIs	4	1406	17.66	328.8	5.6	214.4	4.8
PCBs	30	3055	38.37	3524.2	60.0	2787.5	61.8
FCBs	9	63	0.79	385.4	6.6	272.2	6.0
Total	47	7961	100.00	5867.6	100.00	4509.7	100.00

Source: Bangladesh Bank Annual Report 2012-13.

CHAPTER 3

LITERATURE SURVEY

3.1 INTRODUCTION

In spite of efforts to liberalise and modernise financial institutions, markets and instruments in less-developed countries (LDCs), the banking sector remained the most important source of financing in these economies and it is likely to remain so in the foreseeable future (Stiglitz, 1989; Singh, 1997). Hence, the investment choice of banks could either contain role of finance in growth or enhance that role. Thus, it was very important to analyse the situation of excess liquidity in the banking system and also the reasons behind it.

As discussed before, one of the main aims of financial liberalisation was to increase the banking sector competition. For this, countries would deregulate interest rates, privatise and liberalise bank licensing (in order to increase competition), lower the reserve requirements and dismantle any credit allocation schemes. Moreover, discerning private bankers, without the constraints of credit controls, would allocate funds to the most productive users.

Allocation of short- and long-term credit was also mentioned as one of the channels between financial development and economic growth (Das and Guha-Khasnobis, 2008; Yucel, 2009). These two together should mean that banks would be able to lend more. It may be expected that ability of banks to give more credit would imply that there would be less excess liquidity in the banking sectors. In other words, financial liberalisation should reduce the excess liquidity problem.

However, the practical experience of different developing economies around the world told a different story. In many less developed countries banks hold large quantities of excess liquidity in their asset portfolio, a

large part of which was non-remunerated (Fielding and Shortland, 2005; Khemraj, 2006; Saxegard, 2006).

As described in Section 1.2.4, it was observed that various countries still suffered from the problem of excess liquidity. For example, it was present in the African countries (Fielding and Shortland, 2005; Gulde et al., 2006; Khemraj, 2006; Saxegaard, 2006). Similarly, it was also observed that this problem was present in China (Chen, 2008; Zhang, 2009; Yang, 2010) and also in some other Asian countries (Agenor et al., 2004; Mohan, 2006; Majumder, 2007; Zhang and Pang, 2008; Bhattacharya and Khan, 2009). Holding huge amount of liquidity implied banks were trading off possible profits with enormous risks related to existing vulnerable investment avenues.

There was a difference of opinion among the economists on whether excess liquidity was good for the economy or not. According to some economists, excess liquidity was somewhat desired (Friedman and Schwartz, 1963; Calomiris and Wilson, 1996; Ramos, 1996). This strand of argument considered accumulation of excess reserves as protective liquidity. On the other hand, some other economists viewed excess liquidity as an undesired phenomenon attributed to exogenous economic factors (Bernanke, 1983, 1995; Ferderer and Zalewski, 1994).

There was also disagreement on whether excess liquidity was a demand or a supply side phenomenon. If there was lack of credit demand from the borrowers' side, then it could be attributed to demand side. But if there was enough demand for credit (in other words, if the credit demand was not fulfilled) while the banks had excess liquidity, then it should be attributed to the supply side.

Several authors had pointed to weak bank lending as one of the main reasons for the build-up of excess liquidity. Wyplosz (2005) and Gilmour (2005) identified weak bank lending, due to poor growth prospects, as the reason for the increase in excess reserves in the Eurozone. Saxegaard

(2006), on the other hand, found that weak loan demand (owing to high loan rates) accounted for the involuntary reserve accumulation in several African countries.

However, in several other countries it was present side by side with unfulfilled credit demand. For instance, it was found that banks in Tanzania had excess liquidity though there was high private sector credit demand (Aikaeli, 2011). This was supported by a World Bank study where it was mentioned that “excess liquidity can coexist with very limited investable funds” (Honohan and Beck, 2007).

This also seemed to be generally the case for Bangladesh. Though at times of financial crisis, lowering of investment rates could contribute to excess liquidity, generally excess liquidity existed alongside unmet credit demands. As already mentioned once, former President of the Federation of Bangladesh Chambers of Commerce and Industry Hossain said, “Though the BB (Bangladesh Bank) says there is no liquidity crisis, as a borrower I face it” (The Daily Star, 21 June 2011).

All these imply that excess liquidity in many countries was not due to lack of demand from the borrowers’ side but it was a situation arising from the supply side. The banks were lending less than the amount they could or were expected to lend due to some reasons other than the lack of demand. So, in this study, the excess liquidity situation will be examined to explore these possible factors.

The literature review section is broadly divided into two categories. The first discusses the studies related to excess liquidity while the second part describes the empirical works on lending.

3.2 DETERMINANTS OF EXCESS LIQUIDITY

Earlier studies on excess liquidity used various factors as the determinants of excess liquidity. The most important explanatory variable of excess liquidity that emerged from the previous studies was **reserve requirement**.

In their study on Thailand, Agenor et al. (2004) included it as one of the independent variables and found it to be significant. Nyagetera (1997) also agreed that reserve requirements play an important role in withdrawing or enhancing liquidity in the banking system in Tanzania. In a separate research, Aikaeli (2011) also studied excess liquidity problem for Tanzania and found that along with other variables, the rate of required reserves was also responsible for accumulation of excess liquidity in commercial banks.

Chirwa and Michila (2004) mentioned that banks in many developing countries were still subject to high liquidity reserve requirements even after financial liberalisation. In sub-Saharan Africa, Seck and Nil (1993) underscored the role of high reserve requirements, which acted as an implicit financial tax by keeping interest rates high. While reserve requirements may be designed with the aim of protecting depositors, the availability of a pool of resources allowed for financing high fiscal deficits through the implicit financial tax, thereby creating an environment that could promote high inflation and persistent high intermediation margins. The opportunity cost of holding reserves at the central bank, where they generally would earn less interest than lending, increased the economic cost of funds above the recorded interest expenses that banks tend to shift to customers.

Other things being equal one would expect that an increase in **lending rate** of the commercial banks would reduce lending and contribute towards increasing excess reserves. This was observed in the study of Saxegaard (2006) for sub-Saharan African countries. High lending interest rates, whether caused by inefficiency or lack of competition, increased borrower's costs. By pricing the safer borrowers out of the market, high interest rates could increase the risk of lending, making banks less willing to lend and potentially resulting in credit rationing leading to high bank liquidity. This was also mentioned in the work of Stiglitz and Weiss (1981).

Another important factor that was found to be related with excess liquidity was **deposit volatility**. Agenor et al. (2004) found that deposit volatility was one of the main factors that could explain the excess liquidity problem for the economy of Thailand. Larsen (1951) also identified volatility as a probable reason for excess liquidity. According to him, liquidity preference of banks was affected by the formation of public expectations. To analyse banks' demand for liquidity, volatility of depositors' cash preference should thus be taken into consideration. Saxegaard (2006) observed that currency withdrawal volatility⁹, which was very similar to deposit volatility, could influence the excess liquidity situation.

Barajas et al. (2000) found evidence of a positive and significant relationship between **interest rate spread (IRS)** and liquidity reserves in the Colombian banking system. Brock and Rojas-Suarez (2000) and Saunders and Schumacher (2000) observed that reserve requirement could have an influence on the spread as they found evidence that suggested reserve requirements acted as a tax on banks that translates into higher spreads in a number of Latin American and developed countries.

Different authors observed that sometime banks kept excess reserve than required in case of emergency. Mishkin (2001) explained that banks kept excess reserves as an insurance against the costs associated with deposit outflows. According to him, the higher the costs associated with deposits outflow the more the excess reserves banks wanted to hold. This cost was called the **penalty rate** and was generally proxied by either the discount rate or the money market rate (Agenor et al. 2004; Aikaeli, 2006; Saxegaard, 2006; Khemraj, 2010).

In a Bank of International Settlement (BIS) paper by McCauley and Zukunft (2008) on the economy of Malaysia, the Philippines and Thailand, it was observed that excess liquidity was due to **weak credit growth in relation**

⁹ Here the currency withdrawal volatility does not refer to 'capital flight' but is referring to volatility in the depositors' behaviour in withdrawing their deposits from banks.

to **domestic deposit growth**. They measured this as a ratio of loan to deposit.

One important factor that may cause excess liquidity and was used in some of the earlier studies was **excess savings**. Chen (2008) considered five indicators of excess liquidity on China. One of the determinants was excess savings resulting from the poor social security network. This was supported by some other studies where it was observed that one of the causes of excess liquidity was the high saving ratio (Gu and Zhang, 2006; Wang, 2006; McKinnon, 2006, 2007; Han and Chen, 2007; Roubini, 2007; Xia and Chen, 2007; Zheng and Yi, 2007). Jiao and Ma (2007), in their study of the excess liquidity problem for the economy of China, used a slightly different concept of savings where the variable they used was low consumption rate paired with high savings rate.

Though Jiao and Ma (2007) studied the excess liquidity problem for the economy of China using low consumption rate paired with high savings rate, Qing (2006) used only the low consumption spending as an independent variable to see its impact on excess liquidity in the economy. He observed that **low consumer spending** resulted in large amounts of funds in the banking system and thereby increased liquidity.

Two similar concepts of risks were used in different papers which were very similar to each other. These were: the liquidity risk and the credit risk. Agenor et al. (2004) used the concept of **liquidity risk** in their study on Thailand while Aikaeli (2006) used **credit risk** as one of the variables and found that credit risks were responsible for accumulation of excess liquidity in commercial banks in Tanzania. Changes in the demand for cash could be a proxy for this and the authors used the measure of deviation of output from trend for it.

Many studies identified different **external factors** as reasons for excess liquidity. Chen (2008), in a study on China, considered foreign exchange system as one of the indicators of excess liquidity. This was supported by

some other studies where it was observed that one of the causes of excess liquidity was the foreign currency exchange system (Gu and Zhang, 2006; Wang, 2006; McKinnon, 2006, 2007; Han and Chen, 2007; Roubini, 2007; Xia and Chen, 2007; Zheng and Yi, 2007). Khemraj (2006) identified several possible determinants of excess liquidity. One of these was unsterilised foreign exchange market interventions. He explained that sterilisation involved simultaneously selling Treasury bills to mop up the liquidity injected when the central bank buys foreign currencies from the foreign exchange market. If there was total sterilisation then one could observe a sterilisation coefficient of -1 while partial sterilisation was represented by a coefficient value of between 0 and -1.

Bakani (2012), in his BIS paper, found that recent increase in **foreign exchange reserve** was the main reason for excess liquidity in Papua New Guinea. Jiao and Ma (2007) also observed that the continued growth of foreign exchange reserve was one of the reasons for the excess liquidity problem for the economy of China.

Another external factor used by authors was **export**. Jiao and Ma (2007) used rapid rise in exports as one of the factors of excess liquidity and found that it actually affected the excess liquidity. Similarly, Qing (2006) observed that rapid growth of exports and investment could be a factor of excess liquidity, especially if the consumption growth was way behind the speed of investment and export.

Foreign aid was another external factor which was identified as a probable factor leading to excess reserves. Gilmour (2005) argued that a significant part of the increase in aid inflows in the early part of this century were saved and channeled into excess reserves in Ethiopia. Saxegaard (2006) also observed that excess liquidity could be due to variables such as foreign aid which could account for the involuntary reserve accumulation in several African countries.

Saxegaard (2006) mentioned that **oil revenues** could account for the involuntary reserve accumulation. He found it to be true for some of the African countries and this view was supported by one of the IMF (2005) studies where they reported that in the case of Equatorial Guinea, large oil inflows were associated with increase in excess liquidity.

Among other external factors, Bakani (2012) pointed towards the private **foreign direct investment** as one of the reasons for excess liquidity in Papua New Guinea while Khemraj (2006) identified **remittance** as one of the possible determinants of excess liquidity as it could cause a build-up of deposits (and reserves) as people convert foreign currency into local currency.

There was also an indication in the literature that excess liquidity may vary during **periods of stress** relative to normal situations, leading to greater asset price volatility during the former and so disrupting liquidity targets (Cohen and Shin, 2003). Morrison (1966) did a study on demand for excess reserves in both panic and non-panic periods of banks. He concluded that excess reserves were held as a buffer to avoid asset transaction costs emanating from unforeseen transitory deposit shocks. This sort of excess liquidity could also be interpreted as an insurance against deposit outflows. Al-Hamidy (2013) found for the economy of Saudi Arabia that turbulent international markets slowed down domestic credit growth and increased excess liquidity.

Fielding and Shortland (2005) estimated a time-series model of excess liquidity for the Egyptian banking sector and found that though financial liberalisation and financial stability were found to have reduced excess liquidity, these effects were offset by an increase in the number of violent political incidents. They concluded that one of the reasons for excess liquidity in Egypt was **political instability**.

Supply of credit or loan is expected to be related with excess liquidity since an increase in the supply of credit from the banking sector should

mean that there would be less excess liquidity in the banking sector. Thus excess liquidity could be taken as the other side of the coin of credit supply and the factors that may affect the supply of credit could also be the factors of excess liquidity. In this regard, the study of Andrianova et al. (2010) could be helpful. They mentioned moral hazard (strategic loan defaults) and adverse selection (lack of good projects) as two of the factors that could affect the loan supply. Thus two very similar factors could be used to explain the liquidity problem: one related to **weak contract enforcement and rule of law** and the other related to **weak and uncertain economic growth**. As both could lead to loan default, therefore impaired loan was included in this analysis to see if these factors actually played any role in the excess liquidity problem in Bangladesh.

Business cycle can have an effect on the excess liquidity situation of the banks through its effect on lending. During economic boom, it was expected that there will be an increase in demand for loans. Moreover, the probability of loan default was expected to decrease during this time as a result of borrowers doing well during this period. These will make banks become softer in lending which may reduce the excess liquidity situation. During the bust or economic downturn, banks would become stricter as the probability of loan default increased. Moreover, investors also became more careful in investing at this time and, as a result, may end up having higher amount of deposit in banks. Therefore, an inverse relationship was expected to prevail between business cycle and excess liquidity which meant that during the boom period of the business cycle, there would be less excess liquidity while during the bust period, excess liquidity will be more (Ruckes, 2004).

Although there were many works on business cycle and lending (particularly using the bank ownership characteristics), but studies on the relationship between business cycle and excess liquidity were very scarce. Most of the studies on business cycle and lending were done at cross-country levels. From these studies, it was generally observed that different types of banks had different lending pattern over the business cycle.

Davydov (2013) observed that private banks' lending pattern was generally procyclical. The author observed that when public banks lending was also procyclical, they were less procyclical than private banks in most cases. In some cases, it was observed that lending of public banks could even be counter-cyclical (Bertay et al., 2012). Some of the earlier studies found mixed results for different countries or regions (Cull and Peria, 2012) while some others did not find any significant difference in lending between these two types of banks (Iannotta, et al., 2011). Thus it could be concluded from these above mentioned works that the lending behaviour of banks according to ownership was not same in all cases and varies where in some cases they were procyclical, in some cases they were counter-cyclical while in some cases they were acyclical.

This view of dissimilarity in lending according to ownership was also supported by various country-level studies. For example, Berger et al. (2008) observed it for Argentina, Lin and Zhang (2009) found this for China, and Omran (2007) witnessed it for Egypt.

In some cases, it was observed that public banks and private banks were almost equally efficient (Beck et al., 2005; Kraft et al., 2006). In another study, Micco et al. (2007) observed that this feature of higher efficiency of private banks was truer for developing countries than in the developed countries. Davydov (2013) stated three possible reasons for the comparative inefficiency of the public banks. They were: (i) political interference, that deviate them from the profit maximisation aims; (ii) incentives structure for managers were weaker than the private banks; and (iii) inferior incentives for owners leading to poor monitoring.

However, it may be noted that the idea of comparing public and private banks in terms of efficiency or profitability was rather misleading since public banks had many other agenda along with the agendum of profitability and hence pursuing solely the profit objective was not their aim (UNCTAD, 2008). To attain these other objectives, the public banks needed to compromise with the objective of profit maximisation to a

certain degree and became less profitable than their counterparts. Therefore less profitability of public banks did not necessarily imply that they were less efficient.

Another interesting and related topic which may also affect the lending behaviour of banks was crisis time. The **financial crisis** and business cycle could be closely related due to the fact that if the downturn or recession of the business cycle goes on for a long time, it could lead to crisis. This reasoning was supported by Bordo et al. (2001): “crises are an intrinsic part of the business cycle and result from shocks to economic fundamentals.”

Similar to the difference in bank lending in terms of ownership during business cycle, it was also observed that banks lend differently according to ownership during crisis time. In different cross-country studies on non-crisis times, it was commonly found that public banks were less efficient and sometime led to lower financial development than private banks (Barth et al., 2004; Bonin et al., 2005; Duprey, 2013).¹⁰

However, during the recent financial crisis of 2008-09, the public banks played a positive role for the economy by generally acting counter-cyclically (Allen et al., 2013) or less procyclically (Fungacova et al., 2013). This was crucial and helped the economy to stabilise as the domestic private banks acted procyclically (Kowalewski and Rybinski, 2011; Cull and Peria, 2012). This was also true for earlier financial crises in Asia and Latin America in the 1990s (Hawkins and Mihaljek, 2001).

Micco and Panizza (2006), in their study of 179 countries, mentioned four possible reasons why public banks stabilised credit: (i) public banks do it as part of their objectives, (ii) with possibilities of bank failures, people generally considered public banks to be a safer place and hence these banks end up having a better deposit base during the crisis which led them to a better position for smoothing credit, (iii) public bank managers could

¹⁰In some cases, it was also observed that this feature of higher efficiency of private banks was truer for developing countries than the developed countries.

be lazy due to lack of having a proper set of incentives, (iv) in election years, politicians could try to influence public bank lending.

Studies on financial crisis and excess liquidity could be broadly divided into two categories. One group analysed how excess liquidity acted as one of the factors for the **financial crisis** (Palma, 2009; Acharya and Naqvi, 2012; Brana et al., 2012) while the other group discussed how financial crisis could affect excess liquidity.

One of the possible effects of financial crisis was that it increased uncertainty and riskiness in the economy. This made lending riskier for the banks. Therefore, banks lent less and thereby the excess liquidity situation increased. For example, Agenor et al. (2004) observed this for Thailand while Ashcraft et al. (2011) found it for US. Montoro and Moreno (2011) found similar results for Peru. In another study, Murta and Garcia (2010) examined excess liquidity for banks in the Euro area.

The most direct empirical study till now, to our knowledge, that examined the effect of the recent financial crisis on the excess liquidity situation of banking sector was carried out by Pontes and Murta (2012). They studied this relationship for the African economy of Cape Verde. Their results suggested that the crisis decreased the excess liquidity in the economy. The possible reasons included the extreme dependence of the economy on the external economy (especially remittance) as well as the underdevelopment of the financial markets.

3.3 DETERMINANTS OF LENDING

Different studies used different sets of explanatory variables. Some of them were more common while others were used less frequently across studies. The three most common explanatory variables used in the earlier studies were: economic growth, interest rate and the lagged dependent variable.¹¹

¹¹The definition of these variables and their measurement are given in detail in Appendix 6.1.

It was expected that if there was **economic growth**, there would be higher demand for investment and also increased demand for loan. This was mainly due to the fact of favourable economic conditions. Therefore, economic growth should affect lending positively. This was also observed in earlier empirical studies (Cottarelli et al., 2003; Kiss et al., 2006; Kraft, 2006; Gattin-Turkalj et al., 2007; Brissimis et al., 2014). To capture economic growth, real GDP was used in this study.

The rate of interest was another variable that had been frequently used in studies of lending. It was expected to have a negative relationship with lending since lower interest rate should increase the demand for credit and vice versa (Egert et al., 2006). In this study, to capture the effect of interest rate, interest rate was taken in real terms, which was calculated by deducting the current inflation from the nominal interest rate. This was done to reflect the true effect. To convert interest rate into real terms, both consumer price index (CPI) and GDP deflator were used.¹²

Lagged Dependent Variable was also applied in earlier studies. It was found to have a positive effect on lending (e.g. Gattin-Turkalj et al., 2007). Hence, this variable was included in this study to capture and account for the persistence of lending from the earlier period.

Since **financial liberalisation** took place in most of the economies around the 1990s, the impact of this process was part of some of the recent studies on lending. As the liberalisation process was initiated at the backdrop of the financial repression and was proposed to remove various credit restrictions to ensure the free flow of credit, it was expected that there will be a positive relationship between liberalisation and lending.

Different **bank-specific characteristics** could play a role in lending. These include bank ownership, size, mode of operation and age.¹³ Summarily it can be said that there could be differences in the lending behaviour of

¹² Results using the real interest rate using CPI are presented in the main text while that using the other measure of real interest rate are given in Appendix 6.3.

¹³ These characteristics are discussed in detail in Sections 4.3 and 6.2.

banks according to these characteristics and it would be interesting and worthwhile to see if and how these characteristics significantly differed lending of banks.

It was generally believed that the availability of bank lending depends, in addition to the traditional factors, on the process of **financial liberalisation**. With the process of liberalisation, banks would be able to lend more due to the fact that entry into the banking sector would be easier. Furthermore, the expansion of the banking sector would also increase the credit supply and reduce the lending rate (Boissay et al., 2005; de Haas and van Horen, 2010).

However, the process of liberalisation could also increase the interest rate volatility and asset prices. This rise in asset and property prices could also trigger a temporary unwarranted credit boom (Bandiera et al., 2000). Furthermore, competition among banks could increase as a result of the liberalisation process which may end up in a situation where banks lend imprudently (Caprio et al., 2006). But imprudent lending could be due to outright managerial failure also (Honohan, 1997). Therefore, the overall impact of financial liberalisation on credit mainly leans towards the fact that lending would increase. This positive relationship between liberalisation and lending was also supported by earlier empirical works (Cottarelli et al., 2003; Gattin-Turkalj et al., 2007)¹⁴.

Since it was a continuous and multi-faceted process (Bandiera et al., 2000), the results could be misleading if a binary dummy variable was used to represent this versatile process. Therefore, to address the process in a more comprehensive way, an index of financial liberalisation was used by Abiad et al. (2010). Although most studies either used a binary dummy or a single indicator of liberalisation, the use of an index to appropriately capture the process of liberalisation was not uncommon. For example,

¹⁴ Although many earlier studies observed that even with the financial liberalisation, credit for firms remained a major problem and this was true for many developing countries around the world. For a comprehensive survey, see the works of Aryeetey et al. (1997) and Niskanke (2001), among others.

Cottarelli et al. (2003) also applied a similar index in their study of CEEC countries. In this study an index motivated by that of Abiad et al. (2010) was used.

The earlier related works on lending could be broadly divided into three categories. The first category of these studies investigated the effect of financial liberalisation on lending. These were done at an aggregate level and not across banks (Boissey et al., 2005; Egert et al., 2006).

The second category of research used some classifications of banking to see how they were related to the changes in the monetary policy. For example, Lang and Krznar (2004) used the bank characteristics of ownership, capitalisation, liquidity and size to see how they differed in their reaction to changes in the monetary policy in Croatia. But they did not see how the process of financial liberalisation affected lending according to these characteristics.

The third category of works, which was analogous to this study, used bank-level data to see the effect of some other phenomena (than financial liberalisation) on lending. For instance, Cull and Peria (2012) used bank-level data for some countries in Eastern Europe and Latin America but their main aim was to see if lending changed along with the process of the financial crisis of 2008-09.

There were quite a few studies on European Countries. Among the recent cross-country studies on lending, Brzoza-Brzezina (2005) studied the new European Union (EU) countries and found that lending generally increased across countries. However, the degree differed from country to country with Hungary and Poland experiencing a very strong growth as well as Ireland and Portugal. Similar observations of differing degree of changes were observed by Egert et al. (2006) in their study of 11 Central and East European (CEE) countries. They observed that while some countries experienced steady growth (e.g. Estonia and Latvia), some others experienced growth after initial slowdown (e.g. Hungary and Croatia) while

some others experienced almost steady decline (e.g. Czech Republic and Bulgaria).

For example, Calza et al. (2001) studied the lending pattern of the Euro area while Cottarelli et al. (2003) studied the Central and East European Countries (CEEC). They observed that although lending as a ratio of GDP increased in most of the countries (e.g. Bulgaria, Croatia, Poland and Slovenia) but it declined for some other countries (e.g. Czech Republic, Slovak Republic and Macedonia). This sort of mixed findings was also supported by, among others, Schadler et al. (2004) and Kiss et al. (2006). In another work by IMF (2004) on some of the European countries, excessive growth in credit was recognised. It was observed that Bulgaria, Romania and Ukraine experienced very high credit growth. The paper observed that although increase in lending was a good sign but excessive credit growth could be a matter of concern.

In a study of 16 industrialised countries across regions, Hofmann (2001) observed that credit as a ratio of GDP increased in most of the countries. The author also observed that growth in credit and economic growth moved very closely with each other, supporting procyclicality of financial development. In another IMF (2004) study, it was observed that although lending increased across countries and regions, it increased more in Southeast Asian countries.

The analysis of the effect of the liberalisation process on lending pattern in Bangladesh started almost immediately after the liberalisation process started in this country. Khan (1993) observed that banks were not able to allocate credit efficiently, mainly due to the problem of imperfect information. However, he also pointed out that it “might be too early to determine the benefit of the liberalisation.” In another study, Ahmed (1995) observed mixed implications of the liberalisation on the banking sector in Bangladesh. Khan et al. (2011) observed that lending in Bangladesh increased for all the banks since the financial liberalisation started. They examined lending by traditional categories of banking data as

was generally available in Bangladesh. According to this, the scheduled banks were classified into SCBs, DFIs, PCBs and FCBs. They also analysed lending according to sectors and found that loans were gradually moving from agriculture towards industrial sector.

One important point to note was that almost all studies on Bangladesh were either done at an aggregate level or when they were done at a disaggregated level, the banks were classified into the earlier mentioned categories of SCBs, DFI, PCBs and FCBs. This was done possibly because of easier data availability as the data were available in this format. However, these studies missed out the possible effects of different bank-specific characteristics which may have an impact on the lending behaviour of banks. Therefore, to investigate if these characteristics significantly (or insignificantly) affected lending of banks, it was crucially important to include these characteristics and study them accordingly. This was attempted in this **bank-level study** for the banks in Bangladesh.

3.4 METHODOLOGY

In this section, some of the methodologies applied in earlier studies on excess liquidity and lending are discussed. In the first part, the works on excess liquidity are discussed followed by studies on lending in the second part. Furthermore, some of the important equations in the earlier studies on excess liquidity and lending are described in the appendix of this chapter.

Various estimation methods were employed by different authors in their works. Most of them used system GMM (generalised method of moments) for its overall superiority over other panel estimators. However, different other methods were also applied by some authors. The methods used in these studies and their rationale are briefly described in the following paragraphs.

When the **country-specific studies** were considered, it was found that different methods were used in different studies. Lin et al. (2012) used the

GMM method for Japan in their study of lending and financial crisis. According to them, the reason for using the Arrellano-Bond (1991) GMM estimator was that it allowed for more flexibility in specifying which variables were to be taken as endogenous or truly exogenous and to assign appropriate instruments to endogenous variables. Moreover, the qualities of all the designations could be tested by different standard tests and it could be evaluated whether the variables of interest were independent of the error term. The Arrellano-Bond (1991) method also enabled to take into account the possible autocorrelation in the dependent variables.

Fungacova et al. (2013) used the maximum likelihood (ML) estimation method to see the relationship between lending and financial crisis in Russia for the stochastic frontier model. According to them, this method helped in capturing the time dimensionality by estimating the model in a series of pooled cross-sections, rather than a panel, because it was important that all model parameters, including residual distributions, could change over time.

To investigate if bank ownership exerted an impact on credit supply during the financial crisis, they added dummy variables for state ownership and foreign ownership to the frontier model as these variables were always viewed relative to domestic private ownership. Further, they included interaction between ownership and time dummy variables for each quarter of the sample period. Moreover, they also stated that the respective parameters of the time variable effects of state and foreign ownership indicated the difference in the change of the proportionality factor of state-controlled and foreign banks relative to private banks in time.

Two-step Generalised Method of Moments was applied by Chen and Liu (2013) for Taiwan in their study of lending and political consideration. They used it because their econometric methodology depended crucially on the validity of the instruments, which could be evaluated with Sargan's test of overidentifying restrictions. Another advantage of this was that it addresses the problem of potential endogeneity when instruments were lagged values

of the dependent variable in levels and in differences, and lagged values of other regressors (that could potentially suffer from endogeneity).

They also stated that the dynamic panel model technique, the GMM model, was particularly well-suited to handling short macro panels with endogenous variables and was also helpful in amending the bias induced by omitted variables in cross-sectional estimates and the inconsistency caused by endogeneity. The dynamic GMM technique also allowed controlling for the endogeneity bias induced by reverse causality running from dependent variable to political effects and other explanatory variables.

Pontes and Murta (2012) used two-stage least squares (2SLS) method along with tests of unit root and cointegration to see how the financial crisis affected the excess liquidity situation in Cape Verde. Their reasoning was that several empirical studies (e.g. Saxegaard, 2006) have recognised the presence of endogeneity of the majority of the explanatory variables. In this type of scenario, the ordinary least squares (OLS) method was not adequate. Therefore they used the 2SLS method.

Akinboade and Makina (2009) used vector autoregressive (VAR) method in their study on South Africa on business cycle and lending because the VAR methodology allowed all variables to be endogenously determined and had the advantage of fully capturing the interactions between banking sector specific and macroeconomic variables.

Among the **cross-country studies** for example, Allen et al. (2013) used system GMM panel estimator in addition to fixed effects (FE) and random effects (RE) in their study on differences in lending according to ownership in times of crisis for central and eastern European countries. They used system GMM to avoid any possible inconsistency due to the potential correlation between the lagged dependent variable and panel level effects.

Duprey (2013) used fixed effects method first and then for robustness applied system GMM methodology in his study on 93 countries of 459 banks for the period of 1990 to 2010. Bertay et al. (2012) also used two-step GMM estimation and the Windmeijer (2005) correction in their study for the period 1999 to 2010 on 1633 banks of 111 countries, to control for the possible endogeneity problem of GDP growth.

Ferri et al. (2013) used the Arellano-Bond type difference GMM estimator (Arellano and Bond, 1991) in their study on the European countries for the period 1999-2011. They used Arellano-Bond type difference GMM estimator (Arellano and Bond, 1991) because of the lagged dependent variable and heteroscedasticity present in the data. According to them, the Arellano-Bond type difference GMM estimator ensured efficiency and consistency of their estimates provided that instruments were adequately chosen. They employed the Hansen test (1982) to examine the validity of the instruments. The Hansen test of overidentifying restrictions had the null hypothesis that instruments were exogenous. A rejection of this null hypothesis implied that the instruments were not satisfying the orthogonality conditions required for their employment. A further test was the Arellano-Bond tests of autocorrelation of errors, with a null hypothesis no autocorrelation in differenced residuals. Specifically, the second order test, AR(2) was more relevant and would be better if the null hypothesis was rejected.

Similarly, the Hansen test of overidentifying restrictions and the Arellano-Bond test for error autocorrelation were applied by Bertay et al. (2012) and Ferri et al. (2013) while Allen et al. (2013) used the Sargan test along with the Arellano-Bond test for error autocorrelation.

APPENDIX 3.1: Some key estimated equations

Some key estimated equations on excess liquidity

In this small space, it is very difficult to include all the estimated equations from previous studies. However, some of the key equations on excess liquidity and lending are stated in the following pages.

Among the studies on excess liquidity, Agenor et al. (2004) used the following equation:

$$\ln\left(\frac{EL}{D}\right) = a_1(L)\ln\left(\frac{EL}{D}\right) + a_2(L)\ln\left(\frac{RR}{D}\right) + a_3(L)\ln CV_{C/D} + a_4(L)\ln CV_{Y/Y_T} \\ + a_5(L)\ln\frac{Y}{Y_T} + a_6(L)r + a_7(L)EXPO + v_t$$

Here, excess liquidity was the dependent variable. The explanatory variables included the required reserve, cash to deposit ratio, discount rate and deviation of output from trend.

In another study on excess liquidity, Aikaeli (2011) estimated the equation below:

$$LZ = \alpha + \beta_1 LX_1 + \beta_2 LX_2 + \beta_3 LX_3 + \beta_4 LX_4 + v_t$$

Here, the explanatory variables were required reserve, cash trend deviation, borrowing rate and loans return deviation.

Fielding and Shortland (2005), in their study on Egypt, utilised the subsequent equation:

$$\Delta \ln(R)_t = \beta_0 + \phi \cdot t + \theta \cdot REFORM_t \\ + \sum_{i=1}^{i=TR} \beta_i \cdot \Delta \ln(R)_{t-i} \\ + \sum_{i=0}^{i=Ts} \gamma_i \cdot \ln(Y)_{t-i} + \sum_{i=0}^{i=Tb} \delta_i \cdot \Delta \ln(b)_{t-i} + \sum_{i=0}^{i=Tr} \xi_i \cdot \Delta r_{t-i} \\ + \sum_{i=0}^{i=Tv} \eta_i \cdot \Delta \ln(v)_{t-i} + \beta^* \cdot \Delta \ln(R)_{t-i} + \gamma^* \cdot \ln(Y)_{t-1} + \eta^* \cdot \ln(v)_{t-1} \\ + \varepsilon_t$$

Where, the logarithm of the reserve assets ratio, $\ln(R)$, depended on the following variables of $REFORM$, $\ln(y)$, $\Delta \ln(b)$, r and $\ln(v)$. Here, $REFORM$

was a dummy for the post-reform period (1991 onwards), $\ln(y)$ was the logarithm of real GDP, $D \ln(b)$ was the rate of parallel exchange rate depreciation, r was the central bank discount rate and $\ln(v)$ was the index of political violence.

In a study on the economy of Thailand, Saxegaard (2006) applied the following two regressions:

$$X^1 = \{RR, VOL_Y, VOL_{CD}, VOL_{PS}, VOL_{GOV}, PORT, Y, r_D\}$$

$$X^2 = \{DEP_{PS}, DEP_G, CRED_{PS}, CRED_G, BOND, AID, OIL, POIL, r_L\}$$

In this study, the independent variables included required reserve, standard deviation (SD) of output gap, SD of cash-deposit ratio, discount rate, output gap, private credit and government credit.

In a separate study by Khemraj (2006), the equation applied was as follows:

$$er_t = \alpha_0 + \sum_{i=0}^n \alpha_i fx_{t-i} + \sum_{j=0}^p \alpha_j \Delta ir_{t-j} + \sum_{k=0}^q \alpha_k volfer_{t-k} + \sum_{l=1}^m \alpha_l er_{t-l} + \varepsilon_t$$

Here, the dependent variable was excess reserve (denoted by er). The explanatory variables were foreign exchange market surplus or deficit (fx), the change in the level of the central bank's international reserves (Δir) and the volatility of the Guyana dollar-US dollar nominal exchange rate ($volfer$).

Pontes and Murta (2012) applied the following equation:

$$EL_t = \alpha_1 + \alpha_2 R_{Dt} + \alpha_3 VOL_{PSt} + \alpha_4 VOL_{Ct} + \alpha_5 DEP_{PSt} + \alpha_6 DEP_{GOVt} + \alpha_7 CRED_t + \alpha_8 BOND_{GOVt} + \alpha_9 IR_t + \alpha_{10} CRISIS_t$$

Where, the dependent variable EL was the ratio between excess reserves and bank's total assets. The exogenous variables represented the precautionary and involuntary factors.

Bank of Cape Verde's (BCV's) lending rate was given by R_D . To include the role of uncertainty, deposit volatility was used and was computed as the moving average of the standard deviation of private sector deposits divided

by the moving average of this variable, VOL_{PS} . The variable VOL_C was the indicator of the volatility of the preference of the public by currency in circulation and was equal to the moving average of the SD of the ratio currency in circulation/deposits divided by moving average of this ratio.

Some key estimated equations on lending

In the study on business cycle, Duprey (2013) used the following equation:

$$\begin{aligned} gLoan_{i,t} = & \beta_1 * MacroShock_{c,t} + \beta_2 * MacroShock_{c,t} * Public_i + \beta_3 * Public_i \\ & + \beta_4 * MacroShock_{c,t} * Foreign_i + \beta_5 * Foreign_i + \beta_6 * X_{i/c,t-1} \\ & + v_{i,t} \end{aligned}$$

Where, i stood for bank, t for year and c for country. *Public* (resp. *Foreign*) was a dummy variable which took 1 if the bank was considered as public (resp. foreign).

In another study, Cull and Peria (2012) applied the following similar equation:

$$\begin{aligned} \Delta L_{i,t,j} = & Foreign_{i,t,j} + Government_{i,t,j} + Crisis_{2008}_{i,t,j} + Crisis_{2009}_{i,t,j} \\ & + Crisis_{2008}_{i,t,j} \times Foreign_{i,t,j} \\ & + Crisis_{2008}_{i,t,j} \times Government_{i,t,j} \\ & + Crisis_{2009}_{i,t,j} \times Foreign_{i,t,j} \\ & + Crisis_{2009}_{i,t,j} \times Government_{i,t,j} + X_{i,t,j} + \alpha_j + u_{i,t,j} \end{aligned}$$

Where, $\Delta L_{i,t,j}$ was the growth of total gross loans (or of corporate, consumer, or residential mortgage loans) for bank i at time t in country j .

Iannotta et al. (2011), in their study on some of the European banks, estimated the following OLS regression:

$$\begin{aligned} LOANSCHG_{i,t} = & f(ELECTION_{i,t}, Gob_{i,t} \\ & \times ELECTION_{i,t}, GDPCHG_{i,t}, ACCOUNTING_{i,t-1}) + \varepsilon_{i,t} \end{aligned}$$

Here, $LOANSCHG$ - the dependent variable - was the change in bank i 's total loans in year t , normalised by total assets from the previous year, that was $(TotalLoans_t - TotalLoans_{t-1}) / TotalAssets_{t-1}$. Annual GDP growth rate ($GDPCHG$) was to control for demand-side effects on loans. *Accounting* was a set of bank-specific variables reflecting factors that affect a bank's loans growth,

namely, (i) $SIZE_{t-1}$, the log of total assets as of year $t - 1$; (ii) $LOANS_{t-1}$, the ratio of loans to total earning assets as of year $t - 1$, (iii) $DEPOSITS_{t-1}$, the ratio of retail deposits to total funding as of year $t - 1$ and (iv) $CAPITAL_{t-1}$, total equity divided by total assets as of year $t - 1$. Lagged values for all four variables were used in this study to avoid endogeneity problems.

Micco et al. (2006) used the following equation to examine whether elections affected the relationship of bank ownership and performance:

$$PERF_{i,j,t} = \eta_{j,t} + PUB_{i,j,t}(\alpha_1 + \alpha_2 GROWTH_{j,t} + \alpha_3 ELECT_{j,t}) \\ + FOR_{i,j,t}(\beta_1 + \beta_2 GROWTH_{j,t}) + X_{i,j,t}\gamma + \varepsilon_{i,j,t}$$

Where, $GROWTH_{j,t}$ was a variable that measured real GDP growth in country j and year t and $ELECT_{j,t}$ was a dummy variable that took value of 1 when country j was in an election year and 0 otherwise (presidential elections and legislative elections in countries with parliamentary systems).

Brzoza-Brzezina (2005) used the following equation:

$$l_t - \beta_0 - \beta_1 y_t - \beta_2 r_t = 0$$

Where l stood for the log of real loans, y for the log of real GDP and r for the real rate of interest.

Calza et al. (2001) used the following regression:

$$(loans - p)_t = \beta_0 + \beta_1 \cdot y_t + \beta_2 \cdot R_t + \beta_3 \cdot \pi_t$$

where loans, p and y in the above equation respectively denoted logs of nominal loans to the private sector, the GDP deflator and real GDP; the nominal composite lending rate was represented by R while π stood for the annualised quarterly inflation rate and was equivalent to $\Delta p * 4$. Loans to private sector were deflated by the GDP deflator. This was done to address the theoretically plausible hypothesis where it was expected that nominal loans were homogeneous with respect to prices in the long-run.

Egert et al. (2006) used the following equation:

$$C^P = f(CAPITA, C^G, i^{lending}, p^{PPI}, spread)$$

In this equation, C^P was bank credit to the private sector expressed as a share of GDP. Robustness of the variables included in the equation was affected by the use of alternative measures often used in the literature (e.g. replacing GDP per capita by real GDP growth or long-term lending rates by short-term lending rates). These alternative variables were subsequently introduced one by one in the baseline specification.

Cottarelli et al. (2003) used the following equation:

$$\begin{aligned} BCPS_{it} = & \alpha_0 + \alpha_1 * PublicDebtY_{it} + \alpha_2 * Log(GDPPC)_{it} + \alpha_3 * (1 - HighInfl) \\ & * \left(\frac{1}{InflThreshold} \right) + \alpha_4 * HighInfl * \left(\frac{1}{Infl_{it}} - \frac{1}{InflThreshold} \right) \\ & + \alpha_5 * LibIndex_{it} + \alpha_6 * Accounting_i + \alpha_7 * EntryRestrictions_i \\ & + \alpha_8 * GermanLegalOrigin_i + \varepsilon_{it} \end{aligned}$$

Here, $BCPS_{it}$ was bank credit to the private sector as a ratio to GDP. In this paper, the RE estimator was preferred to the FE estimator as Hausman specification test did not reject the hypothesis of no correlation between the errors and the regressor.¹⁵

Kiss et al. (2006) applied the following regression:

$$\begin{aligned} \Delta c_{it} = & \phi_i (c_{i,t-1} - \bar{c}_{i,t-1}) + \sum_{j=1}^{m-1} \gamma_{ij} \Delta c_{i,t-j} + \sum_{j=0}^{n-1} \delta_{ij} \Delta f_{i,t-j} + \alpha_i + u_{it} \\ & \bar{c}_{it} = \beta' f_{it} \end{aligned}$$

where c and \bar{c} stand for the actual and equilibrium credit/GDP ratio, respectively, f was the vector of explanatory variables and α_i was an unexplained country-specific effect which could correlate with the other explanatory variables. The sign of ϕ was expected to be negative, meaning that lower than equilibrium credit stock induces credit growth in the next period.

¹⁵ See pp. 57-59 of Cottarelli et al. (2003) for further details.

APPENDIX 3.2: Summative table of some of the key findings

Table 3A.1: Summative table of some of the key findings

Authors	Country	Dependent Variable	Explanatory Variables
Khemraj (2006)	Guyana	Excess reserve	fx , Δir and er_{t-1} (one period lag of er) were significant while $volfer$ was not significant.
Agenor et al. (2004)	Thailand	Excess liquidity	$\ln(RR/D)$ had a negative impact, the volatility of $\ln(C/D)$, tended to increase, the volatility of Y/Y_T , was showing mixed results, the cyclical component of output, as measured by $\ln(Y/Y_T)$, had a positive effect on the demand for excess liquid assets in all three regressions; the effect of an increase in the penalty rate, r , was to increase $\ln(EL/D)$ in the first and third cases; when the Hodrick-Prescott filter was used, the penalty rate had a perverse effect. The foreign exposure variable had the expected sign in the first two regressions. Finally, the effect of lagged EL/D was significant.
Aikaeli (2006)	Tanzania	Excess liquidity	In the long-run, a rise in the rate of required reserves (x_1) by 1 per cent lowered excess liquidity by about 6 per cent, while one per cent surge in volatility of cash preference (x_2), the bank borrowing rate (x_3) and variations of loans return (x_4) increased excess liquidity respectively by about 9 per cent, 0.2 per cent and 1.1 per cent.
Saxegaard (2006)	CEMAC countries	Excess liquidity	Surprisingly, increasing volatility of government deposits appeared to lower excess liquidity. This result proved to be remarkably robust across different specifications and to changes in the sample period. Not only was this counterintuitive, but also contrary to statements made by officials at the regional central bank regarding the cause for the increase in excess reserves in the CEMAC region. Increases in private sector and government deposits both appeared to increase excess reserves whereas increase in credit to the private sector and the public sector lowered excess

Authors	Country	Dependent Variable	Explanatory Variables
			liquidity. There was a significant positive effect on excess liquidity from increases in the aid to GDP ratio. Surprisingly, however, there was no direct effect from changes in the oil price.
Saxegaard (2006)	Nigeria	Excess liquidity	Increase in the required reserve ratio was predicted to reduce excess reserves. Furthermore, the estimated model predicted that banks would demand more excess liquidity if the ratio of demand deposits to time and saving deposits increased. Finally, the liquidity risk, measured by the volatility of the cash to deposit ratio, led to an increase in demand for excess reserves. A net increase in government deposits had the effect of raising excess liquidity. An increase in the lending rate reduced the demand for loans in the private sector and leads to an increase in excess liquidity. Finally, the increases in the ratio of oil exports to GDP were important for the build-up of involuntary excess liquidity.
Saxegaard (2006)	Uganda	Excess liquidity	Volatility in the output gap was important although this was wrongly signed, relative to prior beliefs. Government deposits and lending to the government were important determinants. Also observed a significant effect from lending to the private sector.
Pontes and Murta (2012)	Cape Verde	Excess liquidity	Credit, government bond, international reserve and the financial crisis had significant impact while some other important variables (e.g. required reserve, deposit volatility and deposits of both sectors were found to be insignificant).
Cottarelli et al. (2003)	CEEC and Balkans	Lending	Economic growth was positively related while interest rate was found negative. The liberalisation index was found to be positively related while inflation value, although significant, was almost zero.

Authors	Country	Dependent Variable	Explanatory Variables
Kiss et al. (2006)	CEEC countries	Lending	In this study, economic growth was found to be positively related (1 per cent increase in PPP-based per capita GDP leading to a 0.5 per cent increase in the credit/GDP ratio). Moreover, real interest rate (RIR) and inflation (CPI) were negatively related with lending (where 1 percentage point decreased the credit/GDP ratio by around 2 per cent).
Gattin-Turkalj et al. (2007)	Croatia	Lending	It was observed from this study that economic growth was positively related while interest rate was negatively related. However, the coefficients were slightly higher than most of the studies which could be due to the nature of the data (as the growth rates were yearly rather than quarterly).

CHAPTER 4

RELATIONSHIP BETWEEN FINANCIAL LIBERALISATION AND EXCESS LIQUIDITY AT BANK-LEVEL

4.1 INTRODUCTION

Although there was no specific study on the relationship between financial liberalisation and excess liquidity at bank-level according to our knowledge, there were many works on excess liquidity at an aggregate level. These were discussed earlier in detail in Chapter 3. From all these works, it could be observed that these countries were still experiencing significant amount of excess liquidity and it remained one of the focal problems for most, if not all, of these developing economies.

To have an idea about the excess liquidity situation in Bangladesh, data of nominal excess liquidity, real excess liquidity and excess liquidity as a percentage of required liquid assets are given in Table 4.1¹⁶. It could be observed from the table that excess liquidity in nominal terms has increased substantially. Since increase in the nominal excess liquidity could in some part be attributed to inflation, therefore, excess liquidity data was also provided in real terms. This helped in seeing the actual change and trend of excess liquidity free from the effect of inflation. It could be seen that real excess liquidity also increased over time.

Excess liquidity as a percentage of the required liquid assets (statutory liquidity ratio, SLR) provided the relative excess liquidity situation for the period of 1987-2011. The continuous overall increase of this ratio implied that the rise in excess liquidity was not due to increase in the number of banks or the number of branches because when the number of branches increase then the amount of deposits also increase. As a result of which the total amount of excess liquidity in the country might increase in absolute terms. But when excess liquidity is taken as a ratio of required reserve, then it will truly show the condition and trend of excess liquidity after

¹⁶ This was also provided earlier graphically in Figure 2.6.

nullifying the effects of bank, branch or deposit increase. Increase in all these types of excess liquidity justified the need for an overall analysis of this increasing trend of excess liquidity in Bangladesh. This study aimed at identifying factors which caused excess liquidity to increase even after the financial liberalisation.

Table 4.1: Nominal EL, real EL and EL-SLR ratio in Bangladesh

Year	EL in nominal term (in billion taka)	EL in real term (in billion taka)	EL as a % of SLR
1987	8.60	18.71	34.40
1988	4.75	9.67	12.69
1989	2.36	4.43	5.40
1990	1.08	1.92	2.23
1991	3.50	5.83	6.85
1992	8.43	13.63	16.42
1993	7.01	11.30	12.25
1994	23.93	37.18	37.00
1995	17.23	24.94	24.78
1996	13.32	18.49	16.63
1997	17.09	23.02	19.24
1998	19.73	25.24	20.24
1999	33.35	40.77	31.84
2000	53.44	64.14	42.77
2001	44.62	52.72	30.96
2002	65.87	75.42	40.56
2003	79.71	87.31	42.66
2004	117.54	123.51	69.40
2005	109.42	109.42	55.74
2006	95.91	91.20	37.53
2007	142.79	127.14	46.72
2008	129.89	106.31	36.70
2009	347.62	267.09	81.66
2010	344.99	248.96	65.47
2011	340.71	231.22	51.24

Sources: Bangladesh Bank Annual Reports, various issues.

The nominal excess liquidity data were deflated with the GDP deflator (which was taken from IFS Annual Series, June 2012) and then multiplied by 100 to obtain the series of real excess liquidity. The base year is 2005.

4.2 MOTIVATION OF THIS CHAPTER

4.2.1 How Financial Liberalisation Can Reduce the Problem of Excess Liquidity

As described in Section 1.1, it could be observed that one of the main aims of the financial liberalisation was to increase the banking sector

competition. For this, these countries needed to deregulate interest rates, privatise and liberalise bank licensing in order to increase competition, lower the reserve requirements and dismantle any credit allocation schemes (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973). Moreover, judicious private bankers, without the constraints of credit controls, would allocate funds to the most productive users. These two together would lead banks to lend more. Banks' ability to give more credit would also imply that there would be less liquidity in the banking sectors. In other words, the financial liberalisation should substantially reduce the excess liquidity situation.

4.2.2 Why Financial Liberalisation May Not Reduce the Problem of Excess Liquidity and Rather Increase It

It needs to be taken into account that the process of financial liberalisation was not an isolated process or phenomenon but it rather came with many policies which have their own implications. It was observed by different studies that the process of financial liberalisation could make an economy more fragile and vulnerable because of its related policies. This fragility and vulnerability could also lead to possible banking crises if the institutions were not very strong (Detragiache and Demirguc-Kunt, 1998). Authors also found that the risk in the banking system increased after financial liberalisation (Fischer and Chenard, 1997). These could make the economy less stable and banks may feel more uncertain. If banks were not good at risk management in a more risky environment after the beginning of financial liberalisation, then they might not lend enough. For a similar reason, banks might also decide to keep their money in government bills and bonds as they were risk-free and in most cases had reasonably high rates of return. Banks also take note of the fact that due to the removal of the ceiling of the interest rate (and an increase in the rate thereby), safer borrowers apply less for loans and were replaced by the high-risk borrowers (Blanchard and Fischer, 1989). This either led banks to lend to "projects with lower probabilities of success but higher payoffs when successful" (Stiglitz and Weiss, 1981) or banks might decide not to go for lending for these risky projects and might end up having higher excess liquidity.

4.2.3 Stages and Sequencing of Financial Liberalisation

It was also found that the effect of the financial liberalisation can have different impact on different countries depending on the stage of liberalisation (Bandiera et al., 2000). This is due to the fact that financial liberalisation is a continuous process and a country at its early stage may not have the same impact like a country that is at an advanced stage of the liberalisation.

Sequencing of financial liberalisation can play a vital role in achieving the objectives of financial liberalisation. Moreover, institutional strength was critically important for the success of it. Caprio et al. (2006) mentioned, “institutional strengthening now widely accepted as being the pre-requisite of a successful liberalised financial sector.” If an economy was structurally weak then it was difficult to reap the benefits of financial liberalisation.

4.2.4 Importance of Bank-level Study

Another important contribution of this study was to see the relationship of excess liquidity and financial liberalisation using various bank-specific characteristics. While most of the studies on excess liquidity problem were done on a specific country at an aggregate level (e.g. Agenor et al., 2004; Fielding and Shortland, 2005; Chen, 2008; Zhang, 2009; Yang, 2010; Aikaeli, 2011), very few examined this at a cross-country level. Most of cross-country studies were done on Africa (Saxegaard, 2006; Khemraj, 2010).

According to our knowledge, there was no study on excess liquidity and financial liberalisation at bank-level. In this respect, a study at bank-level could provide important findings for the persistent excess liquidity. Bank-level study could shed important light on how banks behaved in terms of excess liquidity at bank-level. The bank-level study allowed us to look for differences according to different typology of banks. Hence the evolving pattern of excess liquidity with the process of financial liberalisation could be seen more specifically for these different typologies.

The banks in Bangladesh have diverse characteristics and on the basis of various criteria, could be classified into different groups. Based on the existing literature, banks were classified according to ownership (whether owned by the government or privately), size (if they were large or small), mode of operation (whether Islamic or conventional/otherwise) and age (whether new or old). Using data at bank-level, this study attempted to investigate if banks behaved differently in terms of excess liquidity according to these characteristics¹⁷.

This approach could shed important light on the behavioural and operational characteristics and effectiveness of the different types of banking system within a same country and how they adapted and benefitted from financial liberalisation. Antwi-Asare and Addison (2000) observed that bank-specific indicators could be important in showing the different effects of bank performance. These differences among them could have different effects of the financial liberalisation.

It was generally observed that private banks were more efficient than public banks. In a study on Pakistan, the authors used the group-wise efficiency and found that as a group, the private domestic banks had 90.5 per cent efficiency while the nationalised commercial banks had 70.5 per cent (Abbas and Malik, 2010). In another study on Ghana, it was found that the state-run banks were not prepared to take as much risk when lending as the private banks (Antwi-Asare and Addison, 2000). The authors observed that the performances of the private banks were higher than the state-owned banks in terms of profitability, intermediation and operations. However, the above view was not always found to be true. Das and Drine (2011) found that public sector banks were more efficient than the domestic private banks in India.

¹⁷ In this study, the foreign commercial banks could not be included due to lack of bank-level data for foreign banks operating in Bangladesh. Bureau van Dijk - producer of the Bankscope database, which is one of the most comprehensive database of banks operating throughout the world and is the main source of data for this study - was contacted directly but they confirmed that they did not have data at bank-level for foreign banks in Bangladesh.

Generally it was seen that new banks performed better in times of financial liberalisation. One possible reason, mentioned by Kraft and Tirtiroglu (1998), was that since they were not held back by overstaffing or bad loans. However, the empirical results did not always support this view and in some cases it was found that old banks performed better than the new banks. One possible explanation could be their advantage in terms of size and experience, helping them to work nearer to efficient scale and at a comparable or better level of managerial efficiency than the new banks (Kraft and Tirtiroglu, 1998).

The possible effect of financial liberalisation on Islamic banking was still ambiguous. On one hand, there was perception that Islamic banks could not take full advantage of the financial liberalisation as they were comparatively small, narrow in focus and mostly vulnerable to financial shocks. On the other hand, it was also believed that Islamic banks were able to cope better with the vulnerability and the fragility caused by the financial liberalisation. So, whether financial liberalisation had a positive effect on Islamic banking remained inconclusive (Bashir, 2007).

Inability to reach a definitive conclusion was also evident when the possible effect of financial liberalisation on bank size was analysed in the literature. Some argued that large banks performed better in times of financial liberalisation (Berger and Humphrey, 1997; Yildirim, 2002; Andries and Capraru, 2013). The main possible reason for this was the market power of 'larger banks' and their ability to diversify credit risk in an uncertain macroeconomic environment (Yildirim, 2002). Nevertheless, some others had observed that smaller banks were more efficient than the larger ones (Leong and Dollery, 2002). This "could be due to their higher flexibility, which allowed them to adapt to changes in the banking industry brought about by the financial liberalisation programme" (Ataullah et al., 2004).

Therefore, it would be interesting to see if these differences in characteristics in the banking sector had any effect on excess liquidity. Guha-Khasnobis and Mavrotas (2008) mentioned that country-specific

studies could be very useful for a more in-depth analysis. Therefore this study would analyse these aspects of ownership, size, mode of operation and age of the banking sector in Bangladesh.

4.2.5 Contribution of this Chapter

Financial liberalisation in Bangladesh was initiated in the early 1980s. But this was not a one-step process. Three distinct sectors were identified in which financial liberalisation took place. These were: (a) development of competitive banking sector and a viable rural financial system; (b) control over interest rate, exchange rate and capital flows; and (c) development of money and capital market. Financial liberalisation in these three sectors did not take place simultaneously. In fact, it was not until 1990 that the process of financial liberalisation started in the case of interest rates. This was observed with the departure of nominal interest rates and the interest rate spread from the regimentally fixed round values after 1990 (Hossain, 1996). Regarding the interest rate liberalisation, Mujeri and Younus (2009) wrote:

“Bangladesh began to implement financial sector reform measures in the 1980s and the interest rates were partially deregulated in November 1989 to introduce flexibility in determining deposit and lending rates. As a part of the process, Bangladesh Bank started to set the ceilings and the floors and individual banks were allowed to set their interest rates within the stipulated band. In April 1992, the interest rate bands for lending were removed for all sectors except agriculture, small industries and exports while, for deposits, the ceilings were removed but the floors were retained.”

It could be observed from Table 4.1 that excess liquidity in Bangladesh had a general growing pattern over time. One point that needed to be noted was that excess liquidity fell before the financial liberalisation programme but it increased, with some exceptions, after the financial liberalisation. This put forward the need for a study which could explain the reasons for this continuous increasing trend. It could either be due to the financial

liberalisation itself or it could be because of the standard factors used in earlier studies of excess liquidity or could be a combination of both. Therefore, the standard variables along with financial liberalisation was applied in this study to see why excess liquidity was so high and still increasing in Bangladesh.

As mentioned before, there was no study using bank-level data to directly look at the relationship between financial liberalisation and excess liquidity directly according to our knowledge. To fill this vacuum in the literature, bank-level data were used to examine how excess liquidity and the financial liberalisation were related.

As the study period of this paper started after the financial liberalisation was initiated in Bangladesh, hence an index of financial liberalisation (introduced in Section 4.3.2.1) was used to properly capture the effect of it on excess liquidity. It not only allowed a quantitative study of their relationship but also helped in reaching towards a definitive conclusion about the continuous and ever growing debate of the effect of the financial liberalisation and attainment of its objectives.

4.3 THE EMPIRICAL APPROACH

4.3.1 Dependent Variable

The dependent variable for this study was excess liquidity. This was measured using the liquid assets data from Bankscope. It was calculated in Bankscope by summing up: trading securities and at fair value (FV) through income, loans and advances to banks, reverse repos and cash collateral and cash and due from banks. Then mandatory reserves included above were deducted. Finally, growth of this was taken.

4.3.2 Explanatory Variables

One of the main variables of interest in this study was financial liberalisation. Other key variables of interest were the bank typology variables. These were included to see if there was any pattern among different types of banks in terms of excess liquidity due to financial

liberalisation. Moreover, the standard variables in the excess liquidity literature were also incorporated to see the direction and significance of their relationship. These standard variables included deposit volatility, interest rate, government bill and bond rate as well as the lagged dependent variable. The measurements of these determinants in the context of bank-level study of excess liquidity are discussed in the following pages.

4.3.2.1 Standard Control Variables

Deposit volatility: Liquidity preference of banks was affected by the public expectations formation. This was found to be related with excess liquidity. Agenor et al. (2004) found this as one of the main factors that could explain the excess liquidity problem for the economy of Thailand. Larsen (1951) also identified this as a probable reason for excess liquidity. According to him, liquidity preference of banks was affected by public expectations. To analyse demand for liquidity of banks, volatility of depositors' cash preference should thus be taken into consideration. Saxegaard (2006) observed that currency withdrawal volatility, which was very similar to deposit volatility, could influence excess liquidity situation.

From Bankscope, the data of total deposits or total customer deposits could represent the concept of deposit. These measures could also represent concepts like excess savings (that was used by Gu and Zhang, 2006; Wang, 2006; McKinnon, 2006, 2007; Han and Chen, 2007; Roubini, 2007; Xia and Chen, 2007; Zheng and Yi, 2007; Chen, 2008) and low consumer spending (which was used by Qing, 2006; Jiao and Ma, 2007). Moreover, deposit volatility also represented the liquidity risk (Agenor et al., 2004) since the volatility of deposit might force banks to keep more liquid assets than required due to the uncertainty involved.

In this study, the volatility of deposit was measured by a 3-year period standard deviation of total deposit using the overlapping method. Reason for choosing the 3-year period was the short span of data availability as the maximum period of available data for each bank was 15 years. Through this

way, two observations were lost but still there were generally a series of 13 years of data for each bank.

Deposit rate: The deposit rate could affect the excess liquidity situation of the banks. If the deposit rate was high, people would be more interested in keeping their money in banks. Assuming everything else constant, this would lead to higher level of excess liquidity in the banking sector. Hence, it could be assumed that the deposit rate would be positively related with the excess liquidity situation of the banking sector. From Bankscope, the ratio of interest expense on customer deposits as a ratio of average customer deposits was taken to measure this variable.

Impaired loans: One possible reason of high impaired loans was risky environment. If banks faced problem of loan default, then they would be less encouraged towards lending which will lead towards less allocation of credit. Hence, the amount of impaired loans could lead to higher excess liquidity. Impaired loans as a ratio of gross loans data from Bankscope was taken to measure this determinant. This measure might also represent factors like weak contract enforcement and rule of law as well as imprudent lending.

Government bills and bonds: As discussed earlier, out of the total required reserve for each bank, some part was needed to be kept in cash. This was called the CRR. The rest could be put in cash or in government bills or bonds. Since these were risk free, so there was a tendency of banks to put part of their reserves in the government bills and bonds rather than opting for lending as that involved risk of default. The rate of these bills and bonds and their difference with the lending rate played a significant role on how much would be invested on these as well as the direction and significance of the relationship.

In this respect, the spread between the treasury bill rate and the lending rate was applied to see how it affected the excess liquidity situation. This measure involved both the rates that banks consider and decide whether to

invest or keep as liquid assets. Treasury bill rate for the 91-day bills was used to represent the government bills and bonds. Then the lending rate was deducted from this rate for each individual bank. The lending rate was proxied by the 'interest income/ average earning assets (%)' measure from Bankscope.

Lagged dependent variable: The lag of excess liquidity was used in some of the earlier studies of excess liquidity (e.g. Agenor et al., 2004; Saxegaard, 2006; Aikaeli, 2011). The reason for using this as one of the explanatory variables was that it takes into account both the contemporaneous and the lagged effects. Another argument for its inclusion was that the adjustments were unlikely to be instantaneous. Hence, one-year lag values of the dependent variable were taken as one of the explanatory variables.

Some other variables: Some variables that were used in earlier studies but not included in this work due to their similarity with one of the independent variables or the dependent variable are described here. The rate of required reserve was observed as one of the important variables in earlier studies. However, since the dependent variable in its definition deducts the mandatory reserve, hence the required reserve variable was not included as one of the explanatory variables. The concepts of 'excess savings', 'low consumer spending' and 'liquidity risk' could be measured by the same measure of 'deposit volatility' concept while the concept of 'weak credit growth in relation to domestic deposit growth' was very close to the concept of excess liquidity. Since deposit rate was used as an explanatory variable and lending rate was used to measure the spread from the treasury bill rate, so the 'lending rate' and 'interest rate spread' were not used separately. Different external factors like 'foreign reserve', 'export', 'foreign aid', 'oil revenue', 'foreign direct investment', 'exchange rate' and 'remittance' were described important in different earlier studies (e.g. Gilmour, 2005; IMF, 2005; Khemraj, 2006; Qing, 2006; Saxegaard, 2006; Jiao and Ma, 2007; Ma 2007; Bakani, 2012). At bank-level several of these are irrelevant. One measure that might be able to proxy

the variable of exchange rate was deposit rate since central bank could enforce a higher deposit rate for each bank to protect the economy from a weak exchange rate. Since deposit rate was used as one of the explanatory variables, exchange rate was not separately included in this study.

4.3.2.2 Key Variables of Interest

Financial liberalisation: In different works, financial liberalisation was represented by different variables or measures. Generally, easily available monetary aggregates such as M2 or M3 as a ratio of nominal GDP were widely used (Ang and McKibbin, 2007). Using dummy variable for financial liberalisation was also a very common practice. However, since financial liberalisation was a continuous process including many reversals, it was very difficult to capture this process with only a 0 or a 1. Moreover, it involved many processes together and also the process was an on-going one. Keeping this in mind, there has been a recent trend to build index of financial liberalisation where different processes of financial liberalisation were combined together and the magnitudes of those processes could also be incorporated (e.g. Williamson and Mahar, 1998; Bandiera and others, 2000; Edison and Warnock, 2003; Kaminsky and Schmukler, 2003; Laeven, 2003).

In one of these new initiatives, Abiad et al. (2010) formed an index of financial liberalisation where they distinguished seven different dimensions of financial liberalisation. These dimensions were: credit controls and excessively high reserve requirements, interest rate controls, entry barriers, state ownership in the banking sector, capital account restrictions, prudential regulations and supervision of the banking sector and securities market policy (these seven dimensions are discussed in detail in Appendix 4.5).

Following this, an index of financial liberalisation was constructed for Bangladesh for the period of 1997-2011. In every dimension, one or more questions were used and they were coded afterwards to see the overall impact of the financial liberalisation. In the first dimension of 'credit

controls and excessively high reserve requirements', the questions were: 1) Were reserve requirements restrictive? 2) Were there minimum amounts of credit that must be channeled to certain sectors? 3) Was any credit supplied to certain sectors at subsidised rates? 4) Were there in place ceilings on expansion of bank credit?

In the second dimension of 'interest rate liberalisation', deposit rates and lending rates were separately considered. Factors included if both deposit interest rates and lending interest rates were determined at market rates or they were fixed within a band.

'Banking sector entry', which was the third dimension, included the following four questions: 1) To what extent did the government allow foreign banks to enter into a domestic market? 2) Did the government allow the entry of new domestic banks? 3) Were there restrictions on branching? 4) Did the government allow banks to engage in a wide range of activities?

The fourth dimension of 'capital account transactions' included the questions of: 1) Was the exchange rate system unified? 2) Did a country set restrictions on capital inflow? 3) Did a country set restrictions on capital outflow?

The fifth dimension of 'privatisation' examined the magnitude of privatisation of banks. 'Securities markets', which was the sixth dimension, included the following two questions: 1) Had the country taken measures to develop securities markets? 2) Was the country's equity market open to foreign investors?

The last dimension of this index was the 'banking sector supervision'. This had four questions: 1) Had the country adopted a capital adequacy ratio (CAR) based on the Basel standard? 2) Was the banking supervisory agency independent from executives' influence? 3) Did a banking supervisory agency conduct effective supervisions through on-site and off-site

examinations? 4) Did the country's banking supervisory agency cover all financial institutions without exception?

As could be noted from the different dimensions and sub-dimensions, some of these were quantitative while some were qualitative. For the quantitative ones, the published data sources were used. Regarding the qualitative ones, different information from various sources was used for this purpose. After collecting all the information and providing a quantitative value for each one irrespective of whether they were quantitative or qualitative, they were checked with the Abiad et al. database of Bangladesh for the period available (1997-2005). It was found that this new database generally conformed to the Abiad et al. (2010) database.

One difference between the Abiad et al. (2010) index and financial liberalisation index measure of this study was that while Abiad et al. (2010) rescaled their dimensions in creating the final index, here the dimensions were not rescaled after summing up the values of each sub-dimension. The reason behind not rescaling was that this could suppress the effects of the process of financial liberalisation and then the estimates would not fully reflect the effects of this process.

Bank typology: To see if there were any effect of different types of banks on excess liquidity due to the process of financial liberalisation, the banks in Bangladesh in this study were classified according to ownership (whether owned by the government or private), size (whether they have assets over \$1 billion or not), mode of operation (whether run according to Islamic principles of banking or otherwise) and age (whether they were new or old). Although there was no universal definition for the classification of bank size, the rule followed in this study has also been used in many earlier studies (e.g. Cole et al., 2004) including works on Bangladesh (e.g. Cihak and Hesse, 2008). If (and when) banks have assets over \$1 billion, the size

dummy was 1 and 0 otherwise¹⁸. There can be other approaches such as classifying them as big or small on the basis of data at the beginning of the sample, or at the end of the sample, or as averages over the entire sample. However, the approach taken in this study was more reflective of the actual situation as with this approach, there were some banks which have value of 0 in some years and 1 in some other years as they moved from small to large. For banks which remain either in the large or in the small category, have one static value (of either 0 or 1) for the whole study period. For the ownership dummy, the value of 1 was taken if the bank was owned by the state and 0 otherwise. For the dummy value for mode of operation, it was 1 if it operates according to the Islamic principles of banking and 0 otherwise¹⁹. For the age dummy the value was 1 if they were in the new category (established after 1990) and 0 otherwise. All these dummy values were multiplied by the financial liberalisation index value and these multiplied variables were used in the estimation. A table was given here based on the above characteristics.

Earlier works on holding liquid assets started where the cost of having or holding liquid assets, which had lower return than other investments, was compared with the risks of running out (Baltensperger, 1980; Santomero, 1984). This implied that if the risk of running out was higher, then banks would incur the cost of holding excess liquidity. Therefore, excess liquidity situation and decision of bank would depend on the opportunity cost of holding liquid assets. According to the newer generation of models, market imperfections play a key role for banks being unable to raise instantaneous and unlimited amounts of liquidity. These imperfections were generally referred to as moral hazard (Holmstrom and Tirole, 1998) or adverse selection (Kiyotaki and Moore, 2008). Therefore, financially constrained banks would try to have more liquidity.

¹⁸ Due to the growth of the banking sector, many banks moved from small to large category over the study period. Each bank was categorised accordingly by giving a value of 0 when their assets was less than \$1 billion while 1 when they cross this mark.

¹⁹ There are some banks which had some branches or sections operating under Islamic principles of banking. In this study, only those banks were included under Islamic banking category which used Islamic principles of banking throughout.

Table 4.2: Bank classifications

Sl. No.	Name of bank	Bank ownership	Bank size	Bank mode of operation	Bank age	Year of start
1.	AB Bank	Private	Small to Large	Conventional	Old	1982
2.	Agrani Bank	Public	Large	Conventional	Old	1971
3.	Al-Arafah Islami Bank	Private	Small to Large	Islamic	New	1995
4.	Bangladesh Commerce Bank	Public	Small	Conventional	New	1999
5.	Bangladesh Development Bank	Public	Small	Conventional	Old	1971
6.	Bangladesh Krishi Bank	Public	Small to Large	Conventional	Old	1971
7.	Bank Asia	Private	Small to Large	Conventional	New	1999
8.	BASIC Bank	Public	Small	Conventional	Old	1988
9.	BRAC Bank	Private	Small to Large	Conventional	New	2001
10.	City Bank	Private	Small to Large	Conventional	Old	1983
11.	Dhaka Bank	Private	Small to Large	Conventional	New	1995
12.	Dutch Bangla Bank	Private	Small to Large	Conventional	New	1996
13.	Eastern Bank	Private	Small to Large	Conventional	New	1992
14.	EXIM Bank	Private	Small to Large	Islamic	New	1999
15.	First Security Islami Bank	Private	Small to Large	Islamic	New	1999
16.	ICB Islamic Bank Limited	Private	Small	Islamic	Old	1987
17.	IFIC Bank	Private	Small to Large	Conventional	Old	1983
18.	Islami Bank Bangladesh	Private	Small to Large	Islamic	Old	1983
19.	Jamuna Bank	Private	Small to Large	Conventional	New	2001
20.	Janata Bank	Public	Large	Conventional	Old	1971
21.	Mercantile Bank	Private	Small to Large	Conventional	New	1999
22.	Mutual Trust Bank	Private	Small	Conventional	New	1999
23.	National Bank	Private	Small to Large	Conventional	Old	1983
24.	NCC Bank	Private	Small to Large	Conventional	New	1993

Sl. No.	Name of bank	Bank ownership	Bank size	Bank mode of operation	Bank age	Year of start
25.	One Bank	Private	Small	Conventional	Old	1999
26.	Premier Bank	Private	Small	Conventional	Old	1999
27.	Prime Bank Limited	Private	Small to Large	Conventional	Old	1995
28.	Pubali Bank	Private	Small to Large	Conventional	Old	1983 *
29.	Rupali Bank	Public	Small to Large	Conventional	Old	1971
30.	Shahjalal Islami Bank	Private	Small to Large	Islamic	Old	2001
31.	Social Islami Bank	Private	Small to Large	Islamic	Old	1995
32.	Sonali Bank	Public	Large	Conventional	Old	1971
33.	Southeast Bank	Private	Small to Large	Conventional	Old	1995
34.	Standard Bank	Private	Small	Conventional	Old	1999
35.	Trust Bank	Private	Small	Conventional	Old	1999
36.	United Commercial Bank	Private	Small to Large	Conventional	Old	1983
37.	Uttara Bank	Private	Small to Large	Conventional	Old	1983 *

Source for size: Defined according to total asset data from Bankscope.

Source for ownership, mode of operation and age: BB Annual Report, various issues.

*Uttara Bank and Pubali Bank were denationalised to operate as Private Commercial Bank.

Note: Small to Large means that asset of the bank was lower than \$1 billion at the beginning but crossed the threshold at some point during this period.

Earlier works on holding liquid assets started where the cost of having or holding liquid assets, which had lower return than other investments, was compared with the risks of running out (Baltensperger, 1980; Santomero, 1984). This implied that if the risk of running out was higher, then banks would incur the cost of holding excess liquidity. Therefore, excess liquidity situation and decision of bank would depend on the opportunity cost of holding liquid assets. According to the newer generation of models, market imperfections play a key role for banks being unable to raise instantaneous and unlimited amounts of liquidity. These imperfections were generally referred to as moral hazard (Holmstrom and Tirole, 1998) or adverse selection (Kiyotaki and Moore, 2008). Therefore, financially constrained banks would try to have more liquidity.

Based on these models, bank characteristics, such as bank size and ownership, could affect their ability to raise non-deposit forms of finance. For example, small banks had more difficulties in accessing capital markets while public banks were less liquidity-constrained than private banks, as public banks might have an implicit guarantee. This would affect the banks' precautionary demand for liquidity buffers.

Kashyap and Stein (1997) and Kashyap et al. (2002), using a large panel of US banks, found a strong effect of bank size on holdings of liquid assets with smaller banks being more liquid as they face constraints in accessing capital markets. Dinger (2009) also found that smaller Eastern European banks hold more liquidity. However, Aspachs et al. (2005) did not find any significant relationship between excess liquidity and bank size in their panel study of 57 UK resident banks.

Bank age might also be related to performance, since bank production²⁰ might follow the 'learning by doing' hypothesis (Mester, 1996). This would imply that over time, performance of banks would improve as they would learn new things and would adapt to the changing environment more than before. However, it might also happen that efficient management might become less prominent at some stage and opt for a less proactive style, leading to a decrease in efficiency (Esho, 2001). If the latter effect dominates then the age variable should display a positive coefficient.

Staikouras et al. (2007) found that the coefficient of the age variable was positive and statistically significant in all specifications, in contrast to the 'learning by doing' hypothesis, as identified by Mester (1996), DeYoung and Hasan (1998) and Kraft and Tirtiroglu (1998). They also mentioned that older banks were mostly formerly state-owned.

²⁰Banks' ability to ameliorate informational asymmetries between borrowers and lenders and their ability to manage risks are the essence of bank production (Hughes and Mester, 1998). These abilities are integral components of bank output and influence the managerial incentives to produce financial services prudently and efficiently.

Demetriades and Fielding (2009) found that, for very young banks, raising deposits was likely to be easier than identifying reliable borrowers. Older banks were likely to have more information so that their ability to screen borrowers was likely to be better than that of younger banks.

DeYoung (1999) found that bank age influenced the risk of small-bank failure, especially if the banks were three to five years old because it took some time for profits to reach a sustainable levels. Amel and Prager (2013) measured this variable as the number of years since the bank opened. They found it negative and significant for most cases in the rural regions, but its sign varied over time in urban markets.

It was observed in different studies that Islamic banks generally had less excess liquidity than the conventional banks (Gafoor, 1995; Siddiqui, 2013). Initially this was due to less people being attracted towards this new banking system to deposit money. On the other hand, Islamic banking system had fewer instruments than the conventional banking to lend money (Siddiqui, 2013). Over time, more people became interested in the Islamic system of banking and the difference between this type of banking with conventional banking reduced significantly. However, like the conventional banks, Islamic banks in Bangladesh were also suffering from this problem of excess liquidity.

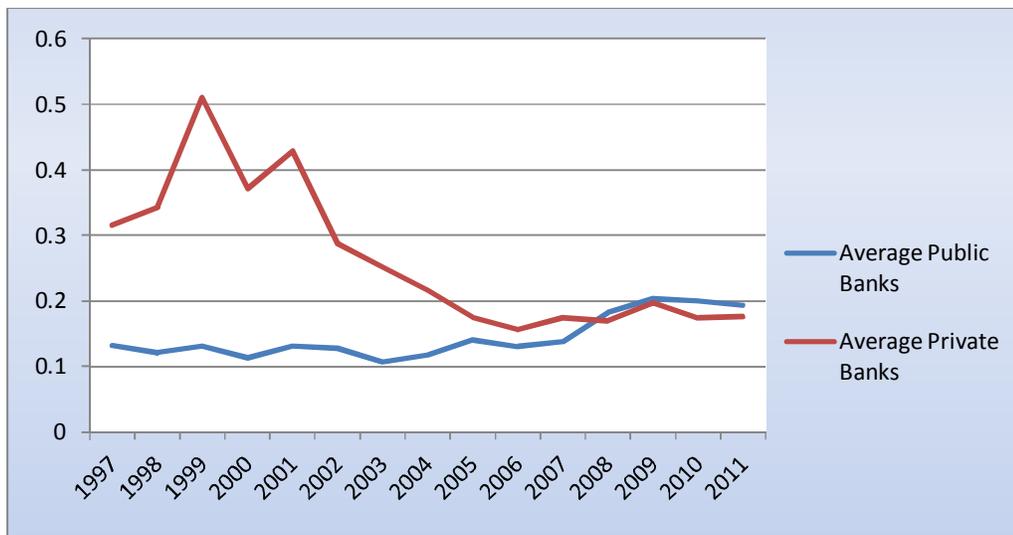
4.3.3 Variations According to Bank-specific Characteristics

Two different strategies were applied here to see if there were any possible differences in excess liquidity according to bank-specific characteristics of ownership, size, mode of operation and age. Firstly, various graphs of the time-evolution of average excess liquidity were drawn splitting the data based on these characteristics. These were done separately as the characteristics were not exclusive from each other. Therefore, four separate graphs were drawn to see visually if there were any variations among them. Secondly, statistical tests were applied according to these characteristics to see if they differed from each other. These tests included both nonparametric and parametric tests.

4.3.3.1 Variations According to Graphs

Figure 4.1 shows the excess liquidity for public and private banks.

Figure 4.1: Excess liquidity according to ownership



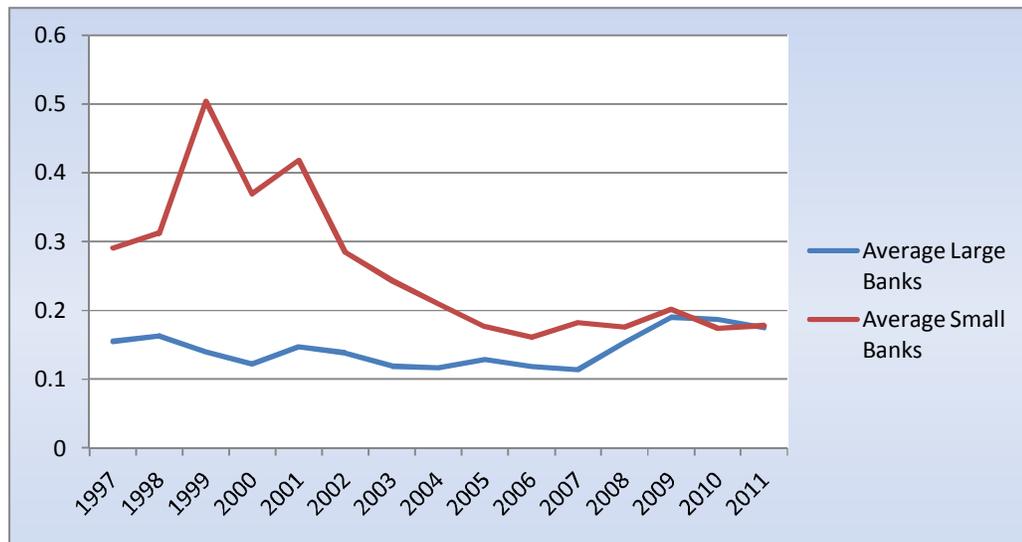
Sources: Author's own calculation based on data from Bankscope and Bangladesh Economic Review, various issues.

It could be seen from the figure that there were differences in excess liquidity between public and private banks. The gap increased in the late 90's but started converging from the early 2000. They remained quite close from 2005 onwards. It could also be observed that while the private banks experienced a fluctuating pattern, the public banks had a rather steady pattern over the period.

Large and Small Banks

Figure 4.2 shows if there was any difference between large and small banks. It could be seen from the figure that there was difference between large and small banks also and the trend was quite similar with the gap increasing in the late 90's but starting to converge from the early 2000s. They remained quite close from 2005 onwards. It could also be observed that while the large banks experienced a fluctuating pattern, the small banks had a rather steady pattern over the period.

Figure 4.2: Excess liquidity according to size

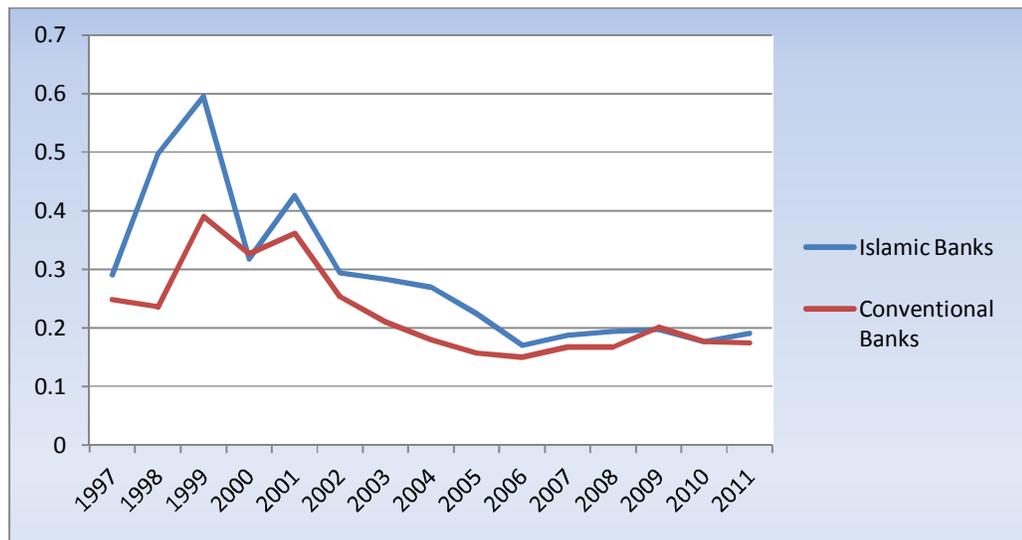


Sources: Author's own calculation based on data from Bankscope and Bangladesh Economic Review, various issues.

Islamic and Conventional Banks

In contrast to the earlier two characteristics, Figure 4.3 showed that excess liquidity of Islamic banking and conventional banking was quite similar.

Figure 4.3: Excess liquidity according to mode of operation



Sources: Author's own calculation based on data from Bankscope and Bangladesh Economic Review, various issues

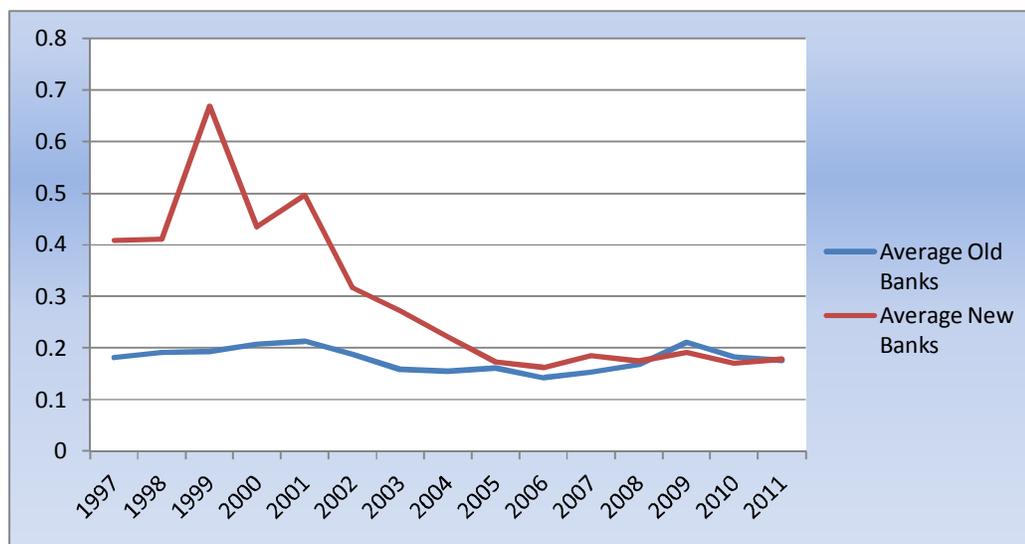
Although the gap increased in the late 1990s, they remained quite close from 2000 onwards. The trend of their change also remained quite similar

over these years where increase and fall followed a very analogous pattern. However, the pattern of the conventional banks fluctuated less than that of the Islamic banks.

New and Old Banks

The characteristic of age seemed to follow a similar pattern of differences as were observed for ownership and size. Starting with a substantial gap at the beginning of the study period, the gap increased substantially. However, over the years it fell markedly and remained quite close from 2005 onwards. It could also be observed that while the new banks experienced a fluctuating pattern, the old banks had a rather steady pattern over the period.

Figure 4.4: Excess liquidity according to age



Source: Author's own calculation based on data from Bankscope and Bangladesh Economic Review, various issues.

4.3.3.2 Statistical Tests for Difference among Bank Typologies

Two types of statistical tests were carried out in addition to the graphical representation above. The first type of test was a non-parametric test while the second type of test was a parametric test. The non-parametric test applied was the Wilcoxon rank-sum test whereas t-test was applied as the parametric test.

The Wilcoxon rank-sum test, also called the Wilcoxon Mann-Whitney test, was a nonparametric test for assessing whether two samples of observations came from the same distribution. This was applied for two unmatched group of observations (Wilcoxon, 1945; Mann and Whitney, 1947). The null was that the two populations had identical distribution functions against the alternative hypothesis was that the two distribution functions differed²¹.

It is one of the most powerful nonparametric tests. This test does not require the assumption that the differences between the two samples be normally distributed. It was also frequently used as an alternative of the two sample t-test when the normality assumption was questionable²². Janusonis (2009) stated that Wilcoxon test should not be applied if one group had 3 and the other group had 3 or 4 cases and t-test was better with sample size of $N = 3$ or $N = 4$. Posten (1982) found that for sample sizes of as small as 5 per group, Wilcoxon test had the highest statistical power²³.

For the Wilcoxon rank-sum test, there were two independent random variables, X_1 and X_2 , and the following null hypothesis of $X_1 \sim X_2$ was tested with a sample size of n_1 for X_1 and n_2 for X_2 . In this test, the null hypothesis was that there was no difference between the two (unmatched) groups. If the null was rejected (when the probability was less than 10% or 0.1), then it implied that there was significant difference between the groups.

The results of the Wilcoxon rank-sum test across bank typologies were given below with the null hypothesis that there was no difference between two groups. Here, excess liquidity was the ranking variable.

²¹ The Mann-Whitney-Wilcoxon (MWW) U-test was an extension of the Wilcoxon (1945) test that was developed for equal sample sizes.

²² The following website contained further details:

<http://www.stats.gla.ac.uk/steps/glossary/nonparametric.html#wmwt>

²³ For detailed discussion and comparison between these tests, see de Winter (2013).

The Wilcoxon rank-sum test results showed that the null of no difference for ownership typology was rejected implying that there was difference between public and private banks in terms of excess liquidity. Similar findings were observed for both size and age typology suggesting that there was variation between large and small banks as well as between new and old banks. However, the null for the mode of operation typology was not rejected implying that there was no significant difference between Islamic and conventional banks in terms of excess liquidity.

Table 4.3: Wilcoxon rank-sum test results for bank typologies of ownership, size, mode of operation and age

Typology	Ownership	observation	rank sum	expected	H ₀ : no difference between two (unmatched) groups
Ownership	Private	30	649	570	3.064 (0.0022)
	Public	7	54	133	
Size	Large	6	207	114	3.132 (0.0017)
	Small	31	496	589	
Mode of operation	Islamic	7	166	133	-1.280 (0.2006)
	Conventional	30	537	570	
Age	New	21	277	399	3.740 (0.0002)
	Old	16	426	304	

The parametric tests applied here was the t-test. The results of the t-test conform to the findings of the Wilcoxon rank-sum test, showing that there were differences for all the bank-specific characteristics except the mode of operation typology.

The results of this test are provided here. The results showed that the coefficient of ownership, age and size were significant at 1% level while that of the mode of operation was not.

Table 4.4: t-test results for excess liquidity according to ownership, size, mode of operation and age

Typology	Coefficient	Standard error	z	P > z	95% confidence interval	
Ownership	-0.114	0.027	-4.23	0.000	-0.166	-0.061
Size	-0.108	0.030	-3.60	0.000	-0.167	-0.049
Mode of operation	0.049	0.033	1.49	0.137	-0.015	0.113
Age	0.099	0.020	4.97	0.000	0.060	0.138

4.4 METHODOLOGY

This study used panel data. This type of data has three main advantages over cross-section data. Firstly, it can exploit both cross-section and time series variation in the data. Secondly, this technique can control for the presence of unobserved firm-specific factors (in this case, bank-specific factors). Finally, this approach can also address the problem of potential endogeneity of the regressors (Verbeek, 2004).

In this panel data analysis, there might be unobserved bank-specific time-invariant heterogeneity, which could bias the estimates if not properly accounted for. This was due to the fact that the error term might contain time varying bank-specific characteristics which might be correlated with banks' liquidity ratios. Another issue was potential endogeneity of some of the explanatory variables.

These concerns could be addressed with the GMM proposed by Arellano and Bond (1991), Arellano and Bover (1995) and recently extended by Blundell and Bond (2000) and Bond (2002). This method was particularly appropriate to address the dynamic panel bias that arised in the presence of lagged dependent variables in samples with a large number of groups (N) and a relatively small number of time periods (T), such as in this study. This method also helped to overcome the weak instrument problem (past

changes do contain information about current levels), and resulted in improvements in the efficiency of the estimates (Arellano and Bond, 1991; Roodman, 2006).

Another advantage of this framework was that it helped to control for potential biases induced by endogeneity (the correlation between the lagged dependent variable and the error term) which was inherent in the specification because of the inclusion of lagged dependent variables as regressors.

However, Roodman (2009) argued that the system GMM could generate moment conditions prolifically, in which case, too many instruments in the system GMM overfits endogenous variable and weakens the Hansen test of the instruments' joint validity. Following Zulkefly et al. (2010), this study adopted two techniques to remedy the problem of instruments proliferation. First, not all available lags for instruments were used. Second, instruments were combined through addition into smaller sets by collapsing the block of the instrument matrix. This technique was also used by Calderon et al. (2002), Cardovic and Levine (2005) and Roodman (2009), among others.

The study used two-step system GMM estimation. Zulkefly et al. (2010) argued that the success of the GMM estimator in producing unbiased, consistent and efficient results was highly dependent on the adoption of the appropriate instruments. Therefore, the following two specifications tests were conducted as suggested by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). Firstly, the Hansen test of overidentifying restrictions, which test the overall validity of the instruments by analysing the sample analogue of the moments conditions used in the estimation process. If the moment condition holds, then the instrument was valid and the model is correctly specified. Secondly, the nonserial correlation among the transformed error term was tested. The AR(2) test for serial correlation was used for this.

Duprey (2013) mentioned that system GMM also has, among others, the following advantages:

- (i) It can limit the number of missing observations by using the forward orthogonal deviation transform instead of the first difference transformation, and
- (ii) The use of the collapsed option was allowed which help to avoid the proliferation of instruments, as all available lags were used as internal instruments.

The estimated equation in this study mainly stemmed from the earlier works of Agenor et al. (2004) and Saxegaard (2006). Additionally, financial liberalisation index was added to see how it was related with excess liquidity. Furthermore, interaction of bank typologies (BT) with the financial liberalisation variable was included to see if there was any difference in the behaviour of banks according to their characteristics. The main equation of excess liquidity to be estimated in this study can be simply written as:

$$EL_{it} = \alpha_0 + \alpha_1 EL_{i,t-1} + \beta_1 DV_{it} + \beta_2 INT_{it} + \beta_3 TBR_{it} + \beta_4 IL_{it} + \beta_5 (FL_t) + \beta_6 (FL_t \times BT_{it}) + \varepsilon_{it} \quad (4.1)$$

The above equation explains effect at bank-level on excess liquidity where EL represented excess liquidity, DV was for deposit volatility, INT showed interest rate, government bill and bond was given by TBR , impaired loan was represented by IL , FL expressed financial liberalisation index and BT showed different bank typologies (ownership, size, mode of operation and age). The interaction terms of FL and BT showed bank typologies based on bank-specific characteristics interacted with the financial liberalisation index. Banks were represented by subscript i and t was showing year.

The above model can be rewritten in a panel data framework in matrix notation in the following way:

$$y_{it} = \alpha_0 + \alpha_1 y_{i,t-1} + \beta x'_{it} + \varepsilon_{it} \quad (4.2)$$

Here excess liquidity was shown with vector y and was denoted as y_{it} which implied excess liquidity of bank i in year t ; α_1 was a parameter to be estimated with respect to the lagged dependent variable (excess liquidity); x'_{it} was a $(1 \times k)$ vector of regressors, β was a $(1 \times k)$ vector of parameters to be estimated and ε_{it} was the stochastic disturbance term.

According to the literature, when numerous individual units were observed over time, specifying the stochastic nature of the disturbances became conceptually difficult (Nerlove, 1971). For example, some of the 'omitted variables' might reflect factors which were peculiar to both the individual banks as well as the time periods for which the observations were obtained. Others may reflect only those bank-specific differences which affect the observations for a given bank while some variables may represent factors which were peculiar to specific time periods (Owusu-Gyapong, 1986).

Nerlove (1971) observed that if these unobservable 'other effects' were not taken account of in the estimation process and ordinary least squares method was applied to equation (4.2), then the estimates of the β 's in this equation might be both biased and inefficient. Therefore, equation (4.2) needed to be transformed to the following error component model to include these other causal variables:

$$y_{it} = \alpha_0 + \alpha_1 y_{i,t-1} + \beta x'_{it} + \varepsilon_{it} \quad (4.3)$$

where,

$$\varepsilon_{it} = \mu_i + v_{it} = y_{it} - \alpha_0 - \alpha_1 y_{i,t-1} - \beta x'_{it} \quad (4.4)$$

and,

$$E[\mu_i] = E[v_{it}] = E[\mu_i + v_{it}] = 0 \quad (4.5)$$

Here, μ_i denote the unobservable individual specific effects and was time-invariant, accounting for the special effects that were not included in the model - the fixed effects. The remainder disturbance varies with both individual and time - the idiosyncratic shock. The error of the model ε_{it}

therefore becomes the sum of μ_i , the individual specific effects, and v_{it} , the well-behaved error component. It was assumed that μ_i and v_{it} were independent for each i over all t .

Although there were various methods of estimation for panel data, over time it has been observed that the system Generalised Method of Moments (system GMM)²⁴ was superior to the fixed effects and the random effects methods. There were some advantages of Generalised Method of Moments over other panel estimators for specific cases. Firstly, this method does not need distributional assumptions like normality. Secondly, heteroscedasticity of unknown form was allowed in this model. Thirdly, even if the model was not solvable analytically from the first order condition, still the method can estimate the parameters (Verbeek, 2004).

From the above discussion, it could be concluded that the most appropriate method was system GMM for the type of model (dynamic with short time dimension) used in this study (Blundell and Bond, 1998). This method was also applied in several empirical studies of similar types. This included works of Cottarelli et al. (2003), IMF (2004) and Louzis et al. (2011).

If the lagged dependent variable was included to account for dynamics in the process, then, methods like OLS, FE or Within Group (WG) estimators contained some limitations. If OLS was applied, then the estimator would be biased due to the presence of lagged dependent variables as one of the explanatory variables. The bank-specific effects could be accounted for by the FE or WG estimator but they would remain biased in the presence of lagged dependent variables. This study therefore used the system GMM estimator developed for dynamic panel data estimation²⁵.

²⁴ System GMM is proposed and continuously developed with the pioneer works of Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998) and Blundell et al. (2000).

²⁵ For a more detailed description, see the works of Arellano and Bover (1995), Blundell and Bond (1998), Baltagi (2001), Bond et al. (2001), Woolridge (2002) and Roodman (2009), among others.

The GMM estimator that combined the moment conditions for the differenced model with those for the levels model was called the SYSTEM estimator (Blundell and Bond, 1998). It was shown to perform better (less bias and more precision), especially when the series were persistent. The system GMM was developed as a superior estimator as it controlled for the firm-specific effects as well as the bias caused by the inclusion of the lagged dependent variable. Moreover, system GMM combined the standard set of equations in first-differences with suitably lagged levels as instruments, with an additional set of equations in levels with suitably lagged first-differences as instruments. This was different from the first-difference GMM approach discussed by Arellano and Bond (1991). In system GMM, the unobserved fixed effects (μ_i) were removed by taking first difference of equation (4.3) and obtaining the following equation:

$$\Delta y_{it} = \Delta y_{i,t-1} + \beta \Delta x'_{it} + \Delta v_{it} \quad (4.6)$$

Additionally, the right hand side variables were instrumented using lagged values of regressors. The equations in first differencing (equation 4.6) and in levels (equation 4.3) were jointly estimated in a system of equations. It was assumed that the error term v_{it} was serially uncorrelated and the regressors x_{it} were endogenous. Therefore valid instruments for the equation in first difference were levels of series lagged two periods (Blundell and Bond, 1998).

For diagnostic checks, the validity of the instruments was tested using the Hansen test of overidentifying restrictions. A test for the absence of serial correlation of the residuals was also applied using the tests of autocorrelation which was important due to the fact that the error term was not serially correlated.

System GMM estimation could be based either on a one-step or a two-step estimator. The two-step estimator was asymptotically more efficient in presence of heteroscedasticity of the error term ε_{it} . However, Monte Carlo simulation showed that standard errors associated with the two-step

estimates were downward biased in small samples (Arellano and Bond, 1991; Blundell and Bond, 1998).

For this reason, the one-step system GMM estimator was believed to be more efficient when the errors were homoscedastic and not correlated over time. As a result, the one-step system GMM estimator, with standard errors corrected for heteroscedasticity, was preferred by researchers than the two-step system GMM estimator. But in a recent development by Windmeijer (2005), who devised a small-sample correction for the two-step standard errors, reported that the two-step system GMM perform somewhat better than one-step system GMM in estimating coefficients, with lower bias and standard errors. Moreover, the reported two-step standard errors were quite accurate with this correction. Consequently, the two-step estimation with corrected errors was considered to be modestly superior to robust one-step estimation and applied in this study.

The data of this study comprised bank-level information of the banking sector in Bangladesh with annual data for the period of 1997-2011. STATA (version 13.1) was generally used for the estimation of applying system GMM to an original panel dataset of $N \times T = 37 \times 15 = 555$ observations. The system GMM estimator was more suitable to datasets with small T and large N observations. Another advantage of the system GMM estimator was that it addresses the problem of possible unit root since it used first differenced models. As a result, if there was a problem of unit root, it would become stationary after first difference.

4.5 SOURCES OF DATA

This bank-level study had mainly used the Bankscope database. The treasury bill rate data was collected from various issues of annual reports published by the Bangladesh Bank. Some of them were also taken from the paper of Ahmed and Islam (2004).

Although most of the banks had 15 years of data but there were some banks for which 15 years of data were not available. In some cases, there

was some missing years inside the series. Out of 38 banks (excluding the foreign banks), data were available in Bankscope for 37 banks. Due to data unavailability, data of 37 out of a possible 47 banks were taken in this study. However, it should be noted that the 37 banks included in the study represented the banking sector in Bangladesh very well since they accounted for more than 99 per cent of bank branches as well as more than 90 per cent of assets and deposits of the 47 banks (Bangladesh Bank Annual Report, 2013). A more detailed discussion on these is provided in Appendix 4.6 along with graphs and tables. A detailed description of data availability is provided in Appendix 4.1.

Regarding the form of data, it was available in consolidated or unconsolidated²⁶ or in both forms. For Bangladesh, it was available in both consolidated and unconsolidated forms for 18 banks, available only in unconsolidated forms for 16 banks and available only in consolidated forms for 3 banks. Since the unconsolidated data availability was greater, so most of the data were taken in unconsolidated forms. Consolidated forms were taken when only they were available and contained more data. This was in line with the literature (Ehrmann et al., 2001; Cihak and Hesse, 2008)²⁷.

4.6 EMPIRICAL RESULTS

4.6.1 Data

To provide some basic idea, a correlation matrix is presented between the dependent variable and the explanatory variables in Table 4.5. The most important observation from this table was that the correlations among the right hand side regressors were low and therefore there was no concern of multicollinearity.

²⁶ According to Bankscope (2014), “A consolidated statement is the statement of a bank integrating the statements of its subsidiaries” while it defined unconsolidated statement as “A statement not integrating the possible subsidiaries of the concerned bank.” Although it was true that consolidated data could reflect activities in several countries if any bank operated across countries and was crucial to take into account in a study, but it was observed that most banks in Bangladesh do not operate abroad and the advantage of Bankscope database was that if any bank operated abroad, then their entities were given separately.

²⁷In their paper, Ehrmann et al. (2001) used consolidated data whenever available and unconsolidated data otherwise.

Table 4.5: Correlation matrix of excess liquidity and the dependent variables

	Excess liquidity (EL)	Lag of EL (LagEL)	Deposit volatility (DV)	Deposit rate (DR)	Govt. bills & bonds (GBB)	Impaired loans (IL)	Financial liberalisation (FL)
EL	1.0000	---	---	---	---	---	---
Lag EL	-0.4830*	1.0000	---	---	---	---	---
DV	0.1901*	-0.1595*	1.0000	---	---	---	---
DR	-0.1731*	0.3176*	0.1338*	1.0000	---	---	---
GBB	0.0850	-0.0995*	0.4498*	0.2316*	1.0000	---	---
IL	0.1467*	-0.3410*	-0.2484*	-0.5636*	-0.2854*	1.0000	---
FL	0.1854*	-0.2518*	0.1557*	0.0486	0.2426*	-0.0993	1.0000

* Significant at 5% level.

4.6.2 Discussion of Results

The excess liquidity of banks in Bangladesh was estimated applying the two-step system GMM. All the variables were taken in log form except the bank typology variables. Flexibility in taking both actual and log values of the explanatory variables were evident from earlier works (Levine et al., 2000; Hauk Jr. and Wacziarg, 2009; Roodman, 2009; Jayasuriya and Burke, 2013). The typology variables were not taken in a simple form but they were taken in an interaction form where each typology was multiplied by the financial liberalisation variable.

From Table 4.6, it could be observed from the Hansen test that there was no identification problem. The Arellano-Bond (1991) test of autocorrelations showed, with the values of AR(2) test, that there was no problem of autocorrelation. The Wald test, which was equivalent to the F-test, showed that the overall results were significant for all cases.

The main variable of interest in this analysis was the variable of financial liberalisation. As discussed earlier, financial liberalisation could have both positive and negative effect on the excess liquidity situation in the banking sector.

Table 4.6: EL estimates applying two-step system GMM

Variable	Coefficient
LagEL	0.766*** (0.107)
DV	0.047** (0.019)
DR	0.140** (0.060)
IL	0.021* (0.012)
FL	1.039** (0.507)
Wald chi2 (7)	436.28 (0.000)
Hansen Test	0.08 (0.779)
Sargan Test	0.14 (0.708)
Test for AR (1) errors	-4.19 (0.000)
Test for AR (2) errors	-0.72 (0.470)
No. of banks	37
No. of observations	337

Note 1: The FL variable here was constructed following the Abiad et al. index of financial liberalisation.

Note 2: Standard errors were in parentheses to the right of the respective estimated coefficients. In the lower part of the table, the probability values were given in parentheses.

* Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

The result showed that there was significant positive relationship between financial liberalisation and excess liquidity situation for the banking sector in Bangladesh. It was positive and significant (1.039).

Deposit volatility was another important determinant as observed from earlier studies. This variable was generally found to be positively affecting the excess liquidity situation. Agenor et al. (2004), Larsen (1951) and Saxegaard (2006) also found similar results. This was also found significant in this study with a coefficient value of 0.047.

Another explanatory variable that was found in the literature on excess liquidity was deposit rate²⁸. This variable was also found to be significantly and positively related with a value of 0.140. This meant that with higher

²⁸ Islamic banks do not have any pre-announced interest rate as their rate of profit or loss is calculated after the period. Information of this rate is available for the Islamic banks along with other banks in Bankscope and is used in this study.

deposit rate, banks would have more deposit and with higher deposit rate, chances were that lending rates would be higher. In these circumstances, the demand for loans would be lower. As mentioned earlier, deposits would be high, implying overall higher amount of excess liquidity.

Impaired loans variable, which represented risky environment in terms of loan default, was positive and significant. If banks feel that there is possibility of loan default, then they would be less interested in lending and thereby leading to higher amount of excess liquidity. The positive and significant value (0.021) for this variable justified the above view for the banking sector in Bangladesh.

The results showed that the lagged dependent variable was significant. From the positive value of the coefficient, it can be concluded that the previous year's excess liquidity significantly affected the present excess liquidity along with other explanatory variables which were found to be significant.

Government bills and bonds could affect the excess liquidity situation positively if this rate was higher than the lending rate as banks would keep their funds in these bills. However, unlike in some other countries, this rate (proxied by the 91-day treasury bill rate) was lower than the lending rate in Bangladesh. This explained the insignificant (though negative) results of this variable for different regressions.

One important feature of this study was the application of bank typology variable. Different bank typologies were used to see if there were any differences according to different bank-specific characteristics in terms of excess liquidity with the financial liberalisation. For this, interaction variables were taken where the financial liberalisation values were multiplied by the dummy values of bank typologies according to their definitions.

Table 4.7: EL estimates applying two-step system GMM with bank typologies

Variable	Ownership	Size	Mode of operation	Age
	Coefficient	Coefficient	Coefficient	Coefficient
LagEL	0.796*** (0.222)	0.899*** (0.225)	0.820*** (0.240)	0.908*** (0.223)
DV	0.054* (0.031)	0.071** (0.029)	0.058* (0.032)	0.080*** (0.029)
DR	0.220** (0.106)	0.250** (0.098)	0.214** (0.098)	0.248** (0.108)
TBR	0.003 (0.022)	-0.014 (0.025)	0.002 (0.021)	-0.005 (0.024)
IL	0.058** (0.029)	0.067** (0.030)	0.063* (0.032)	0.069** (0.031)
FL	1.170** (0.551)	1.278** (0.621)	1.147** (0.536)	1.157** (0.576)
Public* FL	0.241*(0.137)	---	---	---
Large* FL	---	0.185 (0.179)	---	---
Islamic* FL	---	---	0.020 (0.124)	---
New* FL	---	---	---	-1.272* (0.770)
Wald chi2 (7)	94.45 (0.000)	91.35 (0.000)	81.21 (0.000)	105.59 (0.000)
Hansen Test	1.70 (0.637)	2.69 (0.442)	1.60 (0.658)	2.09 (0.553)
Sargan Test	1.13 (0.770)	2.33 (0.507)	1.00 (0.802)	1.74 (0.628)
Test for AR (1) errors	-2.29 (0.022)	-2.55 (0.011)	-2.24 (0.025)	-2.54 (0.011)
Test for AR (2) errors	0.20 (0.838)	0.26 (0.792)	0.22 (0.826)	0.32 (0.745)
No. of banks	37	37	37	37
No. of observations	283	282	283	282

Note 1: The FL variable here was constructed following the Abiad et al. index of financial liberalisation. The typology variables were taken in dummy form of 0-1 scale.

Note 2: Robust standard errors were in parentheses to the right of the respective estimated coefficients. In the lower part of the table, the probability values were given in parentheses.

* Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

For private banks, 1 per cent increase in financial liberalisation led to an increase of 1.170 while it was even higher for public banks (1.411). Similarly, small, conventional and old banks also experienced significant increase of 1.278, 1.147 and 1.157 respectively for a 1 per cent rise in financial liberalisation. New banks differed significantly from old banks and had lower percentage change (1.272) in excess liquidity. Large and Islamic banks did not experience significant difference to small and conventional

banks respectively. Overall, the results showed that excess liquidity increased for all banks which was in contrast to the theory forwarded by the McKinnon-Shaw hypothesis where one of the aims of financial liberalisation hypothesis was to remove all shortcomings of lending and allocate credit freely which in turn should reduce excess liquidity²⁹.

The 'ownership' variable showed that the effect of financial liberalisation was higher for public banks than private banks. The state-owned banks having higher excess liquidity could be due to large number of staffs and lack of technological approach. However, excessive staff and lack of technological approach would have caused excess liquidity even without financial liberalisation. Therefore, a more plausible explanation of why public banks increased their excess liquidity more than other banks could be due to the fact that the financial liberalisation along with all its policies made the environment risky and uncertain. As observed by many studies before, public banks were usually less efficient than private ones and hence, they were less able to cope with this situation than their counterpart and therefore ended up having higher excess liquidity.

The 'age' variable showed that the effect of financial liberalisation was lower for new banks than old banks. This meant that new banks coped with the risky environment better and thereby had less excess liquidity. This could be as a result of the higher efficiency of these banks due to their modern approach applying latest technologies of banking. Moreover, all the new banks had unique goal of profit maximisation while some of the old banks were public and had various social objectives to fulfil. The result did not show any significant pattern of difference of the effect of financial liberalisation for the remaining two typologies. These were: 'mode of operation' and 'size'.

²⁹ Since bank typologies were taken in interaction form, hence, the coefficients of the FL, which were represented in different columns, showed the impact of private, conventional, small and old banks respectively. It could be observed that for all these banks, excess liquidity increased with the financial liberalisation.

4.6.3 Explanation of Results

This study analysed the relationship between financial liberalisation and excess liquidity situation for the banking sector in Bangladesh using the two-step system GMM. The main aim of this study was to see how the process of financial liberalisation affected the excess liquidity situation in the banking sector in Bangladesh. Moreover, this study also attempted to see if there were any definite patterns between different types of banks in terms of excess liquidity as the financial liberalisation took place. To overcome the fact that the dataset started after the beginning of financial liberalisation in Bangladesh, an index of financial liberalisation was created. This not only helped to capture the different stages of financial liberalisation but also helped in analyzing how it affected the excess liquidity situation in Bangladesh.

The ‘financial liberalisation’ variable had significant positive relationship with the excess liquidity for all types of banks. Increased uncertainty among the banks that this process brought along with it when it took place might have prevented lending from increasing enough to stop increase in excess liquidity or reduce it.

As mentioned earlier, one significant feature of this study was that it used bank-level data. The advantage of this was that the bank-level data help in understanding better the differences at bank-level and also assists in identifying the differences across banks because it was easier to classify the banks according to different typology and examine the effect accordingly.

Different classifications of banks showed that new banks had less growth of excess liquidity than the old banks indicating that they performed better in terms of managing risk and uncertainty brought along with the financial liberalisation. This result was in line with the work of Kraft and Tirtiroglu (1998).

Public banks were found to have higher growth of excess liquidity than the private banks indicating that they were not very efficient in lending operations which was consistent with earlier findings (Antwi-Asare and Addison, 2000; Abbas and Malik, 2010). However, it was important to remember that public banks do not follow the only objective of profit maximisation but they also needed to cater for different social needs as per the wish of the government. However, no definite patterns could be observed for Islamic or large banks.

The results also showed that the relationships of the standard control variables of excess liquidity were generally consistent with the earlier studies of excess liquidity (e.g. Agenor et al., 2004; Saxegaard, 2006). The variables of deposit volatility, deposit rate and impaired loans were found to be significantly increasing the excess liquidity in the banking sector whereas the government bills and bonds and the lagged dependent variables were both showing insignificant relationship (the first one negative while the second one positive). As described before, the opposite and insignificant sign of the government bills and bonds was due to the particular scenario of Bangladesh where the lending rate has generally been higher than the treasury bill rate.

4.6.3.1 Prudent Lending

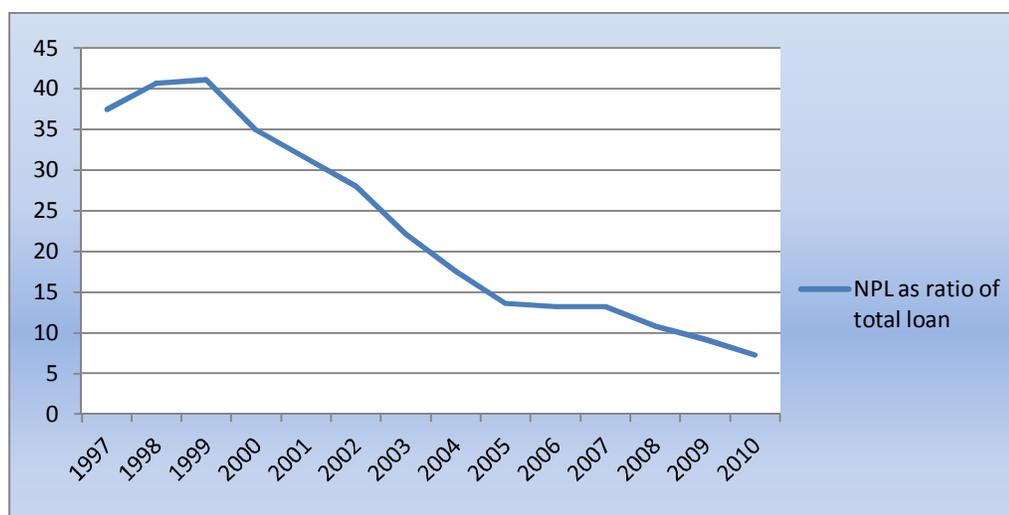
Prudent lending due to increased risk could lead banks to keep higher amount of excess liquidity. After financial liberalisation, with banks becoming more independent but at the same time having less support or backing from the government, banks needed to be more careful in all their operations including lending. It is also well-known that liberalisation could make the economy more vulnerable and fragile. The increased risk along with higher competition could lead banks toward improper lending and to higher default.

Conversely, banks might become more prudent to survive in this new situation and lend carefully. This would lead toward lower NPL (as a ratio of total lending) but at the same time toward higher amount of excess

liquidity. This possibility was examined with the graph showing amount of NPL as a ratio of total lending.

It could be observed that although this ratio experienced some increase at the beginning of this study period for a couple of years but then decreased continuously from 1999. This decline in the ratio justified the fact that banks have become more prudent in lending in the face of the more risky environment.

Figure 4.5: NPL as a ratio of total loan



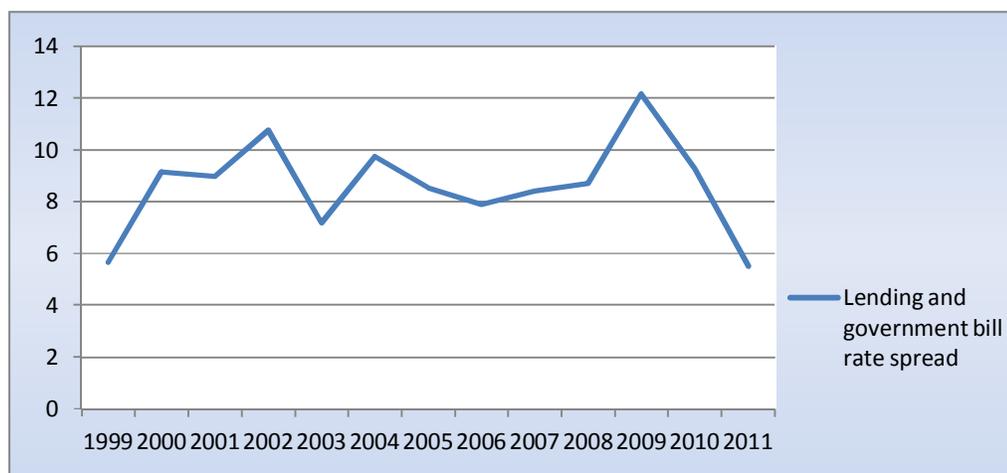
Source: Bangladesh Bank Annual Report, various issues.

4.6.3.2 Spread between Government Bill and Interest Rate

Government bill and bond rate can also play a role for banks about whether to keep their reserve in this form to avoid risky lending. If the rate of government bills and bonds were higher than the lending rate then banks would be inclined more towards these options. If the rates of government bills and bonds were lower than the lending rate but were reasonably high, even then banks might still incline towards these options depending on other circumstances and earn interest since there was no risk involved.

A close look at the government bill and bond rate (or the spread of it with the interest rate) overtime shed further light on this. Therefore, the spread is shown graphically in the following graph.

Figure 4.6: Lending rate and government bill rate spread



Source: Author's own calculation based on data from various issues of Bangladesh Bank Annual Report.

The graph did not show any gradual increase overtime. Although it fluctuated significantly, overall it hovered around the same mark. This tendency alone may not justify banks moving towards government bills when there was higher return through lending. Nevertheless, higher risk in lending (due to increased interest rate) along with more prudent lending by banks could lead to a situation of high excess liquidity. In such a situation, banks might opt towards keeping more reserves in government bills as a second best option in terms of return but a more secured one, without the fear of default.

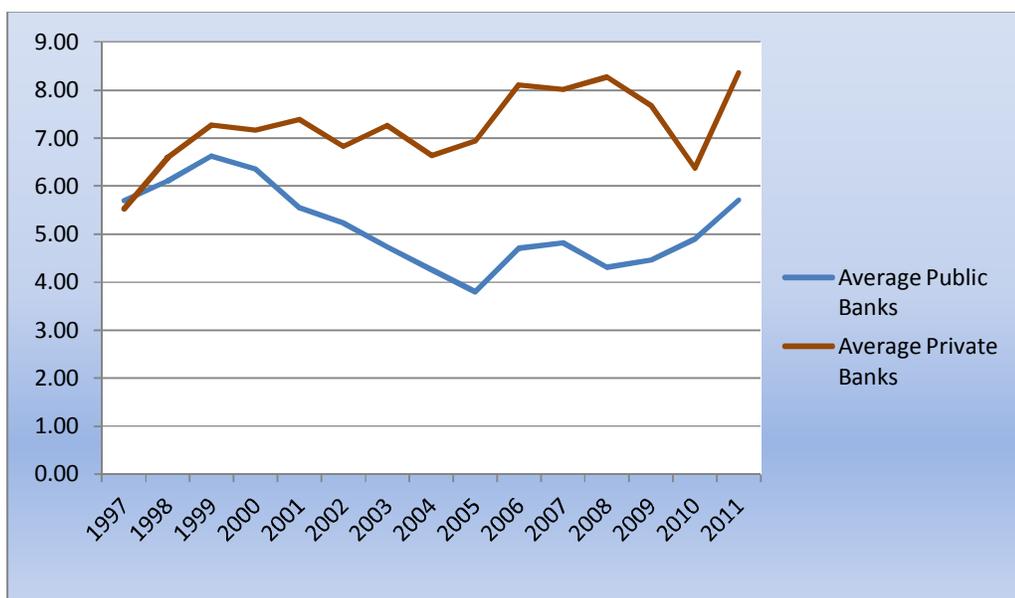
4.6.3.3 Differences in Interest Rate

Variations in interest rate according to different bank-specific characteristics can play a significant role in difference in excess liquidity. To analyse this, interest rates of banks were averaged for each typology. The higher the interest rate, it was expected that the less would be the demand for borrowing and hence higher excess liquidity. Therefore, it would be interesting to see if there were any differences in interest rates among the bank-specific characteristics. These are analysed in the following paragraphs.

Ownership Typology

Interest rates for ownership typology showed that although they were very close at the beginning of the study period, they gradually diverged over time. There were years where there was convergence, still a substantial gap remained with the average interest rate of public banks were significantly higher than the private banks. This higher interest rate of public banks might be an explanation of why excess liquidity of public banks were negatively related with lending and positively related with excess liquidity as was found by this study.

Figure 4.7: Interest rate according to ownership

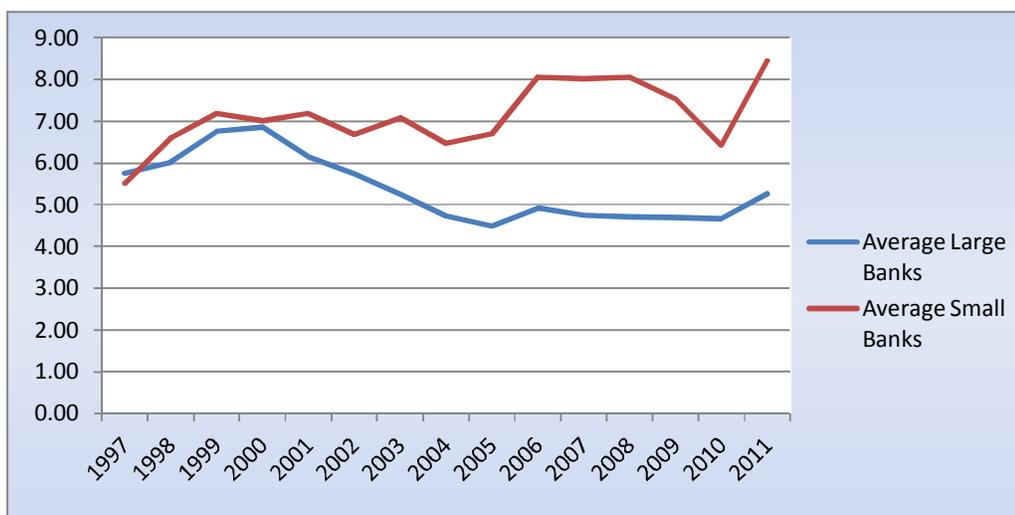


Source: Author's own calculation based on Bankscope database.

Size Typology

Although gap between large and small banks could be observed in terms of interest rates, it could be seen that the gap was much smaller than ownership typology. This was one of the reasons why the size typology coefficient was not significant. This also implied that unless difference in interest rate according to a characteristic reach a certain level, the variation in lending will not be significantly affecting excess liquidity.

Figure 4.8: Interest rate according to size

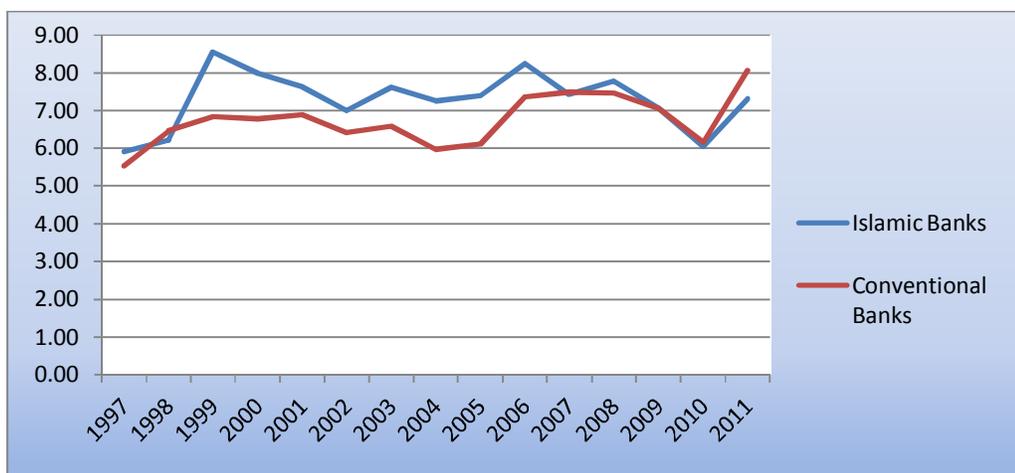


Source: Author's own calculation based on Bankscope database.

Mode of Operation Typology

When interest rates for mode of operation typology were analysed, it was observed that they had similar trends and not much gap existed between Islamic and conventional banks. Moreover, they experienced convergence in the latter period of study. This showed a different pattern than the previous two typologies. Since no significant difference was found in this study for mode of operation typology, therefore, this graph further justified the fact that differences in interest rates played a crucial role in lending and thereby impacting excess liquidity.

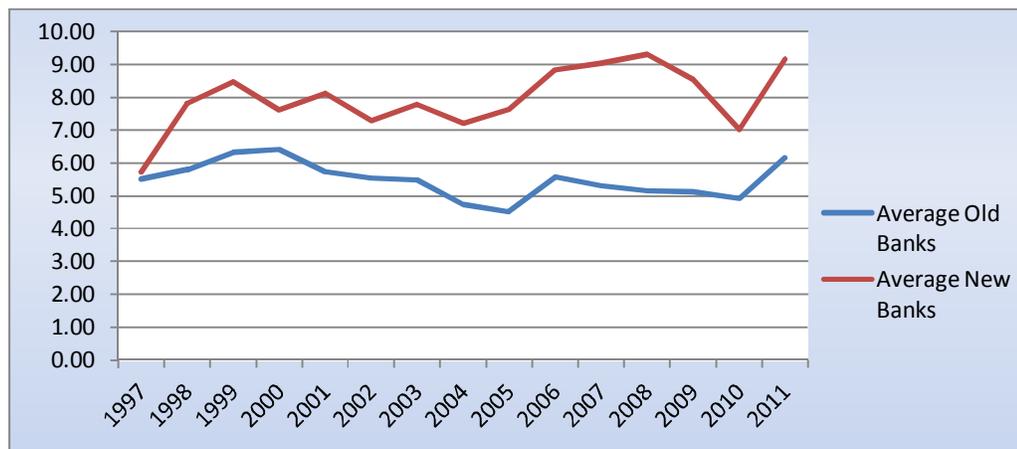
Figure 4.9: Interest rate according to mode of operation



Source: Author's own calculation based on Bankscope database.

Age Typology

Figure 4.10: Interest rate according to age



Source: Author's own calculation based on Bankscope database.

For age typology, interest rates were very close in 1997 but the gap increased dramatically in the next year and remained so with some more increase throughout the period of this study. Again the lower interest rate of new banks justified the finding and reasoning for higher lending of new banks than old banks and leading towards lower excess liquidity.

4.7 CONCLUSION AND POLICY IMPLICATIONS

It can be concluded that this bank-level study on excess liquidity in Bangladesh has given further insight into the long and ongoing debate on financial liberalisation, its effectiveness and success. The results showed that along with the process of financial liberalisation, the excess liquidity situation in the banking sector increased indicating that it was unable to fully achieve one of its objectives of increasing credit supply well enough to reduce excess liquidity. The result was comprehensive in the sense that it used two different and wide-ranging measures of financial liberalisation with both providing similar conclusions as well as the findings were found to hold across different types of banks³⁰.

³⁰ It should be noted that there may be difference between the short- and long-run effects. But T is not large enough in this study to investigate the presence of different effects for the short and the long-run. Therefore, this point is not investigated,

This study allowed one to frame specific policies and its implementations based on different bank-specific characteristics. One significant feature of this study was that it used bank-level data which helped in understanding better the differences at bank-level and to classify the banks according to different typology and examine the effect accordingly.

For ownership typology, it was found that public banks had higher excess liquidity than private banks. Therefore, it is important that public banks step up their lending in normal times rather than using the advantage of government backing. On the other hand, careful attention is needed so that private banks do not lend injudiciously, which may look good in short-run but can be detrimental in long-run due to the higher risk associated with imprudent lending.

Similarly, for age typology, old banks were found to be having more excess liquidity than the new banks. Hence, old banks were needed to be encouraged to lend more using their advantages in lending towards large firms. Since Bangladesh is a country with many small firms, old banks were needed to concentrate in increasing their lending scope by raising lending to small firms and consumers. Specific targets should be set for these types of banks by the central bank in this regard as was done by the central bank in other cases (e.g., specific targets were set for agricultural lending by the central bank in Bangladesh). On the other hand, new banks should be monitored so that they do not overlend, particularly during the initial years to survive. An initial period of a few years of support may help these banks to lend more prudently and survive in this very competitive sector.

This study observed no significant difference for mode of operation and size typologies. These results suggested that policies should be formulated and implemented on a priority basis where the characteristics of ownership and age need to be addressed first. This also supported the view that 'one size fits all' approach should be avoided and specific policies need to be formulated keeping in mind different bank-specific characteristics.

Although bank-level variations are observed, this does not mean that general policies are harmful and should not be taken. What this study points out is that only general policies are not enough and tailor-made policies for different bank characteristics based on the above findings can be very helpful in terms of effectiveness. Therefore, a multidimensional approach should be taken to get the maximum benefit or attainment of the objective since these characteristics were overlapping for banks. Moreover, special attention needs to be given for the variation in interest rates according to bank-specific characteristics. As observed from Figures 4.8 to 4.11, rate of interest played an important role in lending and variation in interest rates had an impact to difference in lending. Therefore, steps need to be taken to address this variation and reduce it to a level so that lending does not differ much according to these bank-specific characteristics.

The financial liberalisation index constructed and applied in this study showed that although liberalisation started in Bangladesh in the early 1990s, it was still far from reaching its completion stage. Hence, it is very important that the remaining process is incorporated and accomplished with urgency so that maximum benefit from it can be achieved.

Sequencing of liberalisation can also play a crucial role in achieving the benefit from this process. If a country is at its early stage, then it is very important to keep in mind this process of sequencing. But for countries where the process started long back and was in place for years, it might be useful to work on strengthening the institutional factors as a pre-requisite for the success of financial liberalisation (Caprio et al., 2006).

APPENDIX 4.1: Data availability of banks in Bankscope

Table 4A.1: Data availability of banks in Bankscope

No.	Name	Form available	Form taken	Period	Total Year
1	Sonali Bank	Unconsolidated	U	1997-2011	15
2	Agrani Bank	Unconsolidated	U	1997-2011	15
3	Rupali Bank	Unconsolidated	U	1997-2011	15
4	Janata Bank	Both (U & C)	U	1997-2011	15
5	United Commercial Bank	Both (U & C)	U	1997-2011	15
6	Mutual Trust Bank	Both (U & C)	U	2000-2011	12
7	BRAC Bank	Both (U & C)	U	2001-2011	11
8	Eastern Bank	Both (U & C)	U	1997-2011	15
9	Dutch Bangla Bank	Unconsolidated	U	1997-2011	15
10	Dhaka Bank Limited	Both (U & C)	C	1997-2011	15
11	Islami Bank Bangladesh	Consolidated	C	1997-2011	15
12	Uttara Bank Limited	Unconsolidated	U	1997-2011	15
13	Pubali Bank Limited	Both (U & C)	U	1997-2011	15
14	IFIC Bank Limited	Consolidated	C	1997-2011	15
15	National Bank Limited	Both (U & C)	C	1997-2011	15
16	The City Bank Limited	Both (U & C)	U	1997-2011	15
17	NCC Bank Limited	Unconsolidated	U	1997-2011	15
18	Mercantile Bank Limited	Unconsolidated	U	1999-2011	13
19	Prime Bank Limited	Both (U & C)	U	1997-2011	15
20	Southeast Bank Limited	Both (U & C)	U	1997-2011	15
21	Al-Arafah Islami Bank	Both (U & C)	U	1997-2011	14*
22	Social Islami Bank Ltd	Both (U & C)	U	1998-2011	14
23	Standard Bank Limited	Consolidated	C	1999-2011	13
24	One Bank Limited	Both (U & C)	U	1999-2011	13
25	First Security Islami Bank	Unconsolidated	U	1999-2011	13
26	The Premier Bank Limited	Both (U & C)	U	1999-2011	13
27	Bank Asia Limited	Both (U & C)	U	1999-2011	13
28	Trust Bank Limited	Unconsolidated	U	2000-2011	12
29	Shahjalal Islami Bank Ltd	Unconsolidated	U	2001-2011	11
30	Jamuna Bank Limited	Both (U & C)	C	2001-2011	11
31	ICB Islamic Bank Limited	Unconsolidated	U	1997-2011	12*
32	AB Bank	Both (U & C)	U	1997-2011	15
33	EXIM Bank Limited	Unconsolidated	U	1999-2011	13
34	Bangladesh Commerce Bank Limited	Unconsolidated	U	2000-2011	12
35	Bangladesh Krishi Bank	Unconsolidated	U	1997-2011	15
36	Bangladesh Development Bank Ltd	Unconsolidated	U	1997-2009	12*
37	BASIC Bank Limited	Unconsolidated	U	1997-2011	15
38	Rajshahi Krishi Unnayan Bank	Not available			No

* One or more year(s) missing inside the period.

U = Unconsolidated, C = Consolidated

APPENDIX 4.2: Variable definitions

Table 4A.2: Variable definitions

Variable Name	Variable Definition	Comment
Dependent Variable		
Excess liquidity	Liquid assets =summing up trading securities and at fair value through income + loans and advances to banks + reverse repos and cash collateral + cash and due from banks) -mandatory reserves included above.	log value taken
Explanatory Variables		
Lag of excess liquidity	Lag of initial year data	log value of initial year data taken
Financial liberalisation (FL)	A composite index of seven indicators following Abiad et al. but constructed by authors	Actual values taken first and then log values taken.
Deposit volatility	SD of total deposit (using 3-year overlapping SD estimation)	log value taken
Deposit rate	Interest expense/ average interest-bearing liabilities	log value taken
Government bills and bonds	(Treasury bill rate of 91-day) - (interest income/ average earning assets)	log value taken
Impaired loans	Impaired loans / gross loans	log value taken
Ownership dummy with interaction	FL* Public (1 if state-owned, 0 otherwise)	
Size dummy with interaction	FL* Large (1 if large, 0 otherwise)	
Mode of operation dummy with interaction	FL* Islamic (1 if Islamic, 0 otherwise)	
Age dummy with interaction	FL* New (1 if new {established after 1990}, 0 otherwise)	

APPENDIX 4.3: Bank size classifications

Table 4A.3: Bank size classifications

Sl. No.	Name of PCB	Bank Size
1	AB Bank	Small to Large
2	Agrani Bank	Large
3	Al-Arafah Islami Bank	Small to Large
4	Bangladesh Commerce Bank	Small
5	Bangladesh Development Bank	Small
6	Bangladesh Krishi Bank	Small to Large
7	Bank Asia	Small to Large
8	BASIC Bank	Small
9	BRAC Bank	Small to Large
10	City Bank	Small to Large
11	Dhaka Bank	Small to Large
12	Dutch Bangla Bank	Small to Large
13	Eastern Bank	Small to Large
14	EXIM Bank	Small to Large
15	First Security Islami Bank	Small to Large
16	ICB Islamic Bank Limited	Small
17	IFIC Bank	Small to Large
18	Islami Bank Bangladesh	Small to Large
19	Jamuna Bank	Small to Large
20	Janata Bank	Large
21	Mercantile Bank	Small to Large
22	Mutual Trust Bank	Small
23	National Bank	Small to Large
24	NCC Bank	Small to Large
25	One Bank	Small
26	Premier Bank	Small
27	Prime Bank Limited	Small to Large
28	Pubali Bank	Small to Large
29	Rupali Bank	Small to Large
30	Shahjalal Islami Bank	Small to Large
31	Social Islami Bank	Small to Large
32	Sonali Bank	Large
33	Southeast Bank	Small to Large
34	Standard Bank	Small
35	Trust Bank	Small
36	United Commercial Bank	Small to Large
37	Uttara Bank	Small to Large

Source: Defined according to total asset data from Bankscope.

*Small to Large means that asset of the bank was lower than \$1 billion at the beginning but crossed the threshold at some part during this period.

APPENDIX 4.4: Generation of PCBs in Bangladesh

Table 4A.4: Generation of PCBs in Bangladesh

Sl. No.	Name of PCB	Year of Foundation/ Denationalisation*
1	Arab Bangladesh Bank Limited	1982
2	IFIC Bank Limited	1983
3	Uttara Bank Limited	1983*
4	Pubali Bank Limited	1983*
5	National Bank Limited	1983
6	Islami Bank Bangladesh Limited	1983
7	The City Bank Limited	1983
8	United Commercial Bank Limited	1983
9	ICB Islami Bank Limited	1987
10	Eastern Bank Limited	1992
11	NCC Bank Limited	1993
12	Prime Bank Limited	1995
13	Dhaka Bank Limited	1995
14	Al-Arafah Islami Bank Limited	1995
15	Southeast Bank Limited	1995
16	Social Islami Bank Ltd	1995
17	Dutch-Bangla Bank Limited	1996
18	Trust Bank Limited	1999
19	Bank Asia Limited	1999
20	EXIM Bank Limited	1999
21	First Security Islami Bank	1999
22	Mutual Trust Bank	1999
23	Mercantile Bank Limited	1999
24	ONE Bank Limited	1999
25	The Premier Bank Limited	1999
26	Standard Bank Limited	1999
27	Bangladesh Commerce Bank	1999
28	BRAC Bank Limited	2001
29	Jamuna Bank Limited	2001
30	Shahjalal Islami Bank Limited	2001

Source: Bangladesh Bank Annual Report, various issues.

*Uttara Bank and Pubali Bank were denationalised to operate as private commercial bank.

APPENDIX 4.5: Coding rules for the financial liberalisation index

Coding rules for the financial liberalisation index, in line with the work of Abiad et al. (2010), is described below. To construct an index of financial liberalisation, codes were assigned along the seven dimensions below. Each dimension had various sub-dimensions. Based on the score for each sub-dimension, each dimension received a 'raw score.' The explanations for each sub-dimension below indicate how to assign the raw score.

After a 'raw score' was assigned, Abiad et al. (2010) normalised to a 0-3 scale. The normalisation was done on the basis of the classifications listed below for each dimension. That is, fully liberalised = 3; partially liberalised = 2; partially repressed = 1; fully repressed = 0.

The final scores were used to compute an aggregate index for each year by assigning equal weight to each dimension. For example, if the 'raw score' on credit controls and reserve requirements totals 4 (by assigning a code of 2 for liberal reserve requirements, 1 for lack of directed credit and 1 for lack of subsidised directed credit), this was equivalent to the definition of fully liberalised. So, the normalisation would assign a score of 3 on the 0-3 scale. However, in this study, we avoided the normalisation process as we thought that this would reflect the process better.

The questions used by Abiad et al. (2010) are described here. This study used the same seven dimensions. These seven dimensions and the situation in Bangladesh in respect to these are given below to explain how each dimension was extended.

I. Credit Controls and Reserve Requirements:

1) Were *reserve requirements restrictive*?

- Coded as 0 if reserve requirement was more than 20 per cent.
- Coded as 1 if reserve requirements were reduced to 10-20 per cent or complicated regulations to set reserve requirements were simplified as a step toward reducing reserve requirements
- Coded as 2 if reserve requirements were less than 10 per cent.

2) Were *there minimum amounts of credit that must be channeled to certain sectors*?

- Coded as 0 if credit allocations were determined by the central bank or mandatory credit allocations to certain sectors exist.
- Coded as 1 if mandatory credit allocations to certain sectors were eliminated or do not exist.

3) Were *there any credits supplied to certain sectors at subsidised rates*?

- Coded as 0 when banks have to supply credits at subsidised rates to certain sectors.
- Coded as 1 when the mandatory requirement of credit allocation at subsidised rates was eliminated or banks do not have to supply credits at subsidised rates.

II. Aggregate Credit Ceilings

- Coded as 0 if ceilings on expansion of bank credit were in place. This includes bank-specific credit ceilings imposed by the central bank.

- Coded as 1 if no restrictions exist on the expansion of bank credit.

III. Interest Rate Liberalisation

Deposit rates and lending rates were separately considered, in coding this measure, in order to look at the type of regulations for each set of rates. They were coded as being government set or subject to a binding ceiling (code=0), fluctuating within a band (code=1) or freely floating (code=2). The coding was based on the following description:

FL=4 [2, 2]

Fully Liberalised if both deposit interest rates and lending interest rates were determined at market rates.

LL = 3 [2, 1]

Largely Liberalised when either deposit rates or lending rates were freed but the other rates were subject to band or only a part of interest rates were determined at market rates.

PR= 2/1 [2, 0] [1, 1][1, 0]

Partially Repressed when either deposit rates or lending rates were freed but the other interest rates were set by government or subject to ceiling/floor; or both deposit rates and lending rates were subject to band or partially liberalised; or either deposit rates or lending rates were subject to band or partially liberalised.

FR= 0 [0, 0]

Fully Repressed when both deposit rates and lending rates were set by the government or subject to ceiling/floor.

IV. Banking Sector Entry

The following sub-measures were considered:

1) *To what extent does the government allow foreign banks to enter into a domestic market?*

This question was coded to examine whether a country allows the entry of foreign banks into a domestic market; whether branching restrictions of foreign banks were eased; to what degree the equity ownership of domestic banks by nonresidents was allowed.

- Coded as 0 when no entry of foreign banks was allowed; or tight restrictions on the opening of new foreign banks were in place.

- Coded as 1 when foreign bank entry was allowed, but nonresidents must hold less than 50 per cent equity share.

- Coded as 2 when the majority of share of equity ownership of domestic banks by nonresidents was allowed; or equal treatment was ensured for both foreign banks and domestic banks; or an unlimited number of branching was allowed for foreign banks.

Three questions look at policies to enhance the competition in the domestic banking market.

2) *Does the government allow the entry of new domestic banks?*

- Coded as 0 when the entry of new domestic banks was not allowed or strictly regulated.

- Coded as 1 when the entry of new domestic banks or other financial institutions was allowed into the domestic market.

3) *Were there restrictions on branching?* (0/1)

- Coded as 0 when branching restrictions were in place.
- Coded as 1 when there were no branching restrictions or if restrictions were eased.

4) *Does the government allow banks to engage in a wide range of activities?* (0/1)

- Coded as 0 when the range of activities that bank can take consists of only banking activities.
- Coded as 1 when banks were allowed to become universal banks.

The dimension of entry barriers was coded by adding the scores of these three questions.

Fully Liberalised= 4 or 5, **Largely Liberalised**= 3, **Partially Repressed**= 1 or 2, **Fully Repressed** = 0

V. Capital Account Transactions

1) *Was the exchange rate system unified?* (0/1)

- Coded as 0 when a special exchange rate regime for either capital or current account transactions exists.
- Coded as 1 when the exchange rate system was unified.

2) *Does a country set restrictions on capital inflow?* (0/1)

- Coded as 0 when significant restrictions exist on capital inflows.
- Coded as 1 when banks were allowed to borrow from abroad freely without restrictions and there were no tight restrictions on other capital inflows.

3) *Does a country set restrictions on capital outflow?* (0/1)

- Coded as 0 when restrictions exist on capital outflows.
- Coded as 1 when capital outflows were allowed to flow freely or with minimal approval restrictions.

By adding these three items,

Fully Liberalised = [3], **Largely Liberalised** = [2], **Partially Repressed** = [1], **Fully Repressed**= [0]

VI. Privatisation

Privatisation of banks was coded as follows:

Fully Liberalised: if no state banks exist or state-owned banks do not consist of any significant portion of banks and/or the percentage of public bank assets was less than 10 per cent.

Largely Liberalised: if most banks were privately owned and/or the percentage of public bank assets was from 10 per cent to 25 per cent.

Partially Repressed: if many banks were privately owned but major banks were still state-owned and/or the percentage of public bank assets was 25 per cent to 50 per cent.

Fully Repressed: if major banks were all state owned banks and/or the percentage of public bank assets was from 50 per cent to 100 per cent.

VII. Securities Markets

1) *Has a country taken measures to develop securities markets?*

- Coded as 0 if a securities market does not exist.
- Coded as 1 when a securities market was starting to form with the introduction of auctioning of T-bills or the establishment of a security commission.
- Coded as 2 when further measures have been taken to develop securities markets (tax exemptions, introduction of medium and long-term government bonds in order to build the benchmark of a yield curve, policies to develop corporate bond and equity markets, or the introduction of a primary dealer system to develop government security markets).
- Coded as 3 when further policy measures have been taken to develop derivative markets or to broaden the institutional investor base by deregulating portfolio investments and pension funds, or completing the full deregulation of stock exchanges.

2) *Was a country's equity market open to foreign investors?*

- Coded as 0 if no foreign equity ownership was allowed.
- Coded as 1 when foreign equity ownership was allowed but there was less than 50 per cent foreign ownership.
- Coded as 2 when a majority equity share of foreign ownership was allowed.

By adding these two sub-dimensions,

Fully Liberalised = [4 or 5], **Largely Liberalised** = [3], **Partially Repressed** = [1, 2], and **Fully Repressed** = [0]

****NOTE****

If information on the second sub-dimension was not available (as was the case with some low income countries), the measure was coded using information on securities market development. When information on securities markets were considered, a 0-3 scale was assigned based on the score on securities markets.

VIII. Banking Sector Supervision

1) *Has a country adopted a capital adequacy ratio based on the Basel standard? (0/1)*

- Coded as 0 if the Basel risk-weighted capital adequacy ratio was not implemented. Date of implementation was important, in terms of passing legislation to enforce the Basel requirement of 8 per cent CAR.
- Coded as 1 when Basel CAR was in force. (Note: If the large majority of banks meet the prudential requirement of an 8 per cent risk-weighted capital adequacy ratio, but this was not a mandatory ratio as in Basel, the measure was still classified as 1). Prior to 1993, when the Basel regulations were not in place internationally, this measure takes the value of 0.

2) *Was the banking supervisory agency independent from executives' influence? (0/1/2)*

A banking supervisory agency's independence was ensured when the banking supervisory agency can resolve banks' problems without delays.

Delays were often caused by the lack of autonomy of the banking supervisory agency, which was caused by political interference. For example, when the banking supervisory agency has to obtain approval from different agencies such as the Ministry of Finance (MOF) in revoking or suspending licenses of banks or liquidating banks' assets, or when the ultimate jurisdiction of the banking supervisory agency was the MOF, it often causes delays in resolving banking problems. In addition to the independence from political interference, the banking supervisory agency also has to be given enough power to resolve banks' problems promptly.

▫ Coded as 0 when the banking supervisory agency does not have an adequate legal framework to promptly intervene in banks' activities; and/or when there was the lack of legal framework for the independence of the supervisory agency such as the appointment and removal of the head of the banking supervisory agency; or the ultimate jurisdiction of the banking supervision was under the MOF; or when a frequent turnover of the head of the supervisory agency was experienced.

▫ Coded as 1 when the objective supervisory agency was clearly defined and an adequate legal framework to resolve banking problems was provided (the revocation and the suspension of authorisation of banks, liquidation of banks and the removal of banks' executives etc.) but potential problems remain concerning the independence of the banking supervisory agency (for example, when the MOF may intervene into the banking supervision in such as case that the board of the banking supervisory agency board was chaired by the MOF, although the fixed term of the board was ensured by law); or although clear legal objectives and legal independence were observed, the adequate legal framework for resolving problems was not well articulated.

▫ Coded as 2 when a legal framework for the objectives and the resolution of troubled banks was set up and if the banking supervisory agency was legally independent from the executive branch and actually not interfered with by the executive branch.

3) *Does a banking supervisory agency conduct effective supervisions through on-site and off-site examinations? (0/1/2)*

Conducting on-site and off-site examinations of banks was an important way to monitor banks' balance sheets.

▫ Coded as 0 when a country has no legal framework and practices of on-site and off-site examinations was not provided or when no on-site and off-site examinations were conducted.

▫ Coded as 1 when the legal framework of on-site and off-site examinations was set up and the banking supervision agency have conducted examinations but in an ineffective or insufficient manner.

▫ Coded as 2 when the banking supervisory agency conducts effective and sophisticated examinations.

4) *Does a country's banking supervisory agency cover all financial institutions without exception? (0/1)*

If some kinds of banks were not exclusively supervised by the banking supervisory agency or if offshore intermediaries of banks were excluded from the supervision, the effectiveness of the banking supervision was seriously undermined.

- Coded as 1 when all banks were under supervision by supervisory agencies without exception.
- Coded as 0 if some kinds of financial institutions were not exclusively supervised by the banking supervisory or were excluded from banking supervisory agency oversights.

Enhancement of banking supervision over the banking sector was coded by summing up these four dimensions, which were assigned a degree of reform as follows.

Highly Regulated = [6], Largely Regulated = [4-5], Less Regulated = [2-3], Not Regulated = [0-1]

Appendix 4.6: Coverage area of this study of the banking sector

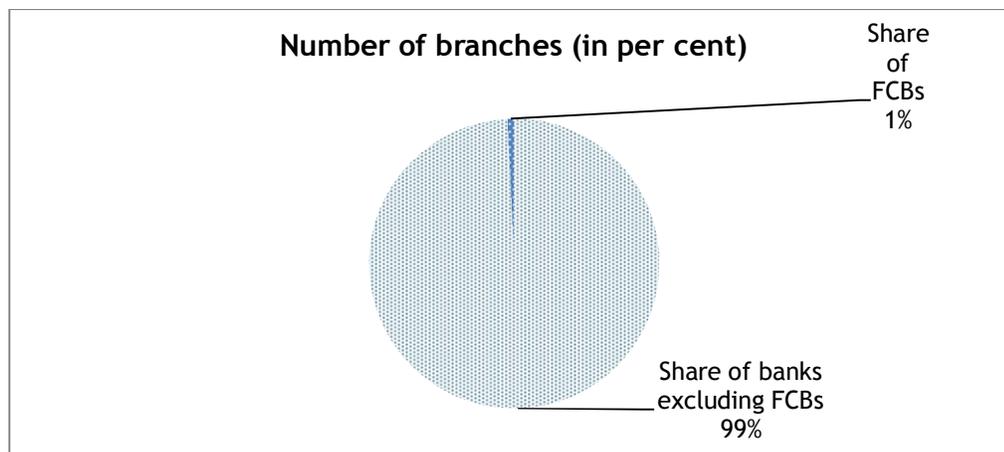
During the period of this study (1997-2011), there were altogether 47 banks operating in Bangladesh. Of them, 9 were foreign commercial banks. As mentioned in footnote 4, they were excluded due to data unavailability. For the same reason, one specialised bank, Rajshahi Krishi Unnayan Bank, could not be included in this study. With the exception of these 10 banks, all the remaining banks were included in this study. These 37 banks included in the study, represent the banking sector in Bangladesh very well since they account for more than 99 per cent of bank branches. Moreover, they had a share of more than 90 per cent of assets and deposits of these 47 banks (Bangladesh Bank Annual Report, 2013). These are graphically presented here with the help of table and pie charts.

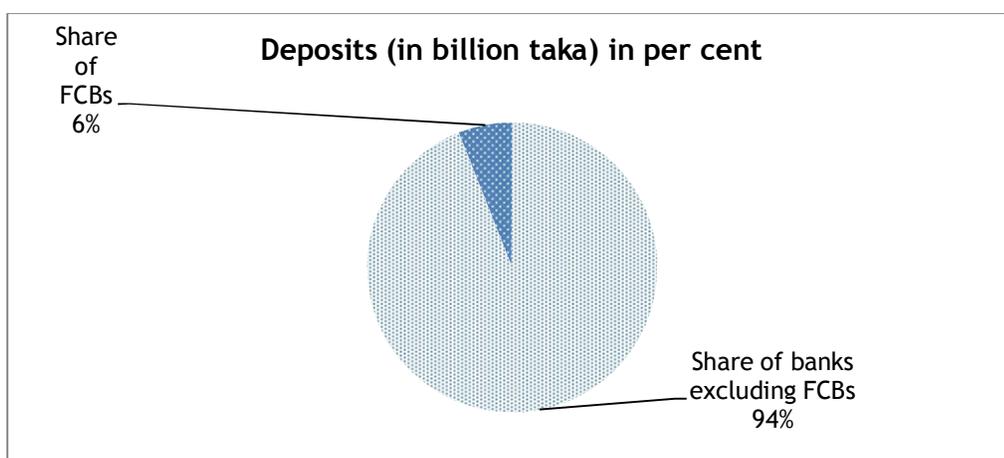
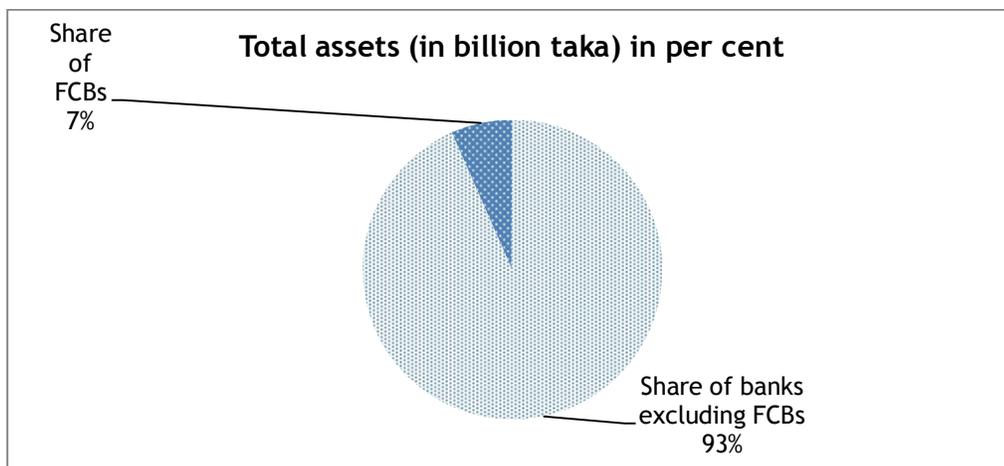
Table 4A.5: Coverage area of this study of the banking sector in 2011

Classification	Number of branches	Total assets (in billion taka)	Deposits (in billion taka)
Share of banks excluding FCBs	7898	5482.2	4237.5
Share of FCBs	63	385.4	272.2
TOTAL	7961	5867.6	4509.7

Source: Bangladesh Bank Annual Report 2013.

Figures 4A.1: Coverage area of this study of the banking sector





It may be mentioned that recently in 2012, ten more new banks were established. But they were not included in this study as they were established after the study period.

CHAPTER 5

EXCESS LIQUIDITY ACCORDING TO BANK TYPOLOGY, BUSINESS CYCLE AND THE FINANCIAL CRISIS

5.1 INTRODUCTION

There were many studies on the lending behaviour with different bank ownerships in terms of **business cycle**. It was observed that different types of banks had different lending patterns over the business cycle. Some of them were procyclical, some were counter-cyclical while some were acyclical. These studies were generally done for public and private banks.

Although it was not true in all cases but generally it was observed that private banks' lending pattern was procyclical whereas public banks lent less procyclically in most cases (Davydov, 2013). However, sometimes the lending of public banks was found to be even counter-cyclical (Bertay et al., 2012). Some other studies found mixed results for different countries or regions (Cull and Peria, 2012) while some others did not find any significant difference in lending between these two types of banks (Iannotta, et al., 2011).

Another interesting and related topic which may also affect the lending behavior of banks was crisis time. Generally it was observed that public banks were less procyclical than the private banks in non-crisis times. During the recent financial crisis of 2008-09, the public banks played a positive role for the economy by either acting counter-cyclically or at least less procyclically.

In some cross-country studies on non-crisis times, it was commonly found that public banks were less efficient, and sometimes led to lower financial development, than the private banks (Barth et al., 2004; Bonin et al., 2005; Duprey, 2013). Micco et al. (2007) observed that this feature of higher efficiency of private banks was truer for developing countries than the developed countries. However, since public banks had additional

agenda to fulfill, this property of efficiency might not be appropriate to distinguish between public and private banks.

This view of dissimilarity in lending according to ownership was also supported by various country-level studies. For example, Berger et al. (2008) observed it for Argentina, Lin and Zhang (2009) found it for China, and Omran (2007) witnessed it for Egypt. But in some cases it was observed that public banks and private banks were almost equally efficient (Beck et al., 2005; Kraft et al., 2006).

Since most of the earlier studies discussed the differences in ownership and their effect, this study addressed the issue using some additional typologies of banking. This included the most common typology of ownership (public versus private banks) along with size (small versus large banks), mode of operation (Islamic versus conventional banks) and age (new versus old banks). It would be interesting to see if the large banks behaved differently from the small banks about their liquid assets while if there was any pattern for new banks which separated them from the old banks. The growth of Islamic banking worldwide and in Bangladesh made it a very worthy effort to investigate if they differed from the conventional banks.

5.1.1 Capitalisation and Excess Liquidity

After the financial crisis of 2007, a process of recapitalisation started to help the banking sector. The Euro area governments announced different measures to support these institutions and one of them was recapitalisation of the financial institutions in difficulty (Stark, 2009). This phenomenon was also observed by Brei and Gadanecz (2012), especially for the G10 countries. In another paper, the authors mentioned that public recapitalisations were almost equal to \$500 billions between 2007 and 2010 (Brei et al., 2013) in the G10 countries. Brei and Gadanecz (2012) observed that majority funds were provided during the period of 2008Q4 to 2009Q1 and most funds were allocated to US, UK, Germany, Netherlands and France.

Therefore, it was important to see if the process of capitalisation was related with excess liquidity. Delechat et al. (2012), in their study of 96 commercial banks from Central American countries, observed that there was significant inverse relationship between capitalisation and excess liquidity. According to them, better capitalised banks had easier access to markets and thus held less liquidity.

Capitalisation could play a key role in reducing the liquidity risk of the banks which in turn could reduce the amount of excess liquidity any bank holds. Since the amount of capitalisation could vary according to bank typologies, it was important to examine how different bank types were affected and how they differed in keeping excess liquidity. For example, public banks have the government to back up in case of any emergency and hence they will be less worried about the liquidity risk and may end up keeping less excess liquidity than the private banks. Similarly, large banks would be more capitalised than the smaller ones and therefore small banks would keep more excess liquidity than large banks due to the higher liquidity risk.

Walker (2012) found evidence that the lending behaviour of less well-capitalised banks was more sensitive to monetary policy shocks than that of better-capitalised banks. Opolot (2013) observed that the interaction term between bank capitalisation and monetary policy was positive and significant implying that banks with high capitalisation ratio were able to offer more loans during a period of monetary policy³¹ tightening (also supported by Zulkefly et al., 2010). This could be due to the fact that banks with higher capitalisation ratio might not be affected that much by a contractionary monetary policy stance.

5.1.2 Structural and Cyclical Factors

Based on the characteristics, the determinants of the involuntary excess liquidity could be classified into two types: (i) structural factors - due to

³¹ Monetary policy is one of the policies of central bank involving management of money supply mainly using interest rate with the objectives include attaining growth, low unemployment and controlling inflation.

macroeconomic and financial development - and (ii) cyclical factors (Pontes and Murta, 2012). The first structural determinant of involuntary liquidity was **low degree of financial development**. This was inversely related with excess liquidity since an inefficient interbank market and high costs of financial operations (e.g. evaluation and monitoring costs) lead banks to keep higher level of reserves (Agenor and Aynaoui, 2010). **High degree of risk aversion** was another structural determinant. It was positively related with excess liquidity as it caused banks to demand a high risk premium and lowered private sector credit demand. The degree of risk aversion was related with macroeconomic instability (Agenor and Aynaoui, 2010). Other structural factors included asymmetric information and lack of competition in the banking sector (Saxegaard, 2006).

Among the cyclical factors, **inflation** was the most mentioned one. This was positively related as a rise in inflation caused higher volatility in relative prices and higher uncertainty in the risk degree of investment projects and in the value of collateral (Agenor and Aynaoui, 2010). Therefore, leading banks to demand higher interest rates on loans which reduced the credit demand and thereby increasing excess liquidity. Another cyclical determinant was **capital inflow**. This could happen as a result of various reasons which include oil commerce receipts, foreign direct investment (FDI) associated with liberalisation of capital flows and/or foreign aid (Saxegaard, 2006). It was also observed that steps removing restrictions on capital inflows for non-residents (maintaining the restrictions on capital outflows), along with privatisation of state enterprises could lead to large inflows of capital intermediated by banks and hence to larger amount of excess liquidity (Agenor and Aynaoui, 2010).

5.1.3 Contribution of this Chapter

The objective of this research was to fill some of the gaps in this strand of literature. The main questions addressed in this study are described below.

(i) Does ownership matter in case of the effect of business cycle? From earlier studies, it could be observed that public banks may had less excess

liquidity due to the fact that these banks had support from the government and therefore would worry less than the private banks about the liquidity risk. We would like to test if business cycle affects the excess liquidity situation differently between public and private banks.

(ii) Does the effect of business cycle vary with bank size? This study examined if business cycle affected differently the excess liquidity situation for large and small banks. From the point of capitalisation, it was mentioned that large banks were more capitalised and therefore would have less excess liquidity than the small banks due to fear of liquidity risk.

(iii) Was there any difference according to age? Another issue was to look at whether old banks have more or less excess liquidity than new banks. For newer banks, it was easier to raise deposits and relatively difficult to identify reliable borrowers. Hence, it was expected that new banks would have more excess liquidity than old banks since the old banks usually have more information and it becomes easier for them to screen the borrowers.

(iv) Were Islamic banks affected differently? Since Bangladesh is a Muslim populated country and the Islamic banking system was flourishing quickly and formed a substantial part, therefore it was important to see if the Islamic banking system was affected differently in terms of excess liquidity situation from the conventional banking system. It was generally observed that Islamic banks, due to its inherent restrictions, did not have enough instruments like the conventional banks to address the issue of excess liquidity and therefore suffered more from this problem. So, it was expected that Islamic banks will have more excess liquidity than the conventional banks.

(v) Were financial crisis and excess liquidity related? Financial crisis is a time when the banks would not feel very confident to lend and there would be less demand from the investors' side. Hence there was supposed to be a positive relationship between the crisis and the excess liquidity. However, the period of crisis was normally accompanied by a process of

recapitalisation to make the economy move on by increased lending. This process might in turn reduce the amount of excess liquidity. Therefore, excess liquidity is expected to increase in the short-term and decrease later.

(vi) Did the relationship of excess liquidity with financial crisis follow the same pattern as business cycle? Finally this study also saw if the relationship of different bank typologies (ownership, size, mode of operation and age) followed the same pattern of relationship as it did for the business cycle bust or did it follow a different pattern. It would be interesting to see if all these typologies had a significant impact on excess liquidity with the process of business cycle or in time of the financial crisis. It could happen that in some cases, they were significant while in some other cases, they were not. This indicated differences of the impact on these typologies.

5.2 PREVIOUS WORKS

Most of the studies in this area were cross-country studies. As discussed in Section 5.1, the general finding was that public banks lend less procyclically in most cases. While sometimes the lending was found to be counter-cyclical, some studies also found mixed results for different countries or regions and some did not find any significant difference. Similarly, different ownerships of banks had different lending patterns during the crisis time. In different cross-country studies on non-crisis times, it was commonly found that public banks were less efficient and sometimes led to lower financial development than the private banks. This feature of higher efficiency of private banks was truer for developing countries than the developed countries.

Davydov (2013) identified three possible reasons for the comparative inefficiency of the public banks. These were: (i) political interference, that deviate them from the profit maximisation aims; (ii) incentives structure for managers were weaker than the private banks; and (iii) inferior incentives for owners leading to poor monitoring.

However, as already mentioned, comparing public and private banks in terms of efficiency or profitability can be misleading (UNCTAD, 2008) since public banks have other agenda (along with that of profitability) and hence pursuing solely the profit objective is not their aim. Therefore, they may sometime need to sacrifice the objective of profit maximisation and become less profitable than the private banks. This (less profitability) does not imply that the public banks were less efficient.

During the recent financial crisis of 2008-09, public banks played a positive role for the economy by generally acting counter-cyclically (Allen et al., 2013) or less procyclically (Fungacova et al., 2013). This was crucial and helped the economy to stabilise as the domestic private banks acted procyclically (Kowalewski and Rybinski, 2011; Cull and Peria, 2012). This was also true for earlier financial crises in Asia and Latin America in the 1990s (Hawkins and Mihaljek, 2001).

Micco and Panizza (2006), in their study of 179 countries, mentioned four possible reasons why public banks stabilise credit. These were:

- (i) it was part of their objectives as public banks;
- (ii) generally it was considered by depositors to be a safer place during possible bank failures, hence the public banks end up having a better deposit base during the crisis and thereby also in a better position to smooth credit;
- (iii) sometimes the public banks do not have a proper set of incentives and hence the public bank managers can be lazy;
- (iv) politicians might try to influence public bank lending in election years.

Bank lending and excess liquidity were very closely related two aspects (Alper et al., 2012) of the banking sector and there were many works on lending and bank ownership related to the financial crisis and business cycle. Interestingly enough, there were very few empirical works on excess liquidity directly related to the financial crisis, especially investigating the aftermath of the crisis on excess liquidity. Similar was also true for

business cycle and excess liquidity. Therefore, this study is trying to fill this gap in the existing literature with the following three objectives. Firstly, by investigating how excess liquidity was affected when the recent financial crisis occurred. Secondly, to see the movement of excess liquidity with the business cycle process. Finally, examine if there were any differences in excess liquidity situation in terms of ownership, size, mode of operation and age.

The boom and bust of the business cycle can have an effect on the excess liquidity situation of the banks. During economic boom, there is an increase in demand for loans and the probability of loan default decreases. This makes banks become softer in lending which may reduce the excess liquidity situation. During the bust or downturn, banks become stricter as the probability of loan default increases. Moreover, investors also become more careful in investing at this time and may deposit more in banks. This implies that the relationship between the business cycle and the excess liquidity is generally expected to be negative meaning that during the boom period of the business cycle, there will be less excess liquidity while during the bust period, the excess liquidity will be more (Ruckes, 2004). Therefore, an inverse relationship is expected to prevail between business cycle and the excess liquidity.

The financial crisis and business cycle can be closely related due to the fact that if the downturn or recession of the business cycle goes on for a long time, it can lead to crisis. This reasoning was supported by Bordo et al. (2001): “crises are an intrinsic part of the business cycle and result from shocks to economic fundamentals.”

Heeboll-Christensen (2011) used the US data from 1987 to 2010 and found that “mechanisms of credit growth and excess liquidity are found to be closely related.” According to this study, housing bubble was created initially with a prolonged credit cycle and was fuelled by excess liquidity and led to the financial crisis of 2007.

The existing works on financial crisis and excess liquidity can broadly be divided into two categories. One group discussed how excess liquidity acted as one of the factors for the **financial crisis** (Palma, 2009; Acharya and Naqvi, 2012; Brana et al., 2012).

The other group discussed how the crisis situation could affect excess liquidity. One of the possible effects of financial crisis was that it increased the uncertainty and riskiness in the economy. This made lending riskier for the banks. Therefore, banks lend less and thereby increasing the excess liquidity situation. This was found in the studies of Agenor et al. (2004) for Thailand and Ashcraft et al. (2011) for US. Montoro and Moreno (2011) found similar results for Peru. In another study, Murta and Garcia (2010) examined the excess liquidity in the banks of the Euro area.

The most direct empirical study till now, to our knowledge, that examined the effect of the recent financial crisis on the excess liquidity situation of the banking sector was carried out by Pontes and Murta (2012). They studied this relationship for the African economy of Cape Verde. Their results suggested that the crisis decreased the excess liquidity in the economy. The possible reasons included the extreme dependence of the economy on the external economic factors (especially remittance) and also the underdevelopment of the financial markets.

5.3 THE FINANCIAL CRISIS AND THE BANGLADESH ECONOMY

The experience of the recent financial crisis showed that not all economies were affected at the same time. Some were affected immediately (termed as first shockwave), some were after some time (called second shockwave through impact on credit), while some were after even some more time (named third shockwave through impact on real economy). Like other economies, the global financial crisis of 2007 also affected the economy of Bangladesh. However, it did not impact the economy immediately but after some time. According to Rahman et al. (2009), the crisis started affecting the economy of Bangladesh from October 2008. One of the main features of

this crisis was that “the crisis has evolved from financial crisis to credit contraction to crisis of confidence.”

The lag effect of crisis could be due to the very little exposure of the capital market in Bangladesh to the foreign portfolio investment (only 2.4%). This perhaps led Bangladesh to survive the first shockwave. However, it started to feel the impact from the second shockwave. The economy was mainly affected through the three channels of exports, remittances and foreign investment.

One of the key factors of the impact of these channels depended on the economic performance of the main partner countries (Murshid et al., 2009). As they were unable to perform well, the crisis also affected the Bangladesh economy negatively.

Ali and Islam (2010) stated that although the financial crisis did not affect the economy very harshly but it still slowed down along with exports and remittances. However, they also mentioned that Bangladesh performed well in agriculture and in equity markets to counterbalance the effect of the financial crisis. Raihan (2010) also mentioned that the crisis affected the export sector negatively and some categories had to suffer negative growth both in terms of value and volume.

5.4 EMPIRICAL APPROACH

There were various works on the relationship between bank lending and ownership during business cycles. Recently the focus shifted to examine the lending pattern of different types of banks during and after the crisis. The main reason for this shift of focus of the recent works was mainly due to the ‘Great Recession’ that occurred from 2007. Because of this, it became important to investigate how it affected the excess liquidity situation of banks and recently the focus shifted to address this issue to some extent (Micco et al., 2007; Omran 2007; Lin and Zhang, 2009; Davydov, 2013; Duprey, 2013).

However, these studies mainly examined the effect of ownership of banks to see the effect of lending. But our study goes further to see other possible and pertinent bank-specific characteristics and their impact on excess liquidity via lending. According to our knowledge, the four bank-specific characteristics used in this study had not been used previously together to study excess liquidity. This was done to have a very comprehensive picture of how bank typologies affect the excess liquidity pattern in the banks.

While many works have already been done on the lending pattern of banking sector and also between different types of banks, they were mostly cross-country studies. Furthermore, the studies (especially the empirical ones) on the relationship between excess liquidity and banking sector and its types were very sparse. As mentioned earlier that lending and excess liquidity were related (and since this work was on the excess liquidity), therefore it would be pertinent to look into how the excess liquidity situation of different types of banks varied with the business cycle and also with the financial crisis.

5.4.1 Dependent Variable

From the earlier studies, it was generally observed that during economic recession or crisis, there would be more excess liquidity and there would be generally an inverse relationship between excess liquidity and the business cycle. This relationship would be similar in times of crisis also. However, different typologies based on bank-specific characteristics might not be related in the same way and for each classification, there could be variation in the direction, degree and significance of the relationship (discussed in detail in sections 4.3.3 and 5.1.3). To investigate this relationship, excess liquidity would be the dependent variable to see how it was affected by different typologies of banking. Additionally, business cycle and the financial crisis were also included in the analysis to see their relationship with excess liquidity.

The data was collected from Bankscope. The excess liquidity was calculated by summing up: trading securities and at fair value through income, loans and advances to banks, reverse repos and cash collateral and cash and due from banks. Then mandatory reserves included above were deducted. As there were banks of different sizes according to assets, therefore growth rate of liquid assets was taken to proxy for the excess liquidity to avoid the scale problem. Logarithm values of these were taken first and then growth rate was calculated by deducting the log value of the previous year. Hence, one observation was lost per series.

5.4.2 Explanatory Variables

5.4.2.1 Standard Control Variables from Earlier Studies on Lending and Excess Liquidity

Different explanatory variables were used in the studies of lending. Of them, some variables may also impact the excess liquidity. These include: capital, size, age, economic growth and inflation rate. Of these, the first three were bank-specific variables while the last two were macroeconomic. Among the macroeconomic variables, a measure similar to GDP growth has been used to empirically emulate the business cycle. Therefore, this variable was not included.

Different studies captured the effect of macroeconomic variables. Among the cross-country studies, Allen et al. (2013) employed GDP growth and inflation rate to capture the effect of the macroeconomic variables.

GDP growth rate: GDP growth rate was used extensively in different works to see the effect of macroeconomic variables (Micco et al., 2007; Bertay et al., 2012; Allen et al., 2013). There could be two possible effects of economic growth on excess liquidity. On one hand, economic growth would continuously increase the lending opportunities of the banks and reduce excess liquidity. On the other hand, there would be higher demand for deposits with the improvement in the overall economic condition of the people, making banks cautious to keep enough deposits which might lead to higher excess liquidity.

In their study on 111 countries, Bertay et al. (2012) used constant per capita GDP. In an even bigger study of 179 countries, Micco et al. (2007) used the GDP growth rate. Following Micco et al. (2007), GDP growth rate was used in this study.

Inflation: Inflation could also possibly play a role in excess liquidity situation of the banks. This relationship and the logic were very similar to that of economic growth. There could be two possible effects of inflation on excess liquidity. On one hand, inflation would continuously increase the demand for loans of the banks which would reduce excess liquidity. On the other hand, there would be higher demand for deposits due to devaluation of money because of inflation, forcing banks to keep more deposits which may lead to higher excess liquidity.

Among the country-specific studies, Akinboade and Makina (2010) used inflation as one of the variables in their study on South Africa. Bertay et al. (2012), in their study on 111 countries, measured inflation as the percentage change in the GDP deflator and used the World Development Indicators database of 2011. Bhaumik et al. (2011) used industry growth in their study on India as for that particular scenario, which was more relevant than the GDP growth (Bhaumik and Piesse, 2008). They also used inflation but found insignificant result³².

Reserve requirement: Earlier studies on excess liquidity used various factors as the determinants of excess liquidity. One of the most important variables of excess liquidity that emerged from the previous studies was reserve requirement. With the same amount of deposit available, if the reserve requirement was higher in the banking sector then it was expected that there would be lower excess liquidity while lower reserve requirement (assuming the same amount of deposit) would mean banks have higher excess liquidity. Therefore, reserve requirement was expected to have negative relationship with the dependent variable.

³²Our observation was also similar in preliminary estimation. Therefore, inflation was not included in the final regression.

In their study on Thailand, Agenor et al. (2004) included it as one of the explanatory variables and found it to be significant. Aikaeli (2011) also studied the excess liquidity problem for Tanzania and found that along with other variables, the rate of required reserves was also responsible for accumulation of excess liquidity in commercial banks in Tanzania. One point that needs to be noted was that the inclusion (and significance) of this variable depends on how excess liquidity was measured. If, as many studies had done before, excess liquidity was proxied by bank liquidity then reserve requirements should be included as an explanatory variable. If, however, excess liquidity was measured net of required reserves then it should not be included as an explanatory variable. Since this study used the second type of definition of excess liquidity, therefore this variable was not included in the final regression.

Period of stress: There was also an indication in the literature that excess liquidity might vary during periods of stress relative to normal situations, leading to greater asset price volatility during the former and so disrupting liquidity targets (Cohen and Shin, 2003). Morrison (1966) did a study on banks' demand for excess reserves in both banks' panic and non-panic periods. He concluded that excess reserves were held as a buffer to avoid asset transaction costs emanating from unforeseen and transitory deposit shocks. This sort of excess liquidity could also be interpreted as an insurance against deposit outflows. Al-Hamidy (2013) found that turbulent international markets slowed down domestic credit growth and increased excess liquidity for the economy of Saudi Arabia.

Political motive: One possible reason for changes in excess liquidity situation in the banking sector was the political situation. Fielding and Shortland (2005) estimated a time-series model of excess liquidity for the Egyptian banking sector and observed that political instability increased excess liquidity while Micco et al. (2007) found that political consideration played a role in lending differences according to bank ownership. This view was also found by others like Cole (2009) for India, Khwaja and Mian (2005) for Pakistan, Carvalho (2010) for Brazil, Sapienza (2004) for Italy, and Dinc

(2005) for a cross-country study. Normally dummy variables for election years were used to see this relationship. For example, Micco et al. (2007) used a dummy variable for election that was equal to 1 when the country was in election year and zero otherwise.

The main reason for this was that sometimes election years had a significant impact on bank lending (Dinc, 2005) due to the pressure from politicians during that time to win the elections. Khwaja and Mian (2005) also found political influence as an important factor for lending by public banks in Pakistan. However, this was not true for all cases as Chen and Liu (2013) found that lending of public banks do not change during the election years and private banks lend more during election years in Taiwan.

An interesting term has been used by Bhattacharya (The News Today, 2013) which ascertains that election years can be related with the business cycle. According to him:

“Ahead of the election, the country enters into a ‘political business cycle (PBC)’. So, both the opposition and ruling leaderships need to deal with the matter so that country’s economy does not experience any shock.”

Hence, it was important to see if political motive played any role in the excess liquidity situation. As election years were mainly used to see if and how the political motive plays any role, therefore dummy was used here for this variable where the value was 1 for election years and 0 otherwise. The value of 1 was only assigned when the full parliamentary elections were held³³.

5.4.2.2 Key Variables of Interest

The main variables of interest in this study were business cycle and the financial crisis. Bank typology variables were also included to see if there was any pattern among different types of banks in terms of excess liquidity

³³ This is in line with the work of Chen and Liu (2013) where the value of 1 was given only when the Presidential elections took place.

due to business cycle and the financial crisis. The main objective was to see whether different types of banks vary in their excess liquidity situation in relation to business cycle and the financial crisis. It could shed important light if it was known that any particular type of banking has procyclical, counter-cyclical or acyclical relationship with business cycle and the financial crisis.

Some of the standard variables in the literature were also incorporated to see the direction and significance of their relationship. Measurement of these determinants in the context of bank-level study of excess liquidity was also discussed.

Business cycle: Among the explanatory variables, the main variable of interest was the business cycle. Business cycle could be defined and identified as showing high and low economic growth in an economy. While the boom period of the business cycle could lead to higher loan demand, it was expected that there will be less excess liquidity in the banks. However, banks would also need to keep higher amount of deposits to meet the demand of the customers who were expected to spend more during the boom periods.

It could be measured in many ways but the most conventional method of measuring it was through the GDP growth rate (Micco and Panizza, 2006). It was observed that GDP growth at both aggregate (Duprey, 2013) or at individual level (i.e. GDP per capita growth rate), was used for this purpose (Bertay et al., 2012). While the first one was more relevant to see how the expansion of GDP affected the relevant variable, the latter one was more related with the development issues. Among these two, the more conventional way of estimating business cycle was by measuring with the GDP growth rate. However, there were many other sophisticated methods³⁴ to calculate it and one of the most common one was the Hodrick-Prescott (HP) method, proposed by Hodrick and Prescott (1997). Because of its many

³⁴ These include the Phase-Average Trend (PAT) method, the Christiano-Fitzgerald (CF) filter, the Baxter-King (BK) filter and the Multivariate Direct Filter Approach (MDFA).

advantages, the HP filter was used in this study. The advantages include its flexibility and its ability to calculate by minimising the gap between the actual and trend output and the trend output rate change. Another major advantage of the HP filter was that it can be applied even when the data was nonstationary.

The HP filtered output trend and the output gap between actual and potential GDP was also used (Duprey, 2013). This variable, defined as 'MacroShock' by Duprey (2013), was used in both absolute and interaction form. Akinboade and Makina (2010) used coincidental indicators to represent the business cycle. The index of coincidental indicators³⁵ was a combination of different business cycle indicators which moved along with the economy and hence a positive value indicates higher economic growth and vice versa.

Stolz and Wedow (2005) used different measures to calculate business cycle fluctuations in their study on Germany. These included: i) the real GDP growth rate; ii) the real GDP growth rates by state (SGDP); and iii) the real output gap (measured by subtracting a non-linear trend from real GDP using the HP filter).

As mentioned before, the HP method was proposed by Hodrick and Prescott in 1997 (although their original work appeared in the form of a working paper in 1980). One major advantage of it was that it may be applied when the data was nonstationary. This removed a major problem which was faced by researchers when macroeconomic or financial data were used (Baum, 2006). It was also flexible and was able to calculate by minimising the gap between the actual and trend output and the trend output rate

³⁵Coincidental indicators are indicators of the state the economy is in at the present, including: number of employees outside of the agriculture sector, personal income less transfer payments, industrial production and manufacturing and trade sales. These indicators occur at approximately the same time as the conditions they signify. Rather than predicting future events, coincidental indicators change at the same time as the economy. For instance, personal income is a coincidental indicator for the economy: high personal income rates will coincide with a strong economy.

change. For these advantages, the HP filter was still used extensively (Woitek, 1998; Gyomai and Wildi, 2013).

The HP filter was an algorithm that “smoothes” the original time series y_t to estimate its trend component τ_t . The cyclical component c_t was the difference between the original series and its trend, i.e.,

$$y_t = \tau_t + c_t \quad (5.1)$$

Where τ_t was constructed to minimise:

$$\sum_1^T (y_t - \tau_t)^2 + \lambda \sum_2^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2$$

The first term was the sum of the squared deviations of y_t from the trend and the second term, which was the sum of squared second differences in the trend, was a penalty for changes in the trend’s growth rate. The larger the value of the positive parameter λ , the greater the penalty and the smoother the resulting trend will be. If, e.g., $\lambda = 0$, then $\tau_t = y_t$, $t = 1, \dots, T$. If $\lambda \rightarrow \infty$, then τ_t was the linear trend obtained by fitting y_t to a linear trend model by OLS.

For quarterly data, Hodrick and Prescott suggested a value of $q = 1/1600$. This value was used and referred to as a smoothing constant. For annual data, Harvey and Trimbur (2008) commented that a smoothing constant value of 6.25 for annual data would be equivalent to 1600 for quarterly data. This smoothing parameter of 6.25 for annual data has been applied by researchers (e.g. Duprey, 2013; Ravn and Uhlig, 2002) and was also applied in this study to estimate the business cycle for Bangladesh.

Although the HP filter still remained a very popular method, there were many other filters. Among these other measures of detrending and calculating the business cycle, the most prominent ones include the PAT method, the CF filter and the BK filter. The PAT method was used in combination with the Bry-Boschan turning point detection algorithm. The

resulting medium-term cycle was smoothed by the Months for Cyclical Dominance (MCD) method to yield the final smooth cycle. Baxter and King (1995) constructed the BK filter which was a bandpass filter of finite order K which was optimal in the sense that it was an approximate bandpass filter with trend-reducing properties and symmetric weights which ensure that there was no phase shift in the filter output. The CF random walk filter was a band pass filter that was built on the same principles as the BK filter. These filters formulate the de-trending and smoothing problem in the frequency domain.

Harding and Pagan (2005) stated that cycles can be measured in three main ways: i) classical (or business) cycles that were measured by the fluctuations in the level of an economic variable; ii) deviation cycles that were measured by the differences between the level and permanent component of an economic variable; and iii) growth rate cycles that were measured by the growth rates of level variables. Egert and Sutherland (2012) observed that HP method was a good way to determine the business cycle.³⁶ As mentioned earlier, one major advantage of the HP filter was that it could be used even if the data was nonstationary which removed a major problem generally faced when macroeconomic or financial data were used. Therefore, HP filter was used in this study to derive the business cycle for Bangladesh. The HP trend value of log of GDP was estimated first and then the difference was taken from the actual value to identify the business cycle.

Financial crisis: There were very few empirical works on the relationship between excess liquidity and the financial crisis. One of the determinants of the excess liquidity studies in general, the deposit volatility, was included in these works (Pontes and Murta, 2012). This was measured by Pontes and Murta (2012) for Cape Verde as the moving average of the standard deviation of private sector deposits divided by the moving average of the same variable. Fadare (2011) examined the banking sector liquidity

³⁶ The cycle can also be measured by the growth rate of customer loans, by GDP growth, and by the growth rate of house and share prices (Egert and Sutherland, 2012).

for the economy of Nigeria to see the effect of the financial crisis. A different approach was taken by him where the basis was to see if the actual loan-to-deposit ratio was above or below the predicted value. If the actual value was above the predicted value, then it implied less liquid assets while less actual value than the predicted value meant more liquid assets. This approach reflected the comment made by Moore (2009):

“If the actual loan-to-deposit ratio is above the predicted value this would suggest that commercial banks were less liquid than is consistent with fundamentals, while if the actual ratio is below the predicted value commercial banks were more liquid than what is consistent with economic fundamentals.”

This approach was applied for the specific years of the financial crisis (i.e. 2007-09) and was found that during the financial crisis, the banks in Nigeria became much less liquid and hence more vulnerable to the crisis although in normal or non-crisis times, the banks were normally holding excess liquidity.

The possible final effect of the financial crisis was also ambiguous since it was expected that initially there would be higher excess liquidity in the banks due to lower demand and higher risk. However, as governments and other organisations recapitalise the banking sector during these periods to boost the economy, banks would be able to lend more and thereby reduce excess liquidity situation. Again, there can be higher excess liquidity if banks lend less than they were recapitalised.

Like the business cycle variable, the financial crisis variable can also be used in both absolute and interaction terms. They were generally given value of 1 for the crisis dummies in years 2008 and 2009 and 0 for others. The interactions of crisis and public bank dummies can show how public banks performed in this period relative to private banks. Dummy variable for crisis was also used by Allen et al. (2013). Kapan and Minoiu (2013) divided the sample period into ‘before’, ‘shock’ and ‘after’ period where the shock period was from July 2007 to September 2008, which was the

period of US subprime crisis. Davydov (2013) used crisis dummy variable that equals one in fiscal years 2008, 2009 and 2010.

Although the financial crisis started in September 2007, the effect of it reached Bangladesh in 2008 and the effect continued in the following year. Therefore, 2008 and 2009 were the most appropriate years and were given value of 1 during these two years. The interactions of crisis and bank typology dummies were used to see how the excess liquidity situation differed for different types of banks. This was in line with some of the earlier studies (Cull and Peria, 2012) that used dummy variables to see the lending pattern during and after the financial crisis.

Capital: Of the bank-level variables, capital was measured by bank equity as ratio of total assets. If the study was related to the financial crisis (as in this case), it would be ideal to include the capital variable as one important feature after the financial crisis was to recapitalise the banking sector in order to increase the flow of money in the economy. Therefore, it was not only interesting but became important to see how, if at all, it affected the excess liquidity situation in the banking sector around the time of the financial crisis. Since highly capitalised banks would be able to lend more, therefore it was expected to have a negative relationship with excess liquidity.

Ownership variable: It was mainly been measured with the help of dummy variable. For the ownership dummy, value of 1 was given if it was a public bank and 0 otherwise. Bank ownership dummy variable was also been used by Van den Heuvel (2002), Gambacorta (2005) and Allen et al. (2013).

Size variable: Another explanatory variable that was used quite often in the earlier studies was the size variable (Vihriala, 1997; Allen et al., 2013; Davydov, 2013). In most cases, the asset values were taken from Bankscope. But it was measured differently in different works. These include: (i) banks average total asset divided by the average total asset of the country, (ii) asset of the bank relative to top 20, and (iii) growth rate

of number. Of all these measures, the first measure showed bank size in absolute terms while the rest of them indicated the variable in relative term (Cull and Peria, 2012; Duprey, 2013).

Age variable: In country-level studies, similar variables were used (Beck et al., 2005; Lin and Zhan, 2009). Beck et al. (2005) also included the age variable with the notion that it could have positive effect on its performance³⁷ due to the experience of older banks while it also had the possibility of negative effect if newer banks gained more rent in foreign exchange rate market. According to them, older and smaller banks performed poorly than newer and bigger banks.

Of the above two concepts, the size variable was not used separately as one of the typologies used in this study was bank size. Similarly, the age variable was also not to be used since another typology (old versus new) covers the effect of this variable.

5.5 METHODOLOGY

If time (T) was short and number of observations (N) was large, then a surprising amount of difference can happen in the estimates of the parameters. The discussion should then not be about the ‘true nature’ of the effects α_i but should be whether the FE approach was conditional upon the true values for α_i . Therefore, it essentially considered the distribution of y_{it} given α_i , where the α_i s could be estimated. This made sense intuitively if the individuals in the sample could not be viewed as a random draw from some underlying population. On the other hand, the RE approach was not conditional upon the individual α_i s, but integrated them out. So the RE approach allowed to make inference with respect to the population characteristics (by focusing on arbitrary individuals with certain characteristics). To see which one of these was true, Hausman (1978) suggested a test for the null hypothesis that x_{it} and α_i were uncorrelated.

³⁷Performance is one of the five variables measuring the performance of bank i at time t . As noted, those variables include return on equity (ROE), return on assets (ROA), and the share of total loans that were non-performing. ROE and ROA were both used including and excluding foreign exchange revenues.

In this test, two estimators were compared where one was consistent under both the null and alternative hypothesis while the other estimator was consistent under the null hypothesis only. The FE estimator of β was consistent irrespective of whether x_{it} and α_i were uncorrelated while RE estimator of β will be consistent only when x_{it} and α_i were uncorrelated. Using the covariance matrix of β_{FE} and β_{RE} , the Hausman test was used to check whether the FE or the RE method were significantly different. As mentioned above, existence of correlation between x_{it} and α_i could be crucial on whether the two estimators would be different. For a more detailed discussion, see Verbeek (2004: 351-352). A similar approach was used by others before (e.g. Duprey, 2013).

In this study, the following two estimation methods of panel regression were applied: fixed effects and random effects. The Hausman test was applied here to compare the FE and the RE method of panel estimation. The null hypothesis was that the individual effects were uncorrelated with the other regressors in the model (Hausman, 1978). The null hypothesis was also checked to see if both the estimators could be used. So, if the null hypothesis was rejected then it implied that RE model would produce biased estimators and therefore FE model was preferred. On the other hand, if the null hypothesis was accepted, it was standard to use both FE and RE methods³⁸ as the null implied that the estimator was indeed an efficient (and consistent) estimator of the true parameters, so there should be no systematic difference between the two estimators when the null was accepted. If the alternative hypothesis was accepted then it meant that FE should be used rather than RE and there would be a difference between the two sets of coefficients.

This was because the random effects estimator makes an assumption (the random effects are orthogonal to the regressors) which the fixed effects estimator does not. If this assumption is wrong, the random effects

³⁸ Similar approach was applied by Duprey (2013) and Allen et al. (2013). Detailed technical explanation was given by Schaffer (2014) in the following link: <http://www.stata.com/statalist/archive/2003-09/msg00595.html> (accessed on 6 August 2014).

estimator will be inconsistent but the fixed effects estimator will remain unaffected. Hence, if the assumption was wrong this will be reflected in a difference between the two sets of coefficients. The bigger the difference (the less similar were the two sets of coefficients), the bigger will be the Hausman statistic.

The reason for not applying GMM here was that this model did not have the lagged dependent variable. This was one of the reasons for using GMM method since it was advantageous when a lagged dependent variable is part of the model (Verbeek, 2004). GMM was also advantageous when there was possible endogeneity problem (Gali and Gertler, 1999). In this study, the lagged dependent variable was not one of the explanatory variables while the business cycle variable was taken at lag level and to avoid any possible problem of endogeneity.

5.5.1 The Model

The FE method examined the relationship within an individual where each individual had its own characteristics that could affect the predictor variables while the variation across individuals was assumed to be random and uncorrelated with the predictor or independent variables in the RE model (Torres-Reyna, 2007). According to Greene (2008, p.183):

“...the crucial distinction between fixed and random effects is whether the unobserved individual effect embodies elements that are correlated with the regressors in the model, not whether these effects are stochastic or not.”

To decide which of these tests should be applied, it is a standard practice to use the Hausman test. This test checks whether the unique errors were correlated with the regressor with the null hypothesis was that they were not (Torres-Reyna, 2007). A large and significant Hausman statistic means the null was rejected implying that both the methods would give similar results while if the null was accepted then FE should be used and not RE. Result of the Hausman test is given below:

Table 5.1: The Hausman test result

H_0	FE and RE estimators do not differ substantially
$chi^2(4)$	2.86 (0.5818)

The result showed that the null hypothesis was not rejected. Therefore, both FE and RE methods were applied. A similar approach has been used by others before (Allen et al., 2013; Duprey, 2013). In this study, FE was applied first followed by RE. Following Duprey (2013), the model below was applied in this study:

$$EL_{it} = \alpha_0 + \beta_1 BC_{it} + \beta_2 BC_{it} * BT_{it} + \beta_3 FC_{it} + \beta_4 FC_{it} * BT_{it} + \beta_5 Z_{it} + u_{it} \quad (5.2)$$

Here, BC represented the business cycle and could be measured with the deviation from the HP filtered output trend or the output gap between actual and potential GDP. Bank typology variables were represented by BT which include ownership, size, mode of operation and age. The financial crisis was showed with FC and can be measured with the dummy variable of 1 when there was financial crisis and 0 otherwise. Here, EL was excess liquidity and Z was representing the set of control variables. The subscript i was representing the banks while t was showing the years.

Whether the banking sector behaved in a procyclical or counter-cyclical manner according to ownership can be analysed using bank-level data. The main source of data used in this paper was the Bankscope database. For bank-level data, Bankscope contained annual income statements and balance sheet data for individual banks. Some publications from Bangladesh Bank and other government publications were also used.

Although most of the banks had 15 years of data in the Bankscope database but there were some banks for which 15 years of data were not available. In some cases, there was some missing years inside the series. Out of 38 banks (excluding the foreign banks), data were available in Bankscope for

37 banks (detailed description of data availability were given earlier in Appendix 4.1).

Regarding the form of the data available, it was available in both consolidated and unconsolidated forms for 18 banks, available only in unconsolidated forms for 16 banks and available only in consolidated forms for only 3 banks. Since the unconsolidated data availability was more, so most of the data were taken from unconsolidated sources. Taking data mainly from the unconsolidated sources was in line with Duprey (2013). However, taking consolidated data along with unconsolidated ones was also in line with some earlier works (Ehrmann et al., 2001; Cihak and Hesse, 2008).

Among other sources, the treasury bill rate data was collected from various issues of annual reports published by the Bangladesh Bank. Some of them were taken from the paper of Ahmed and Islam (2004). The GDP growth and the inflation rate data were collected from various issues of Bangladesh Bank Annual Report.

5.6 EMPIRICAL RESULTS AND DISCUSSION

Excess liquidity data and its characteristics were presented before in the earlier empirical chapter and therefore not repeated here. Here the empirical results are described first followed by a discussion of the results.

5.6.1 Empirical Results

The correlation matrix of the dependent variable and the explanatory variables are presented below in Table 5.2. This correlation matrix shows that the model was free from the problem of multicollinearity. Observed correlations were also found to be significant in almost all cases. This confirmed the finding of the correlation matrix.

Table 5.2: Correlation matrix of EL, BC, FC and other variables of interest

	Excess liquidity (EL)	Capitalisation	Election	Business cycle	Financial Crisis
EL	1.0000	---	---	---	---
CAP	0.0773*	1.0000	---	---	---
ELEC	0.0609	0.0021	1.0000	---	---
BC	0.0842*	-0.1533*	-0.0902*	1.0000	---
FC	-0.0822*	0.1834*	0.4155*	-0.5419*	1.0000

* Significant at 5% level.

The estimation used panel data, which had the advantage of allowing controlling for unobserved individual heterogeneity that was constant over time. Although the simple OLS estimator was unbiased but it was not efficient and the standard errors were wrong since those did not take into account the independence of the error term within individual over time.

The RE estimator take into account of this correlation structure to estimate the parameters efficiently by weighting the observations on the basis of a consistent estimate applying the generalised least squares (GLS) estimator. However, one shortcoming of the RE estimator was that it assumed that the individual effect was uncorrelated with the regressors. This assumption was not particularly true and therefore was not very practical to apply because of its weakness in assumption.

A more realistic scenario was when the unobserved individual effects were correlated with the regressors. In such a situation, OLS and RE estimators were biased and inconsistent. A solution to this was to estimate the model with a separate intercept for every individual by OLS. This can be done by Least Square Dummy Variable (LSDV) estimator. A computationally convenient alternative of this was the FE Estimator.

The estimates were done where a baseline equation was estimated first followed by interaction terms in the next step. The results are reported in the following tables.

Table 5.3: EL estimates applying FE

Variable	Coefficient
CAP	0.190* (0.105)
ELEC	0.160*** (0.045)
BC	-3.964*** (0.651)
FC	-0.033 (0.051)
Asset	---
Age	---
F-value	14.15 (0.000)
No. of banks	35
Observations	440

Note 1: Standard errors were in parentheses to the right of the respective estimated coefficients.

Note 2: * Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

One of the main variables of interest in this study was business cycle. It can be observed from the results that business cycle was negatively affecting the excess liquidity situation of the banking sector where the coefficient value is -3.964.

Among other key variables of interest, the political motive was found to be consistently significant with a positive sign implying that during election years, the banks were not more inclined towards lending (coefficient value of 0.160). On the positive note, this imply that the politicians do not or cannot force the banks for higher lending during this time to influence the election result by implementing different development works at that time. Conversely, on the negative note, this could imply that the situation became uncertain and banks wanted to move carefully about their lending decision. This could be particularly true for Bangladesh as election years generally remained tense and borrowers as well as banks took a cautious approach during this time to gauge the situation and lend less.

Capitalisation was found to be positive (0.190) but significant only at 10 per cent level. Generally it was observed that increased capitalisation could lead banks towards more lending. This was a principle that was applied during the recent financial crisis to bail out the banking sector. However, if increase in lending was less than increase in capitalisation then it would lead towards increased excess liquidity. Since the period of study was 15 years in which a couple of years were directly related to the financial crisis (along with capitalisation), therefore it might have led to this positive but not very significant relationship.

The study period of this analysis (1997-2011) covered the recent financial crisis of 2007. Moreover, there was an opinion that business cycle and financial crisis were related as prolonged period of recession could lead to financial crisis. With both the opinion mentioned above, this study examined if there was any relationship between the recent financial crisis of 2007 and the excess liquidity in the banking sector in Bangladesh.

Unlike the business cycle, the financial crisis was not significant. This implied that the banking sector faced the situation very well and had withstood the negative effects of the financial crisis.

In earlier studies, it was generally found that bank ownership could play a role in terms of lending in times of business cycle with public banks acting less procyclically than the private banks. In this study, the aim was to see if this also holds for the excess liquidity situation in banks. Moreover, some additional typologies of size, mode of operation and age were included to see if there were any differences in terms of excess liquidity according to these typologies.

The results here showed that the coefficient of the interaction term of BC and public ownership was positive. It implied that public banks had higher excess liquidity than private banks. One of the reasons for this could be lower lending by public banks than their counterparts, showing that public banks were less procyclical than private banks. This supported the findings

of earlier works where public banks were found to be less procyclical than the private banks. This implied that in good economic times, the public banks respond less swiftly than their counterpart resulting in higher excess liquidity. During times when growth was less than average, then they also react slowly to lower their lending. Another reason that plays a role in lower liquidity during this time was the fact that government generally stepped in to increase investment. This was mainly carried out by public banks. The variation in the coefficients of this variable can be due to the large standard errors of the coefficients.

Table 5.4: EL estimates applying FE with bank typologies

Variable	Ownership	Size	Mode of operation	Age
	Coefficient	Coefficient	Coefficient	Coefficient
CAP	0.129 (0.100)	0.239** (0.101)	0.191* (0.105)	0.245** (0.101)
ELEC	0.155*** (0.046)	0.141*** (0.043)	0.159*** (0.045)	0.141*** (0.044)
BC	-4.632*** (0.603)	7.213*** (2.858)	-3.307*** (1.134)	6.565** (2.644)
Public* BC	6.473** (1.730)	---	---	---
Large* BC	---	-3.965*** (1.176)	---	---
Islamic* BC	---	---	-0.795 (1.369)	---
New* BC	---	---	---	-3.822*** (1.117)
FC	-0.048 (0.053)	-1.505*** (0.302)	0.013 (0.103)	-1.436*** (0.283)
Public* FC	0.063 (0.119)	---	---	---
Large* FC	---	0.546*** (0.116)	---	---
Islamic* FC	---	---	-0.056 (0.116)	---
New* FC	---	---	---	0.534*** (0.111)
F-value	16.35 (0.000)	14.69 (0.000)	13.01 (0.000)	16.31 (0.000)
No. of banks	35	35	35	35
Observations	440	440	440	440

Note 1: Standard errors were in parentheses to the right of the respective estimated coefficients.

Note 2: * Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

The large banks³⁹ were found to be acting more procyclically with the business cycle as the coefficient of the interaction term of BC term and large bank was negative. This showed that large banks were less procyclical than small banks. As large banks lent more to large companies, it was logical to think that these companies react quickly with the change in the economic environment while smaller ones were affected with some delay. It was also possible that they were affected to a much lesser extent by the business cycle.

Berger and Black (2011), in their study, mentioned that large banks lent more to large companies. This was basically due to the advantage in terms of hard information that was more available for large companies. The authors also mentioned that “Large banks were considered to have comparative advantages in hard technologies because they have economies of scale in the processing and transmission of hard information, and may be better able to quantify and diversify the portfolio risks associated with hard-information loans. Conversely, large banks may be disadvantaged in processing and transmitting soft information through the communication channels of large organisations (e.g. Stein, 2002). Lending based on soft information may also be associated with agency problems within the financial institution because the loan officer was the main repository of the information, giving a comparative advantage to small institutions with fewer layers of management (e.g. Berger and Udell, 2002) or less hierarchical distance between the loan officer and the manager that approves the loans (e.g. Liberti and Mian, 2009).”

However, recently there was a trend for large banks to use hard information technology to increase their lending for small firms. For example, credit scoring information of small firms was used for lending decisions of banks. Different studies confirmed the possibility of banks using a hard technology to expand their small business lending or improve their information sets about very small customers, depending on how the

³⁹In this study, the dummy value of 0 is given for a bank in years when the assets of a bank are below the threshold while it is given 1 when it is over the threshold.

technology was implemented (e.g. Frame et al., 2001; Berger et al., 2005; Berger et al., 2005; DeYoung et al., 2008).

In case of Islamic banking, it was found that the relationship was negative and insignificant. This showed that there was no significant difference between Islamic and conventional banks in terms of excess liquidity with respect to business cycle. This could be due to the judiciousness from Islamic banks in competing and surviving with the conventional banks even though Islamic banks were generally in a disadvantageous position due to the fact that they could not use all instrument of conventional banking due to restrictions in Islamic law.

Finally, the age variable was found to be negatively and significantly related with the business cycle variable. This implied that newer banks were more procyclical in their behaviour with relation to business cycle. Since new banks use modern technologies of banking more than others, it was easier for them to react quickly with changes in the economy.

Regarding the recent financial crisis and relationship of different bank typologies with excess liquidity, the results were again mixed. For ownership and mode of operation typologies, the coefficients were insignificant. For both size and age typologies, the relationships were positive and significant implying that both large and new banks lent comparatively less during the financial crisis than small and old banks respectively. This could be either due to the fact that they were more careful or could afford to lend less and still survive during the time of crisis. It could also mean that a higher fraction of their assets was impaired.

Application of RE Method: The relationship between business cycle and the financial crisis with excess liquidity was also estimated applying the RE method.

The result was very robust as the business cycle variable was again found to be negatively significant while the relationship of the typologies of ownership, size and age were found to be significant. In line with the FE results, election was found to be positively significant in all cases while the significance level of capitalisation was much lower.

Table 5.5: EL estimates applying RE with bank typologies

Variable	Ownership	Size	Mode of operation	Age
	Coefficient	Coefficient	Coefficient	Coefficient
CAP	0.176** (0.090)	0.198** (0.080)	0.190** (0.089)	0.204** (0.081)
ELEC	0.167*** (0.048)	0.148*** (0.044)	0.171*** (0.048)	0.147*** (0.045)
BC	-4.085*** (0.662)	7.377*** (2.038)	-2.817*** (0.944)	6.491*** (1.912)
Public* BC	1.734 (1.468)	---	---	---
Large* BC	---	-3.928*** (0.806)	---	---
Islamic* BC	---	---	-1.242 (1.240)	---
New* BC	---	---	---	-3.699*** (0.762)
FC	-0.078 (0.057)	-1.444*** (0.299)	-0.070 (0.107)	-1.375*** (0.282)
Public* FC	0.210** (0.104)	---	---	---
Large* FC	---	0.518*** (0.114)	---	---
Islamic* FC	---	---	0.020 (0.124)	---
New* FC	---	---	---	0.504*** (0.110)
F-value	75.53 (0.000)	89.71 (0.000)	62.39 (0.000)	99.19 (0.000)
No. of banks	35	35	35	35
Observations	440	440	440	440

Note 1: Standard errors were in parentheses to the right of the respective estimated coefficients.

Note 2: * Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

The findings of the financial crisis were also very similar to that obtained using FE method. The financial crisis variable was found to be insignificant implying the effect of the crisis on excess liquidity was not as

comprehensive as of business cycle. Among the typology variables, both large and new banks were found to be positively significant again. However, as may be noted, the results for public banks were not so robust.

5.6.2 Discussion of Results

This study analysed how the business cycle affected the excess liquidity situation in the banking sector in Bangladesh. Although there were many studies on how business cycle affects the lending pattern of the banking sector, research on relationship between business cycle and excess liquidity was very scarce. The aim of this study was to fill this void in the literature.

Since the study period covered the great recession that started in 2007 and as the business cycle bust for a sustained period could lead to crisis, therefore the financial crisis was also included to see if and how it affected the excess liquidity of the banking sector in Bangladesh. The relationship of excess liquidity with the financial crisis was found to be different from the relationship with business cycle. It showed insignificant relationship which supports the strength of the banking sector as well as the economy in Bangladesh in facing this crisis.

Significant and positive value of the political motive variable showed that banks did not lend excessively during election years. This is a good sign since political influence is used in some countries during the election years. Capitalisation was another key variable of interest which was also found to be positive but significant at a lower level, confirming the earlier results.

Another contribution of this study was to see if there were any definite patterns for different types of banks. To address this, four different typologies of banks were included in this study. The results showed that business cycle had a significant negative effect on the excess liquidity of the banking sector in Bangladesh.

Among the typology variables, the results showed that the public banks acted less procyclically than the private banks validating earlier general findings on lending (Bertay et al., 2012; Davydov, 2013). New and large banks were found to behave more procyclically with the business cycle than their counterparts. No significant difference could be observed between conventional and Islamic banks.

During the financial crisis, among the typology variables, the size and age typologies were found to be positive and significant. These relationships implied that large and new banks had higher amount of excess liquidity due to the financial crisis. For large banks, this could be due to their lack of flexibility relative to the small banks and the diseconomies of scale after a certain threshold level. For new banks, this could be due to their inexperience relative to the older banks. The relationships were insignificant for other typologies.

Variation in Capitalisation

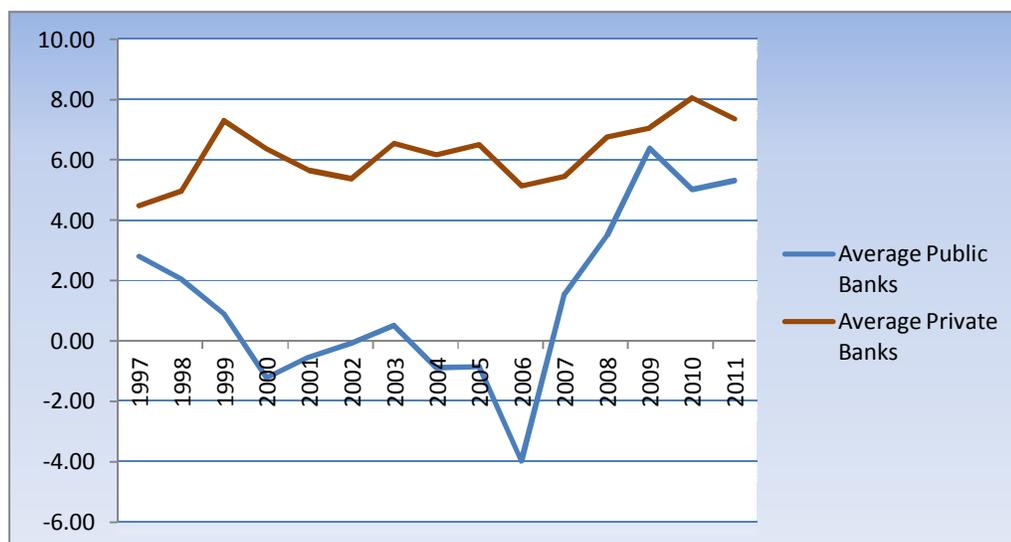
Variations in capitalisation according to different bank-specific characteristics can play a significant role in difference in excess liquidity. It was observed that there was significant inverse relationship between capitalisation and excess liquidity as better capitalised banks had easier access to markets and thus held less liquidity (Delechat et al., 2012).

Ownership Typology

Capitalisation for ownership typology showed that although they were not very distant at the beginning of the study period, they gradually diverged over time. Although there were years where there was convergence, still a substantial gap remained with average capitalisation of the private banks which remained significantly higher than the public banks.

This higher capitalisation of private banks could explain why private banks generally behaved counter-cyclically. It could be seen that during the financial crisis, capitalisation of the public banks increased which led public banks to lend more during these times.

Figure 5.1: Capitalisation according to ownership

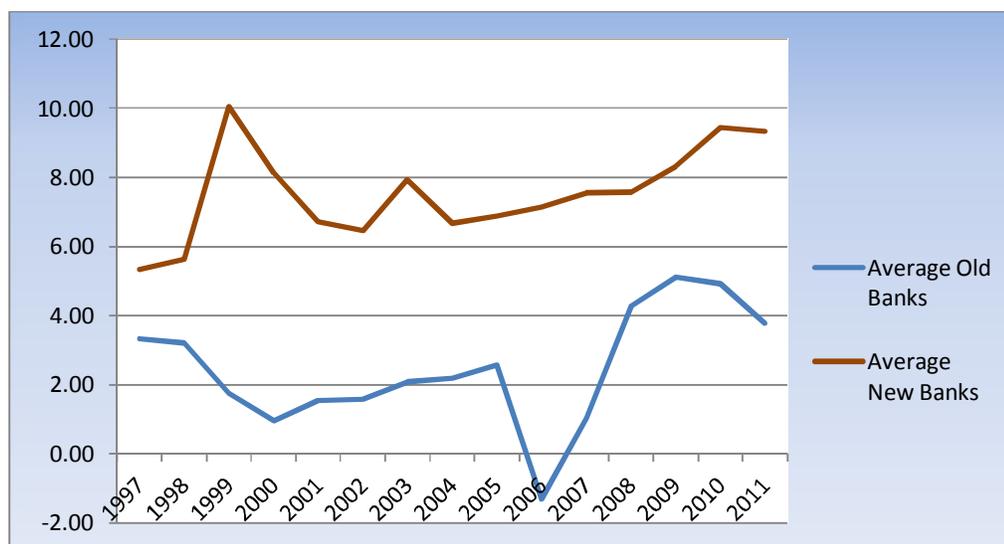


Source: Author's own calculation based on Bankscope database.

Age Typology

For age typology, gap in capitalisation was relatively small in 1997 but the gap increased dramatically in the next year and remained so for most of the period of this study.

Figure 5.2: Capitalisation according to age



Source: Author's own calculation based on Bankscope database.

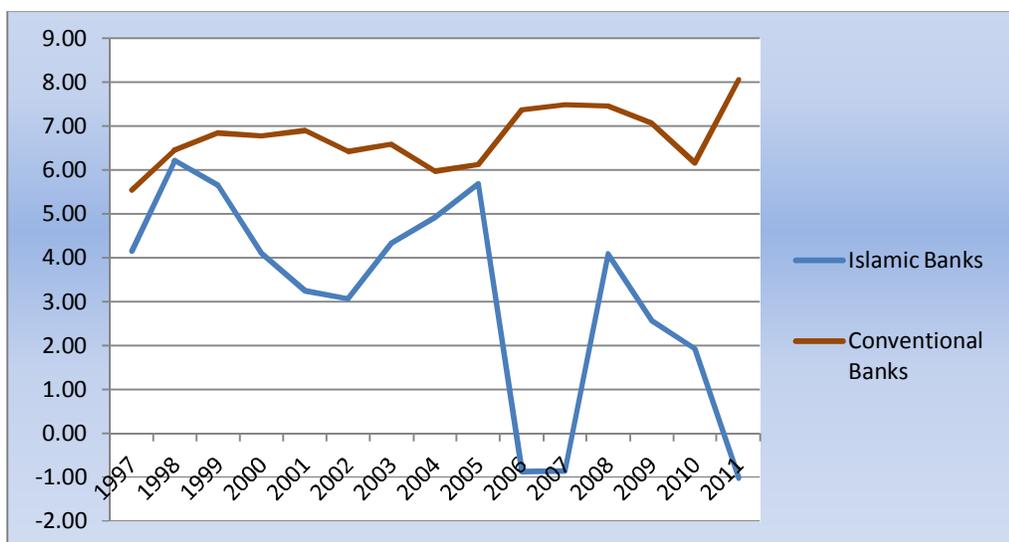
It reached the highest point in 2006, it started to decrease until the end of financial crisis. This justify why new banks generally lend more than the

old banks in good times while relatively less during the crisis times where large banks experienced higher capitalisation.

Mode of Operation Typology

When capitalisation for mode of operation typology were analysed, it was observed that the differences were very volatile starting with not much difference for most of the period. There was a sharp increase in 2005 but it decreased in the following year again in 2005 followed by increase in gap in the next few years. It reduced again but then the gap increased sharply in 2011. This volatility and not much difference for majority period led to the insignificant variation in excess liquidity for this bank typology.

Figure 5.3: Capitalisation according to mode of operation



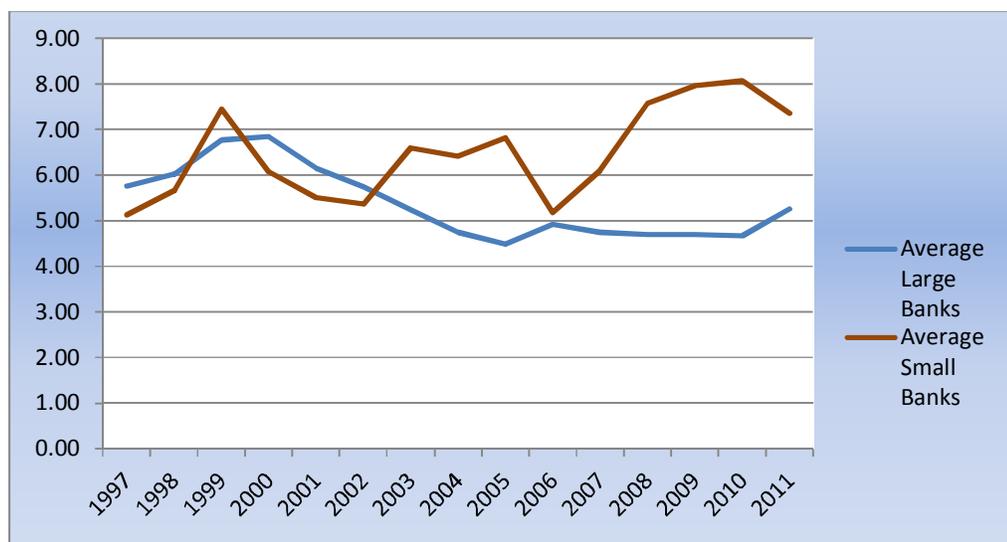
Source: Author's own calculation based on Bankscope database.

Size Typology

Although relatively small, significant gap between large and small banks could be observed in terms of capitalisation. The gap was much smaller at the beginning but gradually increased overtime. Significant gap between large and small banks could be observed from 2002 onwards except in 2005. This was perhaps the reason why the size typology coefficient was significant.

For the financial crisis interacted bank typology variables, it was found that there was no significant difference between public and private banks. The same was true for Islamic and conventional banks. But for the case of size and age typologies, it was observed that large banks and new acted less procyclically than their counterparts. If Figures 5.1 to 5.4 were carefully examined, it can be observed that except for size typology, gap in capitalisation decreased during the financial crisis. While for the size typology, the gap increased during this period. This showed that capitalisation and its difference played a key role in significant (or insignificant) difference in behaviour according to bank-specific characteristics in times of the financial crisis.

Figure 5.4: Capitalisation according to size



Source: Author's own calculation based on Bankscope database.

5.7 CONCLUSION

This bank-level study provided better understanding about the relationship between business cycle and the financial crisis with excess liquidity in Bangladesh. The business cycle was quite consistently found to have significant impact on the excess liquidity. However, the result showed that the banking sector faced the financial crisis very well and, as a result, the excess liquidity was not significantly affected. The fact that the banking sector did not face any banking crisis during or after the financial crisis

supported this finding. This showed the strength and resilience of the banking sector in Bangladesh.

The significant positive effect of political motive showed that excess liquidity increased during these times. This could be due to the lack of demand during this time due to possible political uncertainty. The differences in terms of different typology showed that one-size-fits-all approach should not be applied. Rather it highlighted the importance of addressing the banking sector improvement with a tailor-made-approach. In particular, more attention is required for ownership, size and age typologies during the business cycle while specific attention required for size and age typologies for any crisis time. Combining the above two opinions, it could be concluded that the size and age typologies requires main attention as they were significant at both times (of business cycle and the financial crisis). Further discussion including policy implications is provided in the concluding chapter.

APPENDIX 5.1: Variable definitions

Table 5A.1: Variable definitions

Variable Name	Variable Definition	Comment
Dependent		
Excess liquidity	Liquid assets =summing up trading securities and at fair value through income + loans and advances to banks + reverse repos and cash collateral + cash and due from banks) - mandatory reserves included above.	
Explanatory		
Business cycle	HP filter applied on the GDP data (in billion US dollars) {source of GDP data: World Bank}	log value of GDP taken for filter and then difference taken from actual GDP
Financial crisis	Dummy variable was taken where it takes the value of 1 when the country was affected by the financial crisis and 0 otherwise.	
Capital	bank equity as ratio of total assets	log value taken
Political motive	1 if the national election has taken place on that year, 0 otherwise. Or 1 if there was no democratic government at power on that year, 0 otherwise	2008 and 2009 were taken as election years for Bangladesh
Ownership dummy with BC interaction	BC* Public (1 if state-owned, 0 otherwise)	
Size dummy with BC interaction	BC* Large (1 if large, 0 otherwise)	
Mode of operation dummy with BC interaction	BC* Islamic (1 if Islamic, 0 otherwise)	
Age dummy with BC interaction	BC* New (1 if new {established after 1990}, 0 otherwise)	
Ownership dummy with FC interaction	FC* Public (1 if state-owned, 0 otherwise)	
Size dummy with FC interaction	FC* Large (1 if large, 0 otherwise)	
Mode of operation dummy with FC interaction	FC* Islamic (1 if Islamic, 0 otherwise)	
Age dummy with FC interaction	FC* New (1 if new {established after 1990}, 0 otherwise)	
Lag of excess liquidity	Lag of initial year data	log value of initial year data taken
Inflation	Annual change in the consumer price index {source of GDP growth data: BBS}	log value taken (not used in the final regression)
GDP growth rate	GDP growth rate {source of GDP growth data: BB}	log value taken (not in final regression)

CHAPTER 6

BANK LENDING AND FINANCIAL LIBERALISATION: IS THERE ANY DEFINITE PATTERN FOR DIFFERENT BANK TYPOLOGIES?

6.1 INTRODUCTION

So far in this study we focussed on effects of various factors, particularly financial liberalisation on excess liquidity. Excess liquidity was generally taken to be the opposite of lending. In fact, one of the main interests in a study of excess liquidity was due to the fact that the existence of excess liquidity was a sign of sub-optimal lending. However, there were other factors that also came into play, most significantly deposits, which meant excess liquidity and lending might not have a definite relationship. This was discussed in Section 1.2.3. Therefore, it makes sense to additionally look directly at effects on lending itself, i.e. with lending itself as the dependent variable. Here this was also done differentiating between banks according to the typologies in consideration of ownership, age, mode of operation and size.

It was generally believed that availability of bank lending depends, in addition to the traditional factors, on the process of financial liberalisation. It was expected that with the process of liberalisation, banks would be able to lend more due to the fact that entry into the banking sector would be easier as well as the expansion of these banks would also increase the credit supply and reduce the lending rate (Boissay et al., 2005; de Haas et al., 2010).

However, the process of liberalisation could also increase the interest rate volatility and asset prices. The increase in asset and property prices could also trigger a temporary unwarranted credit boom (Bandiera et al., 2000). Furthermore, competition among banks could increase as a result of the liberalisation process which might end up in a situation where banks lend imprudently (Caprio et al., 2006). Imprudent lending could also be due to

outright managerial failure (Honohan, 1997). The overall impact of financial liberalisation on credit, therefore, mainly leaned towards the fact that it would increase lending. This was supported by earlier works (Cottarelli et al., 2003; Gattin-Turkalj et al., 2007)⁴⁰.

In this section, cross-country studies on lending are discussed first followed by some discussions on banks in Bangladesh. There has been a recent surge of cross-country studies in the lending literature. Brzoza-Brzezina (2005) studied the new European Union countries and found that lending increased in general across countries. However, the degree differed from country to country with Hungary and Poland experiencing a very strong growth as well as Ireland and Portugal. Similar observations of differing degree of changes were observed by Egert et al. (2006) in their study of 11 Central and East European countries. They observed that while some countries experienced steady growth (e.g. Estonia and Latvia), some others experienced growth after initial slowdown (e.g. Hungary and Croatia) while some others experienced almost steady decline (e.g. Czech Republic and Bulgaria).

There were quite a few studies on European Countries. For example, Calza et al. (2001) studied the lending pattern of the Euro area while Cottarelli et al. (2003) studied the Central and East European Countries. They observed that although lending as a ratio of GDP increased in most of the countries (e.g. Bulgaria, Croatia, Poland and Slovenia) but the ratio declined for some countries (e.g. Czech Republic, Slovak Republic and Macedonia). This sort of mixed findings was also supported by, among others, Schadler et al. (2004) and Kiss et al. (2006).

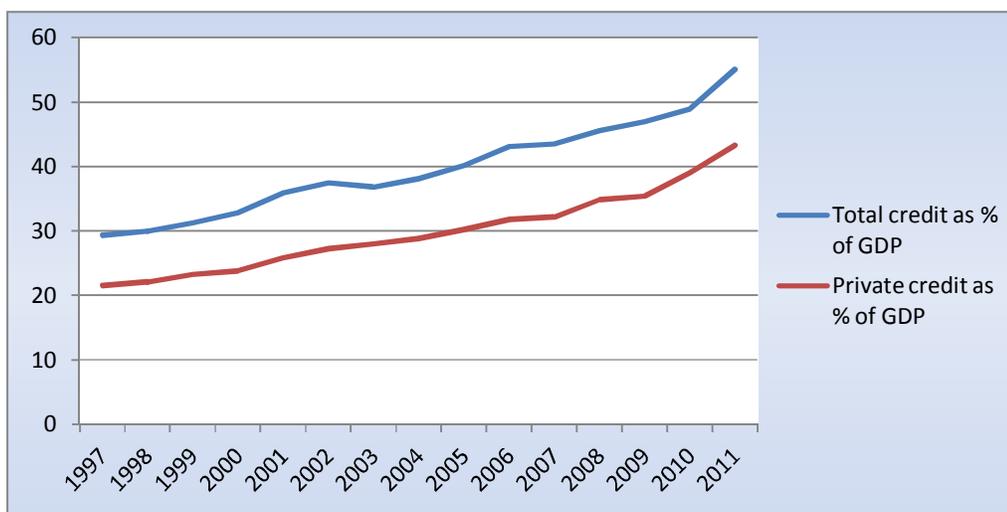
In another work on some of the European countries, excessive growth in credit was recognised (IMF, 2005). It was observed that Bulgaria, Romania and Ukraine experienced very high credit growth. The paper observed that although increase in lending was a good sign but excessive credit growth

⁴⁰However, many earlier studies observed that even with the financial liberalisation, credit for firms remained a major problem and this was true for many developing countries around the world. For a comprehensive survey, see the works of Aryeetey et al. (1997) and Niskanen (2001), among others.

could be a matter of concern. In a study of 16 industrialised countries across regions, Hofmann (2001) observed that credit as a ratio of GDP increased in most of the countries. The author also observed that growth in credit and economic growth moved very closely with each other, supporting procyclicality of financial development. In another IMF (2004) study, it was observed that although lending increased across countries and regions, it increased more in Southeast Asian countries.

The analysis of the effect of the liberalisation process on the lending pattern started almost immediately after it took place in Bangladesh. Khan (1993) observed that banks were not able to efficiently allocate credit, mainly due to the problem of imperfect information. However, he also pointed out that it 'might be too early to determine the benefit of the liberalisation.' In another study, Ahmed (1995) observed mixed implications of the liberalisation on the banking sector in Bangladesh. Khan et al. (2011) observed that lending in Bangladesh increased for all the banks since the financial liberalisation started. They examined the lending by the traditional categories of banking data as was generally available in Bangladesh. According to this, the scheduled banks were classified into SCBs, DFIs, PCBs and FCBs. They also analysed lending according to sectors and found that loans were gradually moving from agriculture towards industrial sector.

Almost all studies on Bangladesh were either done at an aggregate level or when they were done at a disaggregated level, the banks were classified into the earlier mentioned categories of SCBs, DFI, PCBs and FCBs. This was done possibly because of easier data availability as data were available in this format. However, these studies missed out the other different bank-specific characteristics which might have an impact on the lending behaviour of banks. Therefore, to investigate if these characteristics significantly affect the lending of banks, it was important to include these characteristics and study them accordingly. This was attempted in this bank-level study for the banks in Bangladesh.

Figure 6.1: Total and private credit as a ratio of GDP in Bangladesh

Source: Based on data of the Statistics Department, Bangladesh Bank.

The lending pattern of the banking sector in Bangladesh had experienced a very steady growth. In this section, lending in Bangladesh was discussed only for the period that was related to this study period. It can be observed that both total and private lending (expressed as a ratio of GDP) increased significantly. The total lending as ratio of GDP almost doubled increasing from 29.38% to 55.05% while the private lending increased more than two-fold during this time by rising from 21.55% to 43.27%. As this was a ratio of GDP, it showed that the magnitude of increase in lending in Bangladesh was phenomenal.

In nominal terms, the total lending during this period increased more than eight-fold from 1997 to 2011. In 1997, it was 530.86 billion taka and it continuously increased to cross the 1,000 billion taka mark in 2002. The growth continued over the next 5 years and more than doubled by reaching 2056.72 billion taka in 2007. Within the next 4 years, it again increased by more than two-fold and reached a huge amount of 4335.25 billion taka in 2011. Similarly, private lending in nominal terms also increased sharply during this period. It was 389.47 billion taka in 1997, increased to reach 745.54 billion taka in 2002 and 1521.77 billion taka in 2007. Finally, it rose to 3407.12 billion taka in 2011.

One possible reason of higher lending by banks could be imprudent lending. As was known, the liberalisation process increased competition and to maximise profit, banks could end up lending to sectors and individuals who were not worthy of credit. This may result in higher non-performing loans if the borrowers were unable to repay their loans. Demirguc-Kunt and Detragiache (1999) observed that countries where the financial liberalisation took place were more likely to face banking crises. But they also mentioned that this impact was less if there prevailed a strong institutional environment with less corruption and good rule of law.

In Bangladesh, however, it was found that the non-performing loans as a ratio of total loans decreased overtime (Iqbal, 2012). Having a closer look revealed the fact that it increased after the liberalisation started and reached the highest mark of 41.19 per cent in 1999 but then it gradually decreased and reached a single-digit mark (Rahman, 2012).

6.2 BANK TYPOLOGY

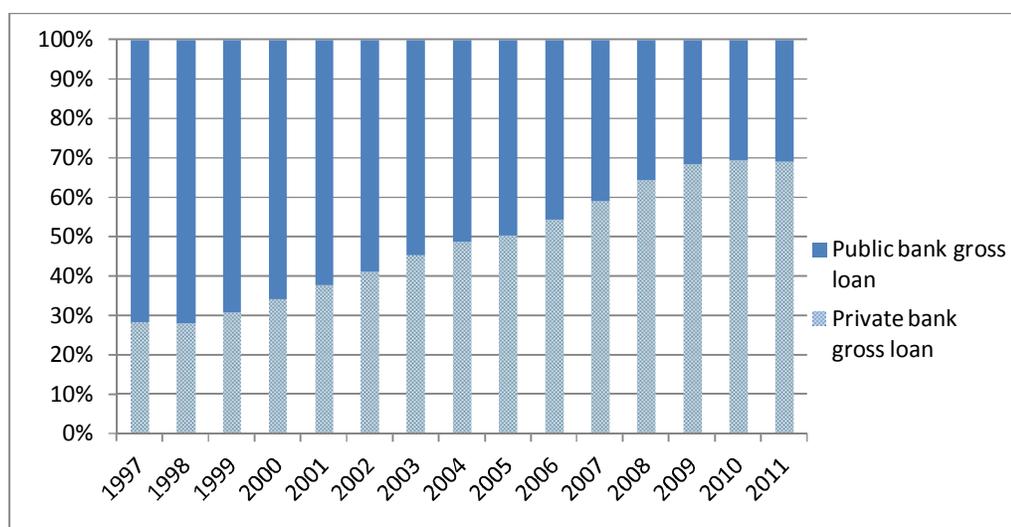
It was observed from the earlier empirical chapters that there could be significant differences in excess liquidity across bank typologies in respect to financial liberalisation, business cycle and the recent financial crisis. This chapter aimed to investigate further if these differences persisted in terms of lending. To analyse this, lending at bank-level was examined to see if there were any significant differences across banks according to different typologies. Lending was measured by gross loan in million US dollars. It was summed up for the relevant category when a particular typology was used. For example, there would be two categories of public and private banks for the ownership typology. Following the earlier empirical chapters, the same bank typologies were applied here which were based on ownership (public and private), size (large and small), mode of operation (Islamic and conventional) and age (old and new).

Public and Private Banks

It was observed that banks differed in their lending behaviour in terms of ownership (De Bonis, 1998). Interest rates of public banks were lower than

the private banks and public banks lent more to the large firms. Public banks also lent more in depressed areas. Although some earlier studies concluded that public banks were less efficient and profitable than the private banks (Martiny and Salleo, 1997; Sapienza, 2004), these findings should not be taken on its own as public banks did not operate with the sole objective of profit maximisation but they also had other broader social objectives to fulfil. So, it would be interesting to see whether lending differed across banks according to ownership.

Figure 6.2: Gross loan according to ownership



Sources: Author's own calculation based on data from Bankscope and Bangladesh Economic Review, various issues.

The graph type was selected to show the comparative scenario of lending between two different types of banks. Significant difference among public and private banks could be observed in terms of direction where share of private banks was less than 30 per cent at the beginning of the study period but continuously increased and more than doubled in the next 15 years to reach almost 70 per cent of the share of lending. The share of public banks decreased continuously over this period and experienced an almost opposite identical scenario where the share was above 70 per cent in 1997 while it was around 30 per cent in 2011. The increase of private banks' share was continuous almost throughout the period (and vice versa for public banks) except in the first two and the last three years where it

remained almost constant. Most importantly, over this period of time, the majority share of lending changed from public to private banks.

Large and Small Banks

It was observed by some earlier studies that large banks mainly relied on 'hard' information such as financial statements and credit scoring (Haynes et al., 1999; Cole et al., 2004; Berger et al., 2005) while small banks mainly relied on 'soft' information which included borrowers' characteristics and conditions of local market (Park and Pennacchi, 2004). Besides, small banks relied on bank-firm relationship as well as depending on the behaviour of more informed investors with a lag (Barron and Valev, 2000). It was also found that smaller banks had comparative advantage in lending to smaller organisations due to their extensive use of soft information (Kashyap and Stein, 1997). Another interesting observation was that small banks did possess some advantage over the large banks due to the fact that soft information were not easily transferrable while the hard information were (Sharpe, 1990; Rajan, 1992). However, since large firms had more information in record, large banks tended to lend more to large firms. This dichotomy of hard and soft information was also respectively referred to as 'transaction-based' and 'relationship' lending (Berger and Udell, 2002). According to this, small banks would do better in case of 'relationship' lending while large banks would do better in cases of 'transaction-based' lending. Dependence on hard information was also called the 'cookie cutter' approach and was supported by empirical studies (Cole et al., 2004).

Kashyap and Stein (1995) observed that smaller banks were more responsive to monetary policy changes and they lent more to small businesses whose demands were procyclical (Peek and Rosengren, 1995; Berger et al., 1998). Another finding of the earlier studies was that small banks made 'high powered loans'. This 'high powered loans' implied that the impact was bigger on the economy⁴¹ when lending of small banks

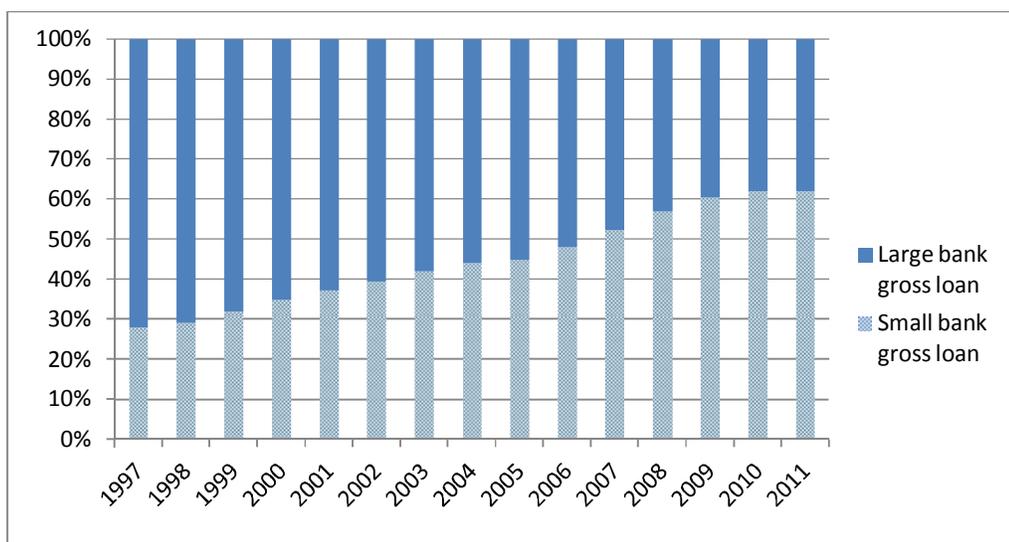
⁴¹ This is measured by gross state product, number of employees, number of firms and real payroll.

declined by a dollar than decline in lending by a dollar of large banks (Hancock and Wilcox, 1998).

However if large banks were public banks (as in many cases) then the lending of large banks might include the implicit guarantee of not being withdrawn. This was mainly related to the hypothesis of ‘too big to fail.’ Additionally, large banks were able and lent at a greater distance (Kashyap and Stein, 2000; Berger et al., 2005).

As large and small banks were grouped according to their assets, therefore it could be observed that there were differences in terms of lending among banks according to this criterion. The magnitude of the aggregate effect of it on the economy depended on the ratio of small and large firms in the economy. However, it was not always true that small banks covered most of the small firm lending. For example, Berger and Black (2011) found that large banks covered 60% of the small firms lending. Similar findings were also observed by de la Torre et al. (2010).

Figure 6.3: Gross loan according to size



Sources: Author’s own calculation based on data from Bankscope and Bangladesh Economic Review, various issues.

Figure 6.3 showed that if there was any difference in lending between large and small banks. It could be observed that share of lending by small

banks were less than 30 per cent at the beginning of the study period but the share continuously increased, except the last year, and more than doubled reaching more than 60 per cent by the end of this study period. On the other hand, the share of large banks almost continuously decreased throughout this period reaching a share of less than 40 per cent in 2011 which was more than 70 per cent in 1997. This change of direction and amount led the majority of share in lending changing from large to small banks.

Islamic and Conventional Banks

The third category of bank classification was based on their mode of banking operation. Islamic banking in Bangladesh flourished significantly and this study also aimed to look at whether there was any difference in lending between Islamic and conventional banking system.

On one side, it was expected that Islamic banks could be under additional pressure to lend due to their mode of operation where profit and loss were shared when returns for depositors were calculated (Khan and Ahmed, 2001). Although it was true that Islamic banks paid according to profit-loss sharing and, therefore, were not forced theoretically to pay a specific amount on deposit but practically they needed to be competitive to survive the competition since there could be loss in some cases which they needed to compensate with higher profits⁴². The additional pressure could be related to screening about whom to lend as Islamic banks could not force borrowers to pay original and profit if they make loss.

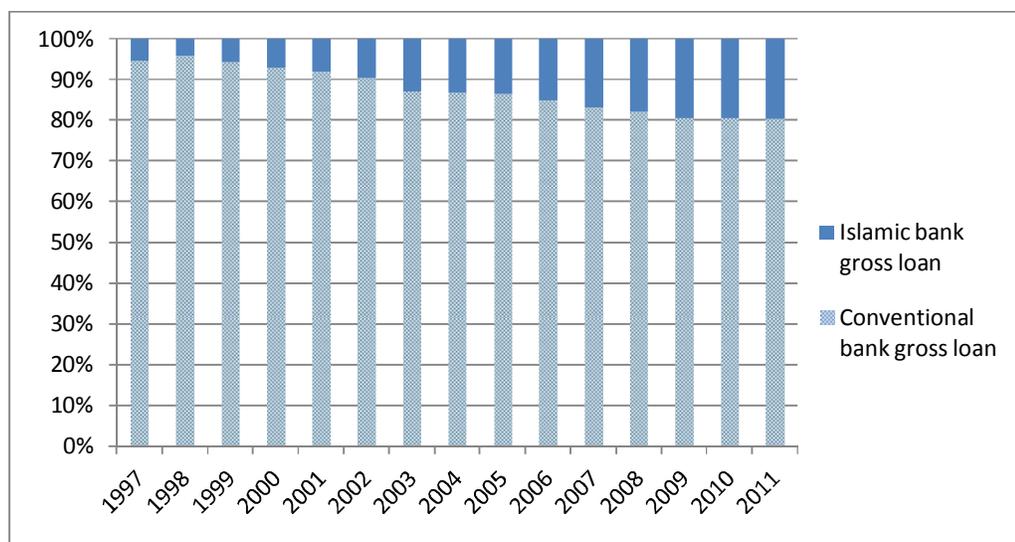
On the other hand, it was also witnessed that religious feeling played a key role in the mind of most of the depositors and there was less chance of withdrawal of deposits even if the return was not competitively high. In a study by Gerrard and Cunningham (1997), it was observed that over 60% of Muslim borrowers declared that they would not withdraw their deposits even if there was no return. This probably played a key role during liquidity

⁴² Moreover, due to the fact that Islamic banks were not allowed to carry out all types of operations of conventional banking, this had also handicapped them to some extent.

crisis when it was found that Islamic banks faced less withdrawal than their conventional counterparts (Zaheer and Farooq, 2013). Moreover, it was also found in some studies that Islamic banks were better capitalised, had superior asset quality and strong liquidity positions. Therefore, it would be interesting to see how these two types of banks differed in their lending behaviour after and with the process of financial liberalisation.

The lending data for these two types of banks are presented in Figure 6.4. This graph showed that lending of conventional banks held the majority of share and it remained so throughout the period of this study. It was more than 90 per cent at the beginning and though it experienced a fall, it still had a share of around 80 per cent by the end of this period. Share of lending of Islamic banks were very low (around 5 per cent) but it continuously rose, except in 1998, reaching almost 20 per cent of the share of lending.

Figure 6.4: Gross loan according to mode of operation



Sources: Author's own calculation based on data from Bankscope and Bangladesh Economic Review, various issues.

New and Old Banks

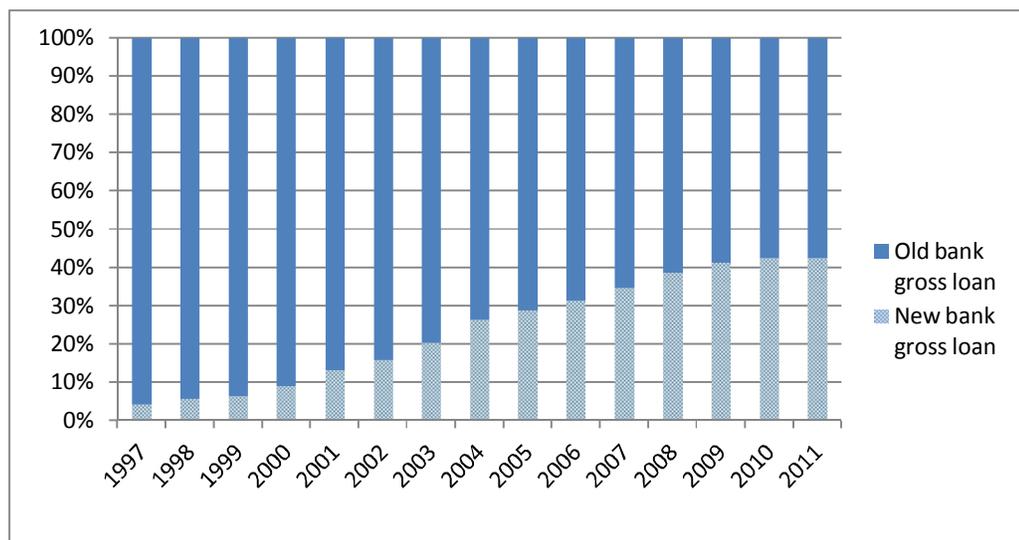
Banks could also differ in terms of lending due to their difference in age. It was seen that new banks might be in a relatively disadvantageous position as they took some time before starting operating at their full capacity. This

was known as the ‘learning by doing’ hypothesis (Mester, 1996; DeYoung and Hasan, 1998; Kraft and Tirtiroglu, 1998). This time period was found to be between three to five years and during that time, there was probability of small bank-failure (DeYoung, 1999).

Therefore, it could happen that banks perform better with age. This was supported empirically by Staikouras et al. (2007) who found that banks established before performed better than the banks established later. However, management could become less proactive and prominent overtime which might decrease their efficiency (Esho, 2001).

Thus, it would be interesting to see the effect of bank age on lending along with the process of the financial liberalisation. Figure 6.5 shows the lending of new and old banks.

Figure 6.5: Gross loan according to age



Sources: Author’s own calculation based on data from Bankscope and Bangladesh Economic Review, various issues.

It could be seen from the graph that there was difference between old and new banks. As mentioned earlier, banks established after 1990 were in the new bank category while those established before 1990 were in the old category. Share of lending of old banks was much higher than the new banks but they converged overtime. The share was more than 90 per cent

in 1997 but gradually decreased and reached a share of less than 60 per cent by 2011. Contrarily, the share of new banks experienced a sharp rise in their share from a mere share of less than 5 per cent in 1997 to more than 40 per cent in 2011.

6.3 CONTRIBUTION OF THIS CHAPTER

It could be observed from the above discussion that lending increased in the banking sector in Bangladesh after the process of financial liberalisation. The data on lending in Bangladesh also supported this view that lending increased after the process of financial liberalisation started (Figure 6.1). However, when the banks were classified according to different bank-specific characteristics, it was observed that there were variations in terms of lending, always in magnitude and sometimes also in direction (Figures 6.2 to 6.5). The aim of this study was to shed further light on this using bank-level data and provide information on whether lending significantly differed across banks and, if they did, in which way.

The earlier related works on lending could be broadly divided into three categories. The first category of studies investigated the effect of the financial liberalisation on lending but they were done at an aggregate level and not across banks (Boissey et al., 2005; Egert et al., 2006).

The second category of research used some classifications of banking to see how they were related to changes in the monetary policy. For example, Lang and Krznar (2004) used the bank characteristics of ownership, capitalisation, liquidity and size typologies of the banks to see how they differed in their reaction to changes in the monetary policy in Croatia but did not see how the process of financial liberalisation affected lending according to these characteristics.

The third category of works, which was analogous to this study, used bank-level data to see the effect of some other phenomenon on lending pattern. For instance, Cull and Peria (2012) used bank-level data for some countries in Eastern Europe and Latin America but their main aim was to see if the

lending changed along with the process of the financial crisis of 2008-09. The difference of this study from those earlier studies was that this study attempted to examine the effect on bank lending of the financial liberalisation while the earlier studies looked at the effect of the financial crisis on bank lending.

The aim of this study was to fill these gaps in the existing literature of these above categories of studies. Using data at bank-level, lending at aggregate level were used for this purpose. Bank-level data of 37 banks for a period of 15 years (1997-2011) from the banking sector in Bangladesh were applied in this study.

The main contribution of this study was to investigate if there was any difference in lending across banks. The bank typologies include bank ownership (public versus private), size (large versus small), mode of operation (Islamic versus conventional) and age (old versus new).

Specifically, the following questions were addressed in this study:

(i) Does ownership matter? One of the aims of this study was to see if and how the ownership criterion affected lending of the banks in times of financial liberalisation. From earlier studies, it was observed that public banks had some advantages in lending to larger firms while private banks were in a relatively disadvantageous position in this regard. However, public banks had social goals in addition to profit maximisation which was not part of the objectives of private banks.

(ii) Does bank size vary the effect of financial liberalisation? This study also examined if financial liberalisation affected the lending decision for large and small banks differently. Some earlier studies found possible negative relationship between bank size and lending (Lang and Krznar, 2004).

(iii) Was Islamic banking affected differently? Mode of operation typology (Islamic versus conventional) was also investigated to see if there was any

difference among their lending pattern. Since Bangladesh is a Muslim populated country and the Islamic banking system flourished and currently formed a substantial part of the banking sector, therefore it was important to see if the Islamic banking system was affected differently than the conventional banking system along with the direction of their relationship.

(iv) Was there any difference according to age? Another typology of banks was also studied to find out whether old banks behaved differently than new banks in times of financial liberalisation. It was generally observed that new banks lent more than the old banks but this study examined how this was affected by the process of financial liberalisation.

6.4 STATISTICAL TESTS FOR DIFFERENCE AMONG BANK TYPOLOGIES

Two types of statistical tests were carried out in addition to the graphical representation above: non-parametric and parametric tests. The non-parametric test applied was the Wilcoxon rank-sum test whereas the t-test was applied as the parametric test⁴³.

The results of the Wilcoxon rank-sum test across these bank typologies were given below with the null hypothesis that there was no difference between two groups. Here, total lending was the ranking variable which was measured by the gross loan as a ratio of GDP.

The Wilcoxon rank-sum test results showed that the null hypothesis was rejected implying that there was difference between public and private banks in terms of total lending. Similar findings were observed for both size and age typology suggesting that there were differences between large and small banks as well as between new and old banks. However, the null for the mode of operation typology was not rejected implying that there was no significant difference between Islamic and conventional banks in terms of total lending.

⁴³ These tests were explained in detail in Section 4.3.3.2.

Table 6.1: Wilcoxon rank-sum test results for bank typologies of ownership, size, mode of operation and age

Typology	Ownership	Observation	Rank sum	Expected	H ₀ : no difference between two (unmatched) groups
Ownership	Private	30	500	570	-2.714 (0.0066)
	Public	7	203	133	
Size	Large	6	207	114	z = -3.832 (0.0001)
	Small	31	496	589	
Mode of operation	Islamic	30	609	570	1.512 (0.1304)
	Conventional	7	94	133	
Age	New	16	426	304	z = 3.740 (0.0002)
	Old	21	277	399	

The results of the t-test also supported the findings of the Wilcoxon rank-sum test, showing that there were differences for most of the bank-specific characteristics. The results of this test were provided here. The results showed that the coefficient of ownership, size and age typologies were significant at 1% level while it was not for the mode of operation.

Table 6.2: t-test results for ownership, size, mode of operation and age

Gross loan	Coefficient	Standard error	t	p > t	95% confidence interval	
Ownership	1.665	0.097	17.08	0.000	1.473	1.856
Size	2.348	0.080	29.32	0.000	2.191	2.505
Mode of operation	-0.293	0.120	-2.45	0.015	-0.529	-0.579
Age	-1.015	0.084	-12.05	0.000	-1.181	-0.850

6.5 METHODOLOGY

This study used panel data. It was logical to assume that the lending behaviour of banks would be influenced by its past lending and therefore a dynamic model specification was more appropriate to use. Based on the methodologies used before in this area of research and also because of its

advantages over other panel methods (already discussed before), two-step system GMM was considered the most appropriate method of estimation for this type of model. For robustness, the Hausmann test was applied to see whether the fixed effects or the random effects method was more appropriate and then the appropriate method was applied.

The main equation of total lending to be estimated in this study could be written as:

$$GL_{it} = a_0 + a_1GL_{i,t-1} + B_1GDP_t + B_2INT_{it} + B_3(FL_t) + B_4(FL_t \times BT_{it}) + \varepsilon_{it} \quad (6.1)$$

The above equation explained effect at bank-level on lending where *GL* was representing gross lending, *GDP* was showing economic growth, interest rate was given by *INT*, *FL* was expressing the financial liberalisation index and *BT* was showing different bank typologies (ownership, size, mode of operation and age). The interaction terms of *FL* and *BT* showed bank typologies based on bank-specific characteristics interacted with the financial liberalisation index. Banks were represented by subscript *i* and *t* was showing year. The variables of lagged dependent variable, economic growth and interest rate were the most common variables applied in most of the earlier studies on lending⁴⁴.

6.6 DATA

The data of this study comprised bank-level information of the banking sector in Bangladesh with annual data for the period of 1997-2011. Version 13.1 of STATA (StataCorp, 2013) was used for the estimation of system GMM to an original panel dataset of 555 observations ($N \times T = 37 \times 15$).

6.6.1 Dependent Variable

The aim of this study was to examine the effect of bank-specific characteristics on lending. The lending in real terms was used in this study to reflect the actual scenario. Lending in real terms rather than in nominal

⁴⁴Some studies have also used inflation but this variable is not used in this study due to problem of multicollinearity.

terms has also been used by others before (Hofmann, 2001; Calza et al., 2003; Hulsewig et al., 2004; Brzoza-Brzezina, 2005).

6.6.2 Explanatory Variables

Different studies have used different sets of explanatory variables. Some of them were more common while some were used less frequently across studies. The three most common explanatory variables used in the earlier studies were: economic growth, interest rate and the lagged dependent variable. The definition of all these variables and their measurement were given in detail in Appendix 6.1.

Economic Growth: It was expected that if there was economic growth, there would be higher demand for investment and also increased demand for loan. This was mainly due to the fact of favourable economic conditions. Therefore, economic growth should affect lending positively. This was also observed in earlier empirical studies (Cottarelli et al., 2003; Kiss et al., 2006; Kraft, 2006; Gattin-Turkalj et al., 2007; Brissimis et al., 2014). To capture economic growth, real GDP was used in this study.

Interest Rate: The rate of interest was another variable that was frequently employed in studies of lending. It was expected to have a negative relationship with lending since lower interest rate should increase the demand for credit and vice versa (Egert et al., 2006). In this study, to capture the effect of interest rate, interest rate in real terms was taken which was calculated by deducting the current inflation from the nominal interest rate. To convert interest rate into real terms, both CPI and GDP deflator were used. Results using the real interest rate using CPI are presented in the main text while the other measure of real interest rate is given in the appendix (in Appendix 6.3).

Lagged Dependent Variable: Lag of the dependent variable was included in this model with an aim to capture and account for the persistence of lending from the earlier period. It was expected to have a positive relationship with the dependent variable of lending. This was also

employed in earlier studies and was found to be positively affecting lending (e.g. Gattin-Turkalj et al., 2007).

Financial Liberalisation: Since financial liberalisation took place in most of the economies around the 1990s, the impact of it was part of some of the studies of lending. As the liberalisation process was initiated at the backdrop of financial repression and was proposed to remove various credit restrictions to ensure the free flow of credit, it was expected that there would be a positive relationship between liberalisation and lending. Since it was a continuous and multi-faceted process (Bandiera et al., 2000), the results could be misleading if a dummy variable or only a single variable was used to represent this versatile process.

Therefore, as described in the previous chapters, to address the process in a more comprehensive way, an index of financial liberalisation was created on the basis of the earlier works. The index used in this study was mainly based on the work of Abiad et al. (2010). Although most studies had either used a dummy or a single indicator of liberalisation, the use of index to appropriately capture the process of liberalisation was not uncommon. Cottarelli et al. (2003) used a similar index in their study of CEEC countries.

Bank-specific Characteristics: Different bank-specific characteristics could play a role in lending. These included bank ownership, size, mode of operation and age (discussed in detail in section 6.2). Summarily it could be said that there could be differences in the lending behaviour of banks according to these characteristics and it would be interesting and worthwhile to see if and how significantly these characteristics affected bank lending.

6.6.3 Sources of Data

Like the previous empirical chapters, Bankscope was the main source of data of this chapter. Data of all banks were not always available for full 15 years (detailed description of data availability has been given earlier in

Appendix 4.1). Data were available in different forms. Earlier practice from the literature was used as a guideline to address this issue (Ehrmann et al., 2001; Cihak and Hesse, 2008).

6.7 EMPIRICAL RESULTS

To provide some basic idea, summary statistics of the variables used in this study are provided below⁴⁵. The dependent variable of gross lending had an average of 3.44 with highest of 23 and lowest of -12. GDP growth rate ranged from 4.42 to 6.71 where the average was 5.76. The average interest rate was around the same mark with a value of 6.87% but fluctuated much more with the highest being 18.88% and the lowest 0.09%. Average of financial liberalisation index was -0.72 with values ranging from -0.87 to 0.54.

Table 6.3: Summary statistics of main regression variables (annual data of 1997-2011)

Variable Description		Mean	Std. Dev.	Min.	Max.
Gross loan (GL)	Real gross loan	3.44	0.04	-12	23
GDP growth (GDP)	Growth rate of log of real GDP	5.76	0.64	4.42	6.71
Interest rate (INT)	log of the ratio of interest rate and inflation	6.87	1.98	0.09	18.88
FL	Financial liberalisation index (using different sub-dimensions)	-0.72	0.12	-0.87	-0.54

Correlations among the variables are shown below to have a primary indication of the relationship between them. The correlation matrix showed that total lending was positively and highly related with its lag implying that lending was highly influenced by its past behaviour.

It was also found to be positively related with economic growth which was logical since growth increased demand for loans through increased demand for investment as well as the supply of loans due to increased savings. An

⁴⁵These statistics in Table 6.3 were based on the panel data in a yearly format.

increase in the interest rate would normally reduce the demand as higher costs would be associated (and vice versa) which was supported by the negative sign. The positive correlation between financial liberalisation and lending supported the theory that lending would increase after the liberalisation. This also confirmed with the final evidence of increased lending after financial liberalisation took place in Bangladesh and in other countries.

Table 6.4: Correlation matrix of total lending and explanatory variables

	Total lending (GL)	Lag of total lending (LagGL)	Economic growth (EG)	Interest rate (IR)	Financial liberalisation (FL)
GL	1.0000	---	---	---	---
LagGL	0.9882*	1.0000	---	---	---
EG	0.0979*	0.0988*	1.0000	---	---
IR	-0.1915*	-0.2937*	-0.2914*	1.0000	---
FL	0.1315*	0.1235*	0.7395*	-0.3080*	1.0000

* Significant at 5% level.

6.7.1 Empirical Estimates

In this estimation, the lending pattern of the banking system was estimated using the two-step system GMM. In Table 6.5, the relationship between total lending with liberalisation, different bank-specific characteristics as well as the macroeconomic factors were presented. The diagnostics of the results were provided at the end of the table.

In the estimated models, the F-test showed that the parameters were jointly significant at the 1% level. The overidentifying restriction tests of Hansen-J statistic showed that the instruments used in this model were not correlated with the residuals, implying that the instruments in this model were justified. Both the tests of autocorrelation, tests AR(1) and AR(2), showed that the application of the two-step system GMM was appropriate since the insignificance of the AR(2) test result showed no second-order serial correlation of the error term, implying there was no problem of

autocorrelation and the GMM estimates were consistent (Arellano and Bond, 1991).

Table 6.5: Gross loan estimates applying two-step system GMM

Variable	Ownership	Size	Mode of operation	Age
	Coefficient	Coefficient	Coefficient	Coefficient
LagGL	0.701*** (0.226)	0.705*** (0.225)	0.725*** (0.210)	0.650** (0.280)
GDPgrowth	0.361*** (0.124)	0.360*** (0.126)	0.365*** (0.126)	0.354*** (0.119)
Interest rate	-3.101** (1.212)	-2.708** (1.269)	-2.780** (1.231)	-3.216** (1.284)
FL	1.343*** (0.475)	1.239** (0.498)	1.248** (0.496)	1.164** (0.490)
Public* FL	-0.186*** (0.063)	---	---	---
Large* FL	---	-0.033 (0.047)	---	---
Islamic* FL	---	---	0.031 (0.048)	---
New* FL	---	---	---	0.211*** (0.066)
Wald chi2 (6)	219.37 (0.000)	153.65 (0.000)	122.18 (0.000)	235.71 (0.000)
Hansen-J Test	2.49 (0.477)	2.43 (0.488)	2.50 (0.476)	2.87 (0.413)
Test for AR (1) errors	-3.09 (0.002)	-3.12 (0.002)	-3.32 (0.001)	-2.54 (0.011)
Test for AR (2) errors	0.31 (0.757)	0.39 (0.699)	0.41 (0.681)	0.23 (0.818)
No. of banks	37	37	37	37
No. of observations	403	403	403	403

Note 1: The FL variable here was constructed following the Abiad et al. index of financial liberalisation. Also the dummy variables were taken in actual form in 0-1 scale.

Note 2: Robust standard errors were in parentheses to the right of the respective estimated coefficients. In the lower part of the table, the probability values were given in parentheses.

* Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

In this study, total lending was estimated by using the growth of the gross loan and then taking its logarithm. The gross loan was taken in real form by deflating with the consumer price index. The results were then checked for robustness using alternative estimators.

Among the explanatory variables, both economic growth and interest rate were taken in log form with the interest rate taken in real terms using the inflation rate represented by CPI as well as GDP deflator. Bank typology variables were represented by the dummy variable of typology interacted with the financial liberalisation index. Flexibility in taking both actual and log values of the explanatory variables were evident from earlier works (Levine et al., 2000; Hauk Jr. and Wacziarg, 2009; Roodman, 2009; Jayasuriya and Burke, 2013). The typology variables were not taken in a simple form but in an interaction form where each typology value was multiplied by the value of the financial liberalisation variable.

The result showed that the lagged dependent variable of total lending was positive and significant in all cases. This supported the view that banks followed their past lending behaviour.

If an economy experienced growth, it improved the economic condition and was supposed to increase the demand for further investment. However, this effect could take time and therefore lag of economic growth was taken here. Using lag of economic growth to capture the effect on lending was not uncommon and was used by others before (Fuentes and Maqueira, 1999). The coefficient in this study was positive and significant which was in line with the prior theories. Similar result was also found earlier by others, both in country-specific studies (Gattin-Turkalj et al., 2007; Brissimis et al., 2014) as well as in cross-country studies (Hofmann, 2001; Calza et al., 2003).

A rise in interest rate increases the cost of borrowing which should reduce the demand for borrowing. On the other hand, a reduction in the interest rate should increase the demand for loans if all other things remain constant. Therefore, lending should be negatively related with the interest rate. In line with this theoretical background, the relationship was found to be negative and significant⁴⁶. Similar results were also observed by others

⁴⁶When GDP deflator was used instead of CPI inflation information in calculating the real interest rate, the result remained almost same. The result is given in Appendix 6.3.

in earlier studies on lending which also found negative relationship (Cotarelli et al., 2003; Brzoza and Brzezina, 2005).

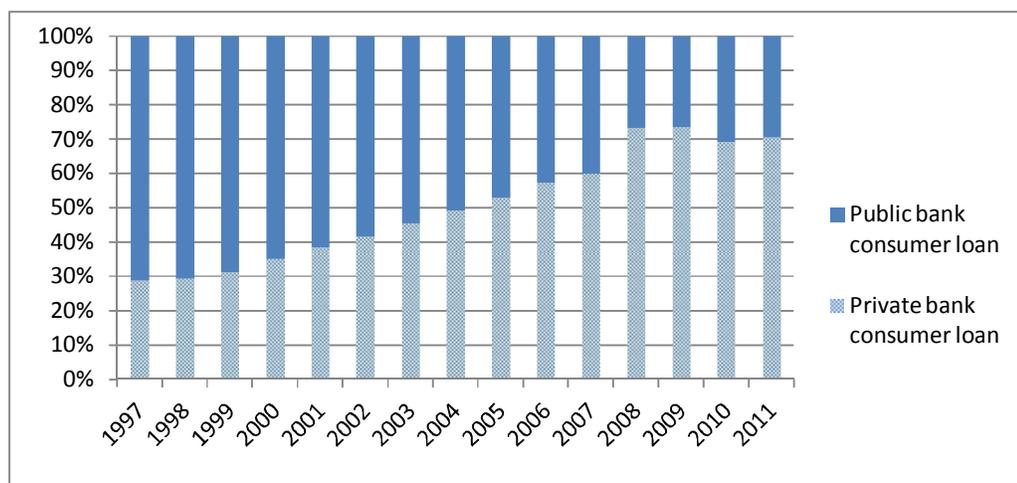
As mentioned before, one of the objectives of the financial liberalisation was to remove the barriers in terms of lending and increase it which in turn would increase investment and economic growth in the economy. Therefore it was expected that the process of financial liberalisation would increase lending in the economy. In this study, the coefficient of financial liberalisation was found to be significantly positive for all bank typologies, justifying the theoretical background of the financial liberalisation.

As different types of banks existed in the banking sector of Bangladesh, it was important to see if they reacted differently in terms of lending with the process of financial liberalisation. To measure this effect, interaction variables were taken where the financial liberalisation variable was multiplied by the typology dummy variables. For the ownership dummy, the value of 1 was given if bank was owned by the government while 0 if it was owned privately. For the size dummy, if a bank has an asset over 1 billion dollars, the bank was categorised as a large bank and was given the value of 1 and was 0 when the bank has less than 1 billion dollars asset. When the mode of operation dummy was applied, the value of 1 was given if it was an Islamic bank and 0 if it was a conventional bank. Finally, the value of 1 was attached with a bank if it was established after 1990 while 0 if it was established before that for the age dummy.

The interaction term for the 'ownership' typology variable showed that financial liberalisation had lower impact on lending for the public banks. This could be due to their disadvantages mentioned in the literature which included low lending to smaller firms. It may be noted that objectives of public banks were not solely to maximise profits but also to pursue and achieve additional social goals. Although these could lead to higher lending but might also reduce the incentive to compete in lending with other banks in maximising their profit.

While the above explanation was based either on Inefficiency of public banks or their lack of capacity to lend to small firms, another possible explanation (which was partly in contradiction with the earlier one) was that financial liberalisation encouraged imprudent behaviour of overlending, especially by private banks. For example, private banks might have extended their lending disproportionately to consumers, while of course public banks would not do that. Indeed private banks had over time taken up a greater share of lending as evident from the following graph. Whether this was attributable to imprudent lending was not certain. When investigated further, it was observed that level of impaired loans were greater for public banks than private banks. For example, the ratio of gross non-performing loans to total loans was 11.3 per cent for public banks while it was only 2.9 per cent for private banks in 2011. Therefore, it is more appropriate to say that private banks captured greater share of lending because of (a) continued growth of private banking itself and (b) better efficiency compared to public banks.

Figure 6.6: Consumer loan according to ownership



Sources: Author's own calculation based on data from Bankscope and Bangladesh Economic Review, various issues.

It can be observed that while the share of public banks reduced to less than half during this period of time, the share of private banks more than doubled during the same time period. This also meant that the majority

share of consumer lending switched from public banks to private banks during this period.

However, the coefficient for the 'size' typology variable with interaction term was insignificant. This implied that bank size did not play any significant role in terms of lending and banks followed a similar pattern in their lending behaviour (irrespective of their size). While the large banks had relative advantages for lending to large firms, small banks' share of consumer loans increased much more than the large banks. These might have nullified each other.

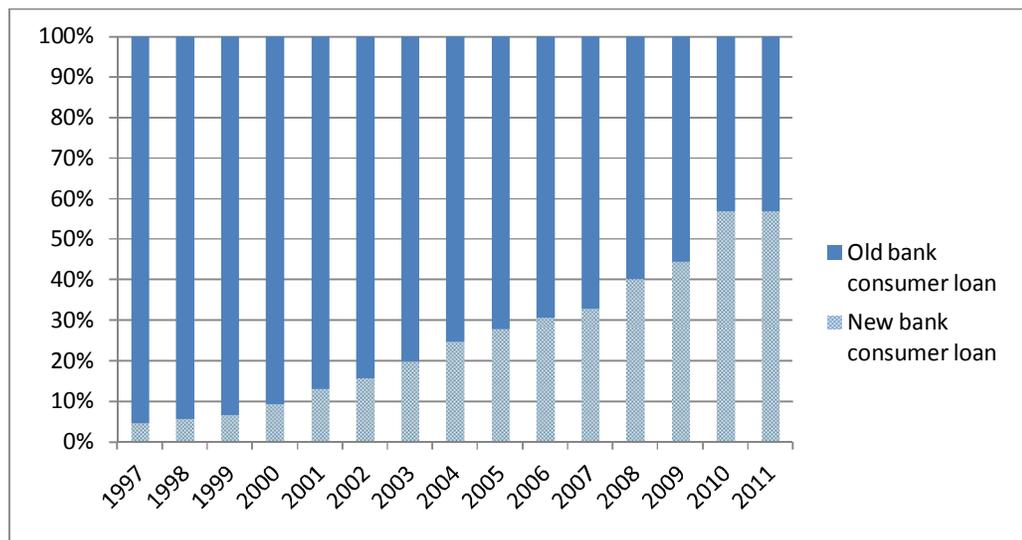
The result also did not show any significant dependence on the 'mode of operation'. This meant that Islamic banks did not behave much differently in relation to conventional banks in terms of lending. While conventional banks were in a more advantageous position due to the availability of more instruments to use for lending, Islamic banks had the advantage of the fact that in a Muslim populated country like Bangladesh, people prefer to engage more in Islamic banking due to religious reasons. These opposite effects might have crossed out each other resulting in an insignificant relationship for this bank typology. This supported the findings of the earlier studies which concluded that Islamic banking did not behave differently in relation to other conventional banks and refuted the opposite findings or theories which said that Islamic banking was different in their behaviour from the conventional banking system. This insignificant relationship might also imply that Islamic banks had done quite well to perform similarly to the conventional banks.

The 'age' typology variable with interaction term was found to be significant and positive. This positive relationship implied that the new banks lent more relative to the old banks. It was worthwhile to mention that banks were classified as first, second and third generation banks along the line of when they were established. This was crucial since the later the banks were established, they were technologically more advanced. Although old banks are also gradually moving towards using modern

technological facilities but it takes time. In most cases, it was almost impossible to change the earlier infrastructure completely. The results above suggested that new banks had used these technological advantages in lending more than the old banks.

Another possible interpretation was that new banks needed to grab a market share and, to do that, they had to expand lending faster than other banks. Their expansion in lending therefore might have little to do with superior technology and efficiency. Another possible factor could be the fact that banks become less efficient overtime (Esho, 2001). Moreover, when the share of consumer lending was examined, it was observed that share of this type of loan for new banks have increased dramatically over the last few years.

Figure 6.7: Consumer loan according to age



Sources: Author's own calculation based on data from Bankscope and Bangladesh Economic Review, various issues.

6.7.2 Robustness Checks

For robustness, an additional method of estimation was applied to check the robustness of the results obtained from the two-step system GMM. The FE method is generally considered to be better when T is larger than 30. The time period for this study was only 15 years and FE method had its own

limitations in respect to estimating the dynamic panel data as was used here. Still the results of FE method are presented in Table 6.6.

Table 6.6: Gross loan estimates for bank typologies using FE method

Variable	Ownership	Size	Islamic	Age
	Coefficient	Coefficient	Coefficient	Coefficient
LagGL	0.344*** (0.061)	0.305*** (0.048)	0.441*** (0.075)	0.291*** (0.065)
GDPgrowth	0.106 (0.414)	0.504 (0.414)	-0.001 (0.428)	0.154 (0.407)
Interest rate	-0.106*** (0.032)	-0.112*** (0.025)	-0.156*** (0.023)	-0.057* (0.032)
FL	14.365*** (1.468)	9.763*** (1.603)	14.745*** (1.528)	15.344*** (1.551)
Public* FL	-1.262*** (0.480)			
Large* FL	-	1.855*** (0.231)	-	
Islamic* FL			0.015 (0.361)	
New* FL	-	-	-	1.410*** (0.346)
Wald Chi2(5)	253.23 (0.000)	226.45 (0.000)	276.51 (0.000)	226.83 (0.000)
No. of banks	37	37	37	37
No. of observations	429	429	429	429

Note 1: The FL variable here was constructed following the Abiad et al. index of financial liberalisation. Also the dummy variables were taken in actual form in 0-1 scale.

Note 2: Robust standard errors were in parentheses to the right of the respective estimated coefficients. In the lower part of the table, the probability values were given in parentheses.

* Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

It could be observed that the results from the two-step system GMM were quite robust as in alternative estimation, all the control variables were found significant (except one) and in line with the expected theories and similar to the results found by the two-step system GMM method. The financial liberalisation variable was found to be significant in all cases and also positive. For the bank typology variables, results for ownership and age typologies were same as the main estimation presented in Table 6.5. Insignificant result for mode of operation typology was similar to the earlier results. However, results for size typology differed from the main estimation.

6.8 CONCLUSION AND POLICY IMPLICATIONS

6.8.1 Conclusion

It could be concluded that this bank-level study of lending for the banking sector in Bangladesh had given further and important insights into the long and ongoing debate of the effect of the financial liberalisation. There were differences of opinions about the success and the extent of it. The results of this study showed that the financial liberalisation increased lending in the banking sector.

The relationship was found to be significant in all cases of four types of regression using four different bank-specific characteristics. This meant that the process of financial liberalisation was able to increase credit allocation, which was in line with earlier empirical findings (e.g. Cotarelli et al., 2003)⁴⁷. However, as observed from the earlier findings of this study, this increase in lending was not large enough to reduce the excess liquidity problem for the banking sector in Bangladesh. Therefore, findings of this chapter (increase of lending with the process of financial liberalisation) in relation to the first empirical chapter (Chapter 4) where it was found that excess liquidity in the banking sector increased after financial liberalisation require some further analysis since lending and excess liquidity were generally expected to move in the opposite direction.

It was quite natural that lending would increase after and with the process of financial liberalisation in line with one of its chief objectives of removing different lending barriers. Similarly, this was also expected to remove or reduce excess liquidity in the banking sector. However, with deposits increasing, if lending grows but less compared to increase in deposit, then lending and EL will both rise. One possible reason for lending not keeping pace with growth in deposits could be a more prudent lending behaviour of banks. Moreover, a consistent spread between government bill and bond rate with the interest rate also helped banks in lending safely because of the interest they could earn in government bills and bonds

⁴⁷Though in most cases, authors used different measures of financial liberalisation than the one used in this study.

without the risk of default. Detailed discussion on this was done in Section 4.8.1.

Variations in interest rate according to different bank-specific characteristics could play a significant role for difference in lending. To analyse this, interest rates of banks were averaged for each typology. The higher the interest rate, it was expected that the less will be the demand for borrowing. Therefore, it would be interesting to see if there were any differences in interest rates among the bank-specific characteristics. It was discussed in detail in Section 4.8.1 and was observed that differences in interest rates above a certain level led to significant differences while if the gap was not much than there was no significant difference. This highlighted the importance for keeping the interest rate within a reasonable band for different banks to avoid too much variation in terms of lending.

It was also observed by earlier studies that stages and sequencing of liberalisation could have an impact on how banks behave (Bandiera et al., 2000). Moreover, institutional strength was also mentioned to be critically important for the success of it. Caprio et al. (2006) wrote: ‘institutional strengthening now widely accepted as being the pre-requisite of a successful liberalised financial sector’. If an economy was structurally weak then it was difficult to reap the proper benefits of financial liberalisation.

6.8.2 Policy Implications

This study highlighted the importance of specific policies and its implementations based on different bank-specific characteristics. One significant feature of this study was that it used bank-level data which helped in understanding better the differences at bank-level and also assisted in identifying the differences across banks. This was because it was easier, with bank-level data, to classify the banks according to different typology and examine the effect accordingly.

For ownership typology, it is important that public banks step up their lending in normal times rather than using the advantage of government backing. On the other hand, careful attention is needed so that private banks do not lend injudiciously, which may look good in the short-run but can prove detrimental in the long-run due to the higher risk associated with imprudent lending.

Similarly, for age typology, large banks need to be encouraged to lend more using their advantages in lending towards large firms. Since Bangladesh is a country with many small firms, large banks also need to concentrate in widening their lending scope by increasing lending to small firms and consumers. Specific targets need to be set for these types of banks by the central bank in this regard as is done by the central bank in other cases. For example, specific targets were set for agricultural lending by the central bank in Bangladesh. On the other hand, new banks should be monitored so that they do not overlend, particularly during the initial years, to survive. An initial period of a few years support is therefore suggested to help these banks to lend more prudently in this very competitive sector.

Insignificance of size and mode of operation typology suggests that policies can be formulated and implemented on a priority basis where the characteristics of ownership and age should be addressed first before the characteristics of mode of operation and size. Therefore, 'one size fits all' approach should be avoided and specific policies need to be formulated keeping in mind different bank-specific characteristics.

Special attention needs to be given to address the variation in interest rates according to bank-specific characteristics. As observed above, rate of interest played an important role in lending and variation in interest rates could lead to difference in lending. Therefore, steps need to be taken to reduce this variation to a certain level across these bank-specific characteristics.

The financial liberalisation index constructed and applied in this study showed that although liberalisation started in Bangladesh in the early 1990s, it was still far from reaching its completion. Hence, it is very important that the remaining process is incorporated and accomplished with urgency so that maximum benefit from it can be achieved.

Some earlier studies observed that sequencing of liberalisation played a crucial role in achieving the benefit from this process. If a country was in at its early stage, then it was very important to keep in mind this process of sequencing. However, for countries where the process started much earlier and was already in place for years, it would be more useful to work on strengthening the institutional factors for its success (Caprio et al., 2006).

APPENDIX 6.1: Variable definitions

Table 6A.1: Variable definitions

Variable Name	Variable Definition	Comment
Dependent Variable		
Gross loan	Gross loans	log value taken
Explanatory Variables		
Lag dependent variable	Lag of initial year data of the dependent variable	
GDP growth	log of GDP growth	log value taken
Interest rate	Deposit rate: Interest Expense/Average Interest-bearing Liabilities	log value taken
Financial liberalisation (FL)	A composite index of seven indicators following Abiad et al. but constructed by authors	Actual values taken first and then log values taken.
Ownership dummy with interaction	FL* Public (1 if state-owned, 0 otherwise)	Interacted with the financial liberalisation
Size dummy with interaction	FL* Large (1 if large, 0 otherwise)	Interacted with the financial liberalisation
Mode of operation dummy with interaction	FL* Islamic (1 if Islamic, 0 otherwise)	Interacted with the financial liberalisation
Age dummy with interaction	FL* New (1 if new {established after 1990}, 0 otherwise)	Interacted with the financial liberalisation

APPENDIX 6.2: Data availability

APPENDIX 6A.2: Data availability of gross loan for banks in Bankscope

Serial	Name	Bank Type	Gross loan	Total Year
1	AB Bank	PCB	1997-2011	15
2	Agrani Bank	SCB	1997-2011	15
3	Al-Arafah Islami Bank	PCB	1997-2011	15*
4	Bangladesh Commerce Bank	PCB	2000-2011	12
5	Bangladesh Development Bank	DFI	1997-2009	12**
6	Bangladesh Krishi Bank	DFI	1997-2011	15
7	Bank Asia	PCB	1999-2011	13
8	BASIC Bank	DFI	1997-2011	15
9	BRAC Bank	PCB	2001-2011	11
10	City Bank	PCB	1997-2011	15
11	Dhaka Bank	PCB	1997-2011	15
12	Dutch Bangla Bank	PCB	1997-2011	15
13	Eastern Bank	PCB	1997-2011	15
14	EXIM Bank	PCB	1999-2011	13
15	First Security Islami Bank	PCB	1999-2011	13
16	ICB Islamic Bank	PCB	1997-2011	15***
17	IFIC Bank	PCB	1997-2011	15
18	Islami Bank Bangladesh	PCB	1997-2011	15
19	Jamuna Bank	PCB	2001-2011	11
20	Janata Bank	SCB	1997-2011	15
21	Mercantile Bank	PCB	1999-2011	13
22	Mutual Trust Bank	PCB	2000-2011	12
23	National Bank	PCB	1997-2011	15
24	NCC Bank	PCB	1997-2011	15
25	One Bank	PCB	1999-2011	13
26	Premier Bank	PCB	1999-2011	13
27	Prime Bank Limited	PCB	1997-2011	15
28	Pubali Bank	PCB	1997-2011	15
29	Rupali Bank	SCB	1997-2011	15
30	Shahjalal Islami Bank	PCB	2001-2011	11
31	Social Islami Bank	PCB	1998-2011	14
32	Sonali Bank	SCB	1997-2011	15
33	Southeast Bank	PCB	1997-2011	15
34	Standard Bank	PCB	1999-2011	13
35	Trust Bank	PCB	2000-2011	12
36	United Commercial Bank	PCB	1997-2011	15
37	Uttara Bank	PCB	1997-2011	15

* 2000 missing; ** 2006, 2010, 2011 missing; *** 1998, 2004, 2005 missing.

SCB = State-owned Commercial Bank, PCB = Private Commercial Bank, DFI = State-owned Development Financial Institution.

APPENDIX 6.3: Additional estimates

Table 6A.3: Gross loan estimates applying two-step system GMM using alternative measure of real interest rate (using GDP deflator)

Variable	Ownership	Islamic	Size	Age
	Coefficient	Coefficient	Coefficient	Coefficient
LagGL	0.732*** (0.219)	0.749*** (0.205)	0.732*** (0.218)	0.681** (0.279)
GDPgrowth	0.317*** (0.117)	0.328*** (0.120)	0.323*** (0.119)	0.298*** (0.110)
Interest rate	-3.705*** (1.395)	-3.185** (1.382)	-3.136** (1.419)	-4.045*** (1.547)
FL	1.637*** (0.535)	1.476*** (0.549)	1.471*** (0.553)	1.499*** (0.557)
Public* FL	-0.193*** (0.059)	---	---	---
Islamic* FL	---	0.033 (0.048)	---	---
Large* FL	---	---	-0.037 (0.045)	---
New* FL	---	---	---	0.231*** (0.058)
Wald chi2 (6)	209.36 (0.000)	132.02 (0.000)	167.81 (0.000)	194.71 (0.000)
Hansen-J Test	1.65 (0.647)	1.68 (0.641)	1.64 (0.650)	2.44 (0.486)
Test for AR (1) errors	-3.22 (0.001)	-3.42 (0.001)	-3.25 (0.001)	-2.65 (0.008)
Test for AR (2) errors	0.89 (0.372)	0.93 (0.351)	0.89 (0.372)	0.82 (0.410)
No. of banks	37	37	37	37
No. of observations	403	403	403	403

Note 1: The FL variable here was constructed following the Abiad et al. index of financial liberalisation. Also the dummy variables were taken in actual form in 0-1 scale.

Note 2: Robust standard errors were in parentheses to the right of the respective estimated coefficients. In the lower part of the table, the probability values were given in parentheses.

* Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

Appendix 6.4: Relationship between excess liquidity and lending

The main objective of this study was to examine the impact of financial liberalisation on excess liquidity and lending. Therefore, the relationship between lending and excess liquidity was never tested in this dissertation. However, possible relationships between them were discussed in detail in Section 1.2.3 to have a clear understanding about how they could be related.

Furthermore, the relationship between lending and excess liquidity was now tested with a regression where lending was the dependent variable and excess liquidity was one of the explanatory variables. The regression result showed that excess liquidity and lending were positively related for Bangladesh. The relationship between lending and excess liquidity was tested with the following equation of total lending:

$$GL_{it} = \alpha_0 + \beta_1 EL_{it} + \beta_2 GDP_t + \beta_3 INT_{it} + \beta_4 INF + \varepsilon_{it}$$

The above equation explained effect at bank-level on lending where GL representing total lending, EL showed excess liquidity, GDP was for economic growth, interest rate was given by INT and INF expressed inflation. Banks were represented by subscript i while t was showing year. The variables of lagged dependent variable, economic growth, inflation and interest rate were the most common variables applied in most of the earlier studies on lending.

Table 6A.4: Relationship between lending and excess liquidity
(Dependent variable: Gross loan)

Explanatory variables	Coefficient
Excess liquidity	10.42*** (1.665)
GDP growth	208.57 (210.676)
Interest rate	179.37 (117.978)
Inflation	57.30 (59.221)

The regression result showed that lending and excess liquidity was positively related. In addition, correlation between excess liquidity and lending was estimated.

Table6A.5: EL and Lending Correlation

Variable	EL (nominal)	EL (real)
Total domestic credit	0.9351*	0.9027*
Private credit	0.9353*	0.9006*

* Significant at 5% level.

The results showed that they were positively correlated with each other. This positive relationship between lending and excess liquidity was observed across different definitions of both of them. Moreover, they were found significant in all cases.

CHAPTER 7

CONCLUSION

7.1 INTRODUCTION

This study investigated the effect of financial liberalisation on excess liquidity and lending along with analysing the impact of business cycle and the recent financial crisis on excess liquidity across banks. Bank-level data of 37 (nearly all) banks for the economy of Bangladesh were used for the period of 1997-2011 in this study. Along with the standard control variables, some other key variables of interest were considered using panel estimation methods. Since Bangladesh is a developing country like most other countries where financial liberalisation took place and the process of liberalisation in Bangladesh started around the same time like in most economies, the findings and policy implications of this study are relevant and applicable for many other countries, particularly developing ones.

One of the main aims of financial liberalisation, which was proposed more than fifty years back, was to increase banking sector competition. Different policies were prescribed for this with the ultimate objective that banks would be able to lend without any constraint. If banks were able and choose to lend without any restriction, then this would have led to a situation of very low or zero excess liquidity in the banking sector. On the other hand, financial liberalisation can increase uncertainty in the economy, leading banks to careful lending and ultimately increase the excess liquidity.

Now, it is observed that though the process of financial liberalisation started in early 1990s for most of the developing economies, still there is substantial excess liquidity problem in the banking sector in these countries, including Bangladesh. Since it is generally observed that there is sufficient demand from borrowers, therefore lending decisions lie mainly with the banks. Thus it was pertinent to study what affected EL and lending and how at bank-level.

7.2 CONTRIBUTION TO LITERATURE AND SUMMARY FINDINGS

According to our knowledge, there has not been any study at bank-level to explore the relationship between excess liquidity and financial liberalisation. This study aimed to fill this gap in the literature by using the bank-level data of the Bangladesh economy.

As the process of liberalisation is a composite process of many steps and sectors, use of a dummy or a single variable to proxy this process has some limitations. To address this difficulty to capture this complex process adequately, an index of liberalisation was used in this study to measure its effect accurately. This index was constructed with seven indicators following the work of Abiad et al. (2010)⁴⁸. The main indicators were: credit controls and excessively high reserve requirements, interest rate controls, entry barriers, state ownership in the banking sector, capital account restrictions, prudential regulations and supervision of the banking sector and securities market policy.

Contrary to the expectation that the liberalisation process would reduce excess liquidity, it was found that in spite of the financial liberalisation in Bangladesh, the excess liquidity for all types of banks has continued to grow. This means that even after the financial liberalisation, banks were either not able to or chose not to lend sufficiently to remove or even reduce excess liquidity problem in the banking sector. As generally there is enough demand from borrowers, the second possible scenario of banks not choosing to lend is more applicable. Increased uncertainty due to liberalisation is found to be a key factor as it led to higher loan default, followed by subsequent prudent lending in response by the banking sector (Figure 4.6). Significant positive impact of impaired loan and deposit volatility variables further supported the effect of economic uncertainty in increasing excess liquidity in the banking sector.

⁴⁸A more detailed discussion about this index was provided in Section 4.3.2.2 and in Appendix 4.5.

Another key contribution of this study to the existing literature was to examine the effect of various bank-specific characteristics. It was observed from previous studies that these characteristics could play a differential role among the banks. However no study till now, according to our knowledge, had investigated if banks behaved differently in terms of excess liquidity due to these characteristics with the financial liberalisation. Therefore, to see if banks behaved differently according to these characteristics, four bank-specific characteristics were used in this study for the banking sector in Bangladesh. These were ownership, size, mode of operation and age.

The results showed that the public banks had higher growth of excess liquidity than the private banks. However, it should be explained carefully as the objectives of public banks include various social objectives which make them less aggressive to lend competitively with other banks whose only aim is profit maximisation.

Lower growth of excess liquidity for the new banks than the old banks support the fact that new banks performed better in terms of managing uncertainty brought along with the financial liberalisation. It also meant that they were engaged in higher amount of lending to get a reasonable share in this competitive market of banking sector quickly.

No definite patterns could be observed for mode of operation bank typology. Unlike the conventional banks, the Islamic banks are unable to use all instruments of lending due to Islamic rules related to interest. But strategically they are in a more advantageous position in a Muslim populated country like Bangladesh as many Muslim actively engage with Islamic banking without worrying much about interest.

No significant difference is observed between large and small banks. Large banks are in a better position where hard information is required but small banks do better when soft information is important. All these opposite

effects have nullified each other and led to an insignificant difference between them.

Careful examination of these bank typologies showed that significant variations in interest rate played a key role in difference in excess liquidity. It was observed that banks with higher interest rate had lower excess liquidity while banks with lower interest rate had higher excess liquidity. Moreover, when the spread of interest rates between two groups were considerably large, significant relationship was observed for that typology (Figures 4.8 to 4.11).

Although previous studies had examined how lending was related to business cycle and if they differed according to ownership (and some other bank-specific characteristics), there has been no study to see how business cycle affected excess liquidity. The second empirical chapter analysed how excess liquidity was related to business cycle in Bangladesh. Applying same bank-specific characteristics of the earlier chapter, an effort was made to see if there were any variations in excess liquidity according to this. It was observed that business cycle had a significant negative impact on excess liquidity of the banking sector in Bangladesh. The results also showed that the public banks acted less procyclically than the private banks validating the earlier similar general findings on lending. However, it was observed that the large and the new banks acted more procyclically than their counterparts. The difference in behaviour by banks according to these bank-specific characteristics during business cycle was explained by the variation in capitalisation. These variations across banks not only explained the reasoning for difference in relation to business cycle but also with the recent financial crisis (Figures 5.1 to 5.4).

Since business cycle bust for a sustained period can lead to crisis and the recent financial crisis falls under the period of this study, this crisis was also included to see if and how it was related with excess liquidity. On the one hand, financial crisis is likely to lead to higher excess liquidity as a crisis period would lower the demand of borrowers as well as making banks

skeptic towards lending due to higher chance of default. Yet, the process of capitalisation during this period can lead banks towards higher lending and lower excess liquidity.

Furthermore, if the economy and the banking sector are strong enough to face the financial crisis, then banks can still continue to lend at a higher level. It was observed that the relationship of excess liquidity with the financial crisis was different from the relationship with business cycle. Factual evidence suggested that all these possible scenarios (careful lending, lower demand, capitalisation and resilience of the banking sector and the economy) and their possible effects, acting in opposite directions to each other, had generally nullified each other during the crisis period. For the typology variables, significant difference was found for size and age typologies where it was observed that the large and new banks acted more procyclically than the small and old banks respectively. As mentioned before, variation in the process of capitalisation was important for this significant difference as higher capitalisation leads to higher lending and thereby lower excess liquidity. This was observed to be true for public and large banks.

Previous studies on lending had either looked at the effect of lending on financial liberalisation at country level or at cross-country levels. Where bank-level data of lending were used, the relationship of lending was analysed for some other phenomena (and not financial liberalisation). Therefore, to fill the gap in the existing literature, relationship between financial liberalisation and lending at bank-level was examined in the third empirical chapter. In line with the earlier two empirical chapters, an effort was made to see if there were any variations in lending among different types of banks. It was found that the financial liberalisation variable had a significant positive relationship with lending across all types of banks. This supported the factual evidence of continuous increase in lending after the process of financial liberalisation. The results relating to the different typologies of banks showed that public banks had lower lending than private banks while large and new banks experienced higher lending than

small and old banks respectively. The remaining typologies of mode of operation did not show any significant variation. Differences in consumer lending was found to play an important role in the variation in lending (Figures 6.6 and 6.7 and discussions thereof).

As mentioned earlier in Chapter 1, part of the motivation of this study was to understand the banks' behaviour regarding excess liquidity. Some of the questions mentioned there included: What factors affected their lending pattern and hence excess liquidity? How did they respond to policy actions such as financial liberalisation, or other external factors such as financial crises, business cycles etc.? How did these responses vary across the various types of banks that existed? These were some of the questions that were addressed in this work and discussed in detail in the result section of each chapter. Summarily, the findings showed that the lagged dependent variable affected lending while impaired loan, interest rate and financial liberalisation were found to affect excess liquidity. It is also found that policy actions like financial liberalisation affected both lending and excess liquidity. When the impact of business cycle and the recent financial crisis were analysed, it was seen that business cycle had a more direct impact while the financial crisis had much less effect. One of the key findings of this thesis is that in several cases, banks behaved differently according to the bank typologies applied in this research⁴⁹.

7.3 POLICY RECOMMENDATIONS

This study highlighted a number of policy issues related to financial liberalisation with excess liquidity and lending as well as the relationship between excess liquidity with business cycle and the financial crisis. These are described below in the following paragraphs.

- (i) **Tailor-made approach for different bank typologies:** In this bank-level study, it is observed that a 1 per cent increase in financial liberalisation led to an increase of 1.170 for private banks, while it was even higher for public banks (1.411). Similarly, small, conventional and

⁴⁹With the exception of 'mode of operation' typology.

old banks also experienced significant increase of 1.278, 1.147 and 1.157 respectively for a 1 per cent rise in financial liberalisation. New banks differed significantly from old banks and had lower percentage change (1.272) in excess liquidity. Large and Islamic banks did not experience significant difference to small and conventional banks respectively.

Based on these findings, it is recommended that 'one size fits all' approach should not be applied. These results suggest that policies should be bank typology specific and have orders of priority where age criterion will come first followed by ownership and size typology.⁵⁰

- (ii) **Observing risky lending:** Consumer lending is found to play an important role in difference in lending. While the private banks were found to rapidly increase their share of consumer lending, the opposite was found for the public banks. Similar to the private banks, the new banks were also observed to increase their share of consumer lending while the share of the old banks decreased. Although increased lending is generally believed to be good, unnecessary increase in lending can lead to risky behaviour. For the private banks, this is due to their aim for profit maximisation while for the new banks, this is to get a reasonable market share in their early period of establishment.

Additionally, non-performing loans are found to be affecting the excess liquidity situation. Hence, close monitoring of loan default situation is recommended in this regard. A specific gestation period at the beginning for new banks is also suggested to avoid any untoward lending.

- (iii) **Reduction of political uncertainty in the economy:** Although it was expected that financial liberalisation would reduce excess liquidity through increased lending, it had failed to achieve reduction in excess

⁵⁰ Similar recommendations have emerged from earlier studies of financial liberalisation on different countries (Griffith-Jones et al., 2003). The difference between those studies and this study is that those were not done at bank-level.

liquidity. In this study, political motive was found to be positive and significant. Therefore, political and other uncertainties need to be especially taken care of to address the problem of excess liquidity.

This is also observed by others. For example, one of the reasons mentioned for excess liquidity in Bangladesh is political uncertainty (Dhaka Tribune, 7 November 2013).

- (iv) **Strengthening of the monetary policy:** In addition to political uncertainty, this study also observed that deposit volatility and impaired loan had significant positive impact on excess liquidity. To remove uncertainties in the economy, it is therefore recommended that monetary policy should be strengthened and made more predictable. This is in line with earlier suggestion by IMF (2009) to address the problem of excess liquidity in Bangladesh.
- (v) **Making capitalisation process symmetric:** This study has observed that when there are differences in capitalisation among banks (according to typologies), there are differences in their in terms of excess liquidity. To avoid this variation, special attention is recommended so that all banks are capitalised in a similar way.

7.4 CONCLUDING REMARKS

This bank-level study on the banking sector in Bangladesh has given further insight into the ongoing debate on the effect of financial liberalisation. Various aspects of excess liquidity and lending with financial liberalisation are analysed in this study. Moreover, impacts of business cycle and the recent financial crisis on excess liquidity are also analysed. Although it is found that financial liberalisation affected lending positively, it is also observed that financial liberalisation has not been able to reduce excess liquidity problem in the banking sector which is contrary to the general expectation. Business cycle is found to be affecting excess liquidity while the financial crisis showed a less conclusive relationship.

Significant relationship of deposit volatility and impaired loans with excess liquidity has shown that uncertain environment (both economic and political) had an impact on excess liquidity situation. This is due to the uncertainty that financial liberalisation brings in with it. Capitalisation showed mixed effect on excess liquidity while political motive is found to positively affect the situation. For lending, it was observed that economic growth was positively related.

Inverse relationship of interest rate with excess liquidity and lending (positive with excess liquidity and negative with lending) supported the generally assumed opposite relationship between lending and excess liquidity. However, positive relationship of financial liberalisation with both excess liquidity and lending led to further analysis and conclusion that prudent lending from banks in the face of uncertain situation to avoid risky lending had kept lending within a certain level.

Variations in behaviour for different bank typologies shed important light on the need for different policies for different banks. It is recommended that significant differences in interest rate, capitalisation and consumer lending among banks with different ownership and age need prior attention while capitalisation of banks with different size and ownership needs to be addressed in times of crisis. However, mode of operation typology requires least attention as Islamic banks, despite its limitations in scopes and instruments related to lending, were generally found to perform similar to the conventional banks.

Overall the results suggested that increased uncertainty due to financial liberalisation had significant impact on the banking sector. It is recommended that institutional and other necessary reforms are carried out to get the maximum benefit from liberalisation rather than imposing this process on a general basis. Since liberalisation is a multi-dimensional process of various phases, sequencing of it also needs to be kept in mind as improper sequencing is an obstacle in getting the maximum benefit unless the process of liberalisation is already on for too long.

Significant impact of deposit volatility, impaired loan and political motive showed that uncertainty in the economy was a very important aspect for the behaviour in the banking sector. This was particularly important due to the fact that financial liberalisation was found to have significant impact on the banking sector and liberalisation can also bring in uncertainty. However, the significant impact of capitalisation highlighted the fact that government or central bank can play a role in addressing issues related to the banking sector. It is recommended that the central bank step in whenever banks behave significantly differently according to their different characteristics.

Variations across bank typologies in this study showed the importance of bank-level study. Bank-level data enabled us to investigate closely how banks behaved differently. It also highlighted the importance of applying bank-level study in other aspects related to the banking sector. After the recent surge of cross-country studies, this new dimension of bank-level study can be a new type of future research area.

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