



**ST. MARY'S UNIVERSITY  
SCHOOL OF GRADUATE STUDIES**

**DETERMINANTS OF LIQUIDITY AND THEIR IMPACT  
ON PROFITABILITY  
OF DEVELOPMENT BANK OF ETHIOPIA**

**BY  
NATHNAEL HAILU**

**OCTOBER, 2013  
ADDIS ABABA, ETHIOPIA**

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**A THESIS IS SUBMITTED TO ST.MARY'S UNIVERSITY,  
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OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF  
BUSINESS ADMINISTRATION**

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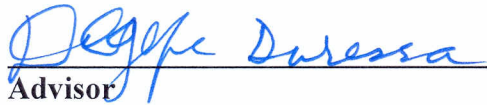
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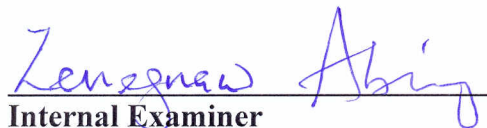
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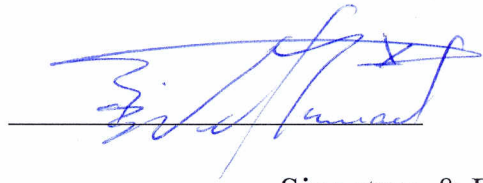
# DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Degefe Duressa Obo. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Nathnael Hailu Tessema

Name

St. Mart's University, Addis Ababa

A handwritten signature in blue ink, appearing to read 'Nathnael Hailu Tessema', written over a horizontal line.

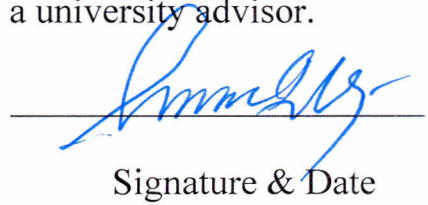
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# ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

  
Advisor

  
Signature & Date

St. Mart's University, Addis Ababa

October, 2013

## **DEDICATION**

I wish to dedicate this thesis to my late mother Sister Zenebech G/Yesus (1927 – 2002 e.c.). She taught me to persevere and prepared me to face challenges with faith and humility. Her encouraging word and belief in hard work is always my inspiration. Although she is not here to give me strength and support I always feel her presence that used to urge me to strive to achieve my goals in life.

## **ACKNOWLEDGEMENT**

A research report requires not only substantial commitment and personal sacrifice of the researcher but also it depends on support and encouragement of many others including family, colleagues and associates. I would like to express my appreciation to the following persons for their suggestion, support and contribution. Moreover, this thesis is also the result of many experiences I have encountered from dozens of remarkable literatures, journals and individuals who I wish to acknowledge.

First, I would like to thank my supervisor Dr. Degefe Duressa Obo for his unreserved assistance in giving me relevant comments and guidance throughout the study.

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I also would like to thank to the staff and management of development Bank of Ethiopia for completing the research survey questionnaire and providing financial data.

Finally, I would like to thank ST. Mary university school of graduate studies for giving me the chance to be partaker of the academic endeavor. My indebtedness also goes to my employer, Development Bank of Ethiopia, for My Msc study would have just remained a dream without obtaining priceless support from my employer.

## **ABSTRACT**

(Erik Banks 2005, pp3), described the term liquidity as “the availability of cash or equivalent resources and is the lifeblood of every commercial and sovereign entity”. This paper has two purposes: firstly to identify determinants of Development Bank of Ethiopia’s liquidity and then see the impact of bank’s liquidity on financial profitability through the significant variables explaining liquidity. Ordinary least square regression model was used to analyze the data covering twenty four years (1990 – 2013). Six factors affecting bank’s liquidity were selected and analyzed. The results of regression analysis showed that short term interest rate and inflation had positive and insignificant impact on DBE’s liquidity. While, NPL ratio impact on liquidity was statistically significant and has positive impact. Loan growth rate and real GDP growth rate had statistically significant effect on the liquidity of DBE and has a negative impact. Among the statistically significant factors affecting bank’s liquidity like real GDP growth rate and loan growth rate had positive impact on financial performance whereas, inflation had positive but statistically insignificant impact on financial performance. Therefore, the impact of bank liquidity on financial performance was non-linear/positive and negative.



## **ACRONYMS**

DBE – Development Bank of Ethiopia

MOFED – Ministry of Finance and Development

CBE - Commercial Bank of Ethiopia

LMI – Liquidity Mismatch Index

IDA – International Development Agency

WB – World Bank

IFAD – International Fund for Agricultural Development

CDB – China Development Bank

EU – European Union

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# CHAPTER ONE

## INTRODUCTION

### 1.1. Background of the Study

Ethiopian modern commercial Banking history dates back to the turn of the twentieth century when, 1905, the Bank of Abyssinia was established in Addis Ababa by the agreement between Emperor Menelik II and a representative of British owned National Bank of Egypt. After the bank was bought and owned by the Ethiopian government, it was disintegrated into two different banks forming the National Bank of Ethiopia and the Commercial Bank of Ethiopia (Mauri, 2003). Four years later Emperor Menelik II on 1909 established a specialized bank that promote agriculture and trade to support the development of the society under the name of The Societe Nationale d’Ethiopie pour le Development de l’agriculture et de Commerce. This Bank has renamed itself several times along with the changing of government economic policy, serving the same mission. Development Bank of Ethiopia (DBE) with its current name is specialized bank with a mission of providing medium and long term loan for priority projects. In the Banking industry DBE’s market share stood second compared to other public and private Banks in Ethiopian financial sector (NBE Quarterly Bulletin, 2012).

Banks are among the financial intermediaries that raise funds, as traditionally perceived, primarily by issuing checkable/demand deposits, saving deposits, and time/fixed deposits (Mishikin, 2004). Development banks fill a gap left by undeveloped capital markets and the reluctance of commercial banks to offer long-term financing. Because the financial system of Ethiopia is at its infancy stage, DBE is authorized to bridge the market where commercial banks fear to take risks. This is done through mobilizing financial resource from local and foreign sources. That will make the Bank riskier than regular Banks. Thus DBE’s financial stability has a paramount for the country’s economic stability.

The market turmoil that began in mid-2007 re-emphasized the importance of liquidity to the functioning of financial markets and the banking sector. In advance of the turmoil, asset markets were buoyant and funding was readily available at low cost. The reversal in market conditions illustrated how quickly liquidity can evaporate and that illiquidity can last for an

extended period of time. The banking system came under severe stress, which necessitated central bank action to support both the functioning of money markets and, in a few cases, individual institutions.

Ethiopia is one of the fastest growing economies in the world, registering double digit growth for a consecutive seven years. The country has liberalized its banking industry for private firms beginning 1990's, and from there on the number of Banks have increased to nineteen as of June, 2013 (NBE Annual Report, 2013). These have created conducive market for investors to put their money in more rewarding financial institutions. Formerly, public organizations as well as private investors were forced to put their excess money only in government owned banks. However, these have sifted on competitive and attractive incentives that the banks offer. This particularly has affected the cost of fund for time deposit mobilizes.

During its history DBE faced different liquidity problem in financing its projects repeatedly, however, the depth and dimension of risk it would face with its current strategic position would be by-implicated at country level. Therefore, DBE's ability to settle its obligation with immediacy is paramount. Consequently, by understanding and using the dimensions of liquidity of DBE this thesis, will identify the determinants of liquidity in development bank of Ethiopia to help in reviewing effective liquidity management system in the Bank and which will further help replicate to other similar financial institutions in Africa where DBE is member to tackle factors hindering their performance.

### **1.1.1. Overview of banking history in Ethiopia**

Modern banking in Ethiopia was introduced in 1905. At the time, an agreement was reached between Emperor Menelik II and a representative of the British owned National Bank of Egypt to open a new bank in Ethiopia. February 15, 1906 marked the beginning of banking in Ethiopia history when the first Bank of Abyssinia was inaugurated by Emperor Menelik II. It was a private bank whose shares were sold in Addis Ababa, New York, Paris, London, and Vienna (NBE 2010). In 1931, Emperor Haile Selassie introduced reforms into the banking system and the Bank of Abyssinia was liquidated and became the Bank of Ethiopia, a fully government-owned bank providing central and commercial banking

services until the Italian invasion of 1936. During the Italian invasion, Bank of Italy was formed a legal tender in Ethiopia. In 1943, after Ethiopia regains its sovereignty, the State Bank of Ethiopia was established, with two departments performing the separate functions of an issuing bank and a commercial bank. In 1963, these functions were formally separated and the National Bank of Ethiopia (the central and issuing bank) and the Commercial Bank of Ethiopia are formed (Mauri, 2003). In the period up to 1974, several other financial institutions emerged including the state owned as well as private financial institution.

Further, as per the NBE (2010), following the declaration of command economy by Derge regime in 1974 the government extended its control and nationalized all of previously established private banks and merged into one bank. After nationalization the Derge regime leave only three government banks; the National Bank of Ethiopia, the Commercial Bank of Ethiopia and Agricultural and Industrial Development Bank (now DBE). This was reversed when the socialist regime was overthrown in 1991. Subsequently, the licensing and supervision of Banking Business Proclamation No. 84/1994 was issued in 1994 which led to the beginning of a new era for Ethiopia banking sector. Following the enactment of the banking legislations in the country in the 1990s, a fairly good number of private banks have been established. For example, in the 2010/11 fiscal year the total number of banks already operational in the country reached fifteen. Of these banks, twelve were private and the other three were government owned. There is also a sign of interest in establishing other new banks by different individuals and groups. Accordingly, at present, there are at least four banks under the process of establishment through issuing their shares. Currently, commercial banks work for profit and the NBE controls and gives license for commercial banks NBE, (2010). It is the reserve or central bank of Ethiopia. According to proclamation No 591/2008 NBE establishment proclamation article 4 the purpose of the NBE is to maintain stable rate of price and exchange, to foster a healthy financial system and undertake other relative activities that are conducive to rapid economic development of Ethiopia. Meanwhile, Development Bank of Ethiopia as part and parcel of the Banking industry is given a mission to lead the banking industry by focusing on development finance, maintaining its sustainability.



### **1.1.2. Development Bank of Ethiopia**

The history of Development Bank of Ethiopia (DBE) goes back to 1909 when it was first established under the name of The Societe Nationale d' Ethiopie pour le Development de l'agriculture et de Commerce (The Society for the promotion of Agriculture and Trade). Since then the Bank has taken different names at different times even though its mission and business purposes have not made significant changes except for occasional adjustments to suit the changing government policies.

After undergoing a series of changes for about six decades, the Bank became a government owned Share Company in August, 1971 by Decree No. 55 under the name or Agricultural and Industrial Development Bank. However, after its nationalization in 1975 the Bank with the same name was re-organized and re-established as a public Finance Agency under proclamation No. 158 of March 1979. In 1994 the Bank was further reorganized and established as a public enterprise with its present name of Development Bank of Ethiopia supervised by the Board of Directors under the Ministerial Council Decree No. 2000/1994.

Furthermore, DBE was re-established under the Council of Ministers' Regulation No. 83/2003 and supervised by the public enterprise proclamation No. 25/1992. Owing to this, the Bank is mandated to operate with a wider business mission who promotes the national economic development through the provision of mainly medium and long-term investment loans by mobilizing financial resource from local and foreign financing agencies.

At present, Development Bank of Ethiopia (DBE) is one of the strategic institutions of Ethiopia for implementation of huge projects that support the economic development of the country, like the Ethiopian renaissance dam. DBE finances 15% of the dam construction through its different financing scheme (Strategic Plan of DBE, 2008). Apart from the renaissance dam, DBE is currently financing huge strategic projects like sugar factory and textile industries which requires substantial amount of finance. In order, to meet this huge financial requirement DBE follows different resource mobilization strategies. One of which recently introduced financing scheme is the renaissance dam saving bond. Saving bond is newly introduced finance mobilization strategy to support the construction of the great renaissance dam. DBE has issued different bonds with different par value ranging from

Birr 5 to 1 million, and which ranges from one year to five years. Accordingly, two years from its introduction DBE have mobilized more than three billion birr bond from the public. Moreover, DBE has also different resource mobilization scheme like soft loan from IDA, WB, IFAD, CDB, EU... as foreign sources, and from local it covers its short term financial requirement by purchasing bond or time deposit from local sources like social security fund, CBE, and other liquid local organizations.

## **1.2.Statement of the Problem**

Liquidity creation itself is seen as the primary source of economic welfare contribution by banks but also as their primary source of risk (see e.g. Bryant 1980; Diamond and Dybvig 1983; Calomiris and Kahn 1991). Since the public loss of confidence as a result of bank distress has tormented the financial sector in the last decade; and the intensity of competition in the banking sector due to the emergence of large number of new banks, every bank should ensure that it operates on profit and at the same time meets the financial demands of its creditors by maintaining adequate liquidity.

Banks have to maintain their optimal liquidity so as to undertake their operations properly and profitably. When we say banks are liquid, they are able to serve the demand of new borrowers and meet its financial obligation on time without affecting their day to day activities. To do so they have to keep sufficient liquid assets on their balance sheet. What is more necessary behind maintaining their liquidity is that properly identifying and managing important factors affecting the liquidity position of banks. According to Asphachs et al. (2005), banks have three possible layers of insurance; a buffer of liquid assets in banks' individual portfolios, unsecured lending/borrowing in the interbank market and a lender of last resort/LOLR safety net. The first one is internal and the remaining two are external sources of liquidity. Like the sources of their liquidity the liquidity position of banks can be affected by bank specific factors, macroeconomic factors and government/central bank regulations.

The problem then becomes how to select or identify the optimum point or the level at which a bank can maintain its assets in order to optimize these two objectives since each of the liquidity has a different effect on the level of profitability. This problem becomes more

pronounced as most banks in general and DBE in particular where engrossed with profit maximization through excessive loan disbursement and as such they tend to neglect the importance of liquidity management. However, financing projects become a myth as the resulted liquidity can lead to both technical and legal insolvency with the consequence of low support, deposit flight, erosion of asset base.

The banking sector has a long year of history in Ethiopia, however it has been playing important role in the economic development of the country recently. Ethiopia's financial sector is largely bank-based as the secondary market is still not found in the country. The financial sector in Ethiopia and as such the process of financial intermediation in the country depends heavily on banks. Hence, keeping their optimal liquidity for banks in Ethiopia is very important to meet the demand by their present and potential customers. Studies made by Wubitu (2012) in her study tried to address factors determining of commercial banks depositors in her case study of CBE, Zewdu (2010) tried to assess the impact of reducing or restricting loan disbursement on the performance of commercial banks in Ethiopia. Worku (2006) and Semu (2010) indicated the presence of excess liquidity held by Commercial Banks in Ethiopia. However, to the knowledge of the researcher the empirical studies on the area of determinants of Development Bank's liquidity and their impact on its profitability were not done. Therefore, empirical studies are important to identify determinants of liquidity and their impact on profitability of DBE. Thus, this study aimed to contribute to the current literature by providing some evidence on the factors that contributes to the liquidity of DBE & the impact of liquidity on financial performance.

### **1.3. Research Question**

In line with the above problem statements, the following research questions need to be addressed.

RQ1: What are the significant determinants of Development Bank of Ethiopia liquidity?

RQ2: What is the impact of liquidity on the financial performance of Development Bank of Ethiopia?

## **1.4.Objective of the Study**

### **1.4.1. General Objective**

The general objective of the study is largely centered on improving liquidity management which enables DBE to determine its liquidity requirement and ensures its ability to meet up its customer demand on time while fulfilling its financial obligations, thereby maximizing its value.

### **1.4.2. Specific Objective**

The specific objective of the study is to: -

- Determine Capital adequacy has impact on the DBE's liquidity.
- Examine the credit growth impact on the DBE's liquidity.
- Assess NPL portfolio composition & its challenge on the liquidity of the Bank.
- Review the adopted liquidity measures of DBE & attempt to see how it has been achieved.
- Examine the effect of changes in liquidity levels on profitability of DBE.

## **1.5.Significance of the Study**

Development Bank of Ethiopia is a specialized Bank, one of public financial institutions having second market share of the Banking industry of Ethiopia. The study has great contribution to the existing knowledge in the area of factors determining Development Bank's liquidity and their impact and sustainability of the Bank. This in turn contributes to the wellbeing of the financial sector of the economy and the society as a whole. Therefore, the major beneficiaries from this study are each DBE, NBE, MOFED, the academic staff of the country and the society as a whole in the country.

## **1.6.Scope of the Study**

The scope of the study was limited to see the impact of capital adequacy, loan growth, and share of non-performing loans from the total volume of loans and advances, and to see the impact of bank's liquidity on financial performance through the significant factors affecting liquidity from 1990 to 2013 of DBE.

### **1.7.Limitation of the Study**

Due to the confidential policy, access to customer and bank's information except officially disclosed financial information, was not possible. The study was limited to bank officials' personal perception and officially disclosed financial data of DBE.

Moreover, DBE has a long year of service in the country in different project finance schemes to bridge market risk for the national socio economic development, following the government development strategy. Accordingly, its name and mission has been changing in accordance with the changing government policy. As a result, the availability of data from the beginning of its establishment year is far-off. Hence, recent twenty four years data of DBE is included in the study.

## **1.8. Definition of Terms**

Definition of terms comprises of conceptual and operational definitions. Conceptual definitions of terms are definitions from the theoretical perspectives which requires descriptions of cites. Whereas, operational definitions is practical definitions given by the researcher as per the context of the text. Accordingly, for this thesis, conceptual definitions of words are used and are described below:-

**Liquidity:** - is define broadly as the availability of cash or equivalent resources, is the lifeblood of every commercial and sovereign entity. (Erik Banks 2005 pp3)

**Risk:** Risk is defined as uncertainty, that is, as the deviation from an expected outcome. (Johanning (1998), p. 47. As per (Steiner and Bruns (1995), pp. 49–50, and Perridon and Steiner (1995), pp. 95–98)) We can differentiate uncertainty into:

**General uncertainty:** Complete ignorance about any potential outcome makes both rational decision making and any quantification impossible.

**Specific uncertainty:** Objective, or at least subjective, probabilities can be assigned to the potential outcomes and hence allow for quantification.

**Liquidity Risk:** as the risk of loss arising from a lack of cash or equivalents or, more specifically, the risk of loss arising from an inability to obtain funding at economically reasonable levels, or sell or pledge an asset at carrying prices, in order to cover an expected or unexpected obligation.

**Joint Asset/Funding Risk:** is the risk of loss arising when funding cannot be accessed and assets cannot be converted into cash at a reasonable cost and within a necessary time frame.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1. Theoretical review of Liquidity**

Different authors defined the concept liquidity in different ways. To begin with, (Erik Banks 2005, pp3), described the term liquidity broadly as “the availability of cash or equivalent resources, is the lifeblood of every commercial and sovereign entity”. This shows that, liquidity includes resources such as cash for a healthy functioning of a commercial firm as well as country. Accordingly, the proper handling of these resource using different measures should be employed.

On the other hand, American Academy of Actuaries (USA) Liquidity is the ability to meet expected and unexpected demands for cash. Specifically, it is a company’s ability to meet the cash demands of its policy and contract holders without suffering any (or a very minimal) loss. The liquidity profile of a company is a function of both its assets and liabilities. (AAA, 2000, p. 4)

Bank for International Settlements (Supranational) A liquid market is a market where participants can rapidly execute large volume transactions with a small impact on prices. (BIS, 2000, p. 5)

Federal Deposit Insurance Corporation (USA) Liquidity represents the ability to efficiently and economically accommodate a decrease in deposits and other liabilities, as well as fund increases in assets. A bank has liquidity potential when it has the ability to obtain sufficient funds in a timely manner, at a reasonable cost. (FDIC, 1998, p. 1)

HM Treasury (UK) Liquidity is the ease with which one financial claim can be exchanged for another as a result of the willingness of third parties to transact in the assets. (HM Treasury, 1999)

Office of the Superintendent of Financial Institutions (Canada) Liquidity is the ability of an institution to generate or obtain sufficient cash or its equivalents in a timely manner at a reasonable price to meet its commitments as they fall due. (OSFI, 1995, p. 2)

### **2.1.1. Bank's Liquidity**

According to the theory of financial intermediation, an important role of banks in the economy is to provide liquidity by funding long term, illiquid assets with short term, liquid liabilities. Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy.

Diamond and Dybvig (1983) emphasize the “preference for liquidity” under uncertainty of economic agents to justify the existence of banks: banks exist because they provide better liquidity insurance than financial markets. However, as banks are liquidity insurers, they face transformation risk and are exposed to the risk of run on deposits. More generally, the higher is liquidity creation to the external public, the higher is the risk for banks to face losses from having to dispose of illiquid assets to meet the liquidity demands of customers. A natural justification for the existence of deposit-taking institutions, thereby giving also an explanation for the economically important role of banks in providing liquidity, was initially modeled by (Bryant 1980 and Diamond and Dybvig 1983). They showed that by investing in illiquid loans and financing them with demandable deposits, banks can be described as pools of liquidity in order to provide households with insurance against idiosyncratic consumption shocks. However, this structure is also the source of a potential fragility of banks since in case of an unexpected high number of depositors deciding to withdraw their funds for other reasons than liquidity needs, a bank run will result. Both papers stand in the tradition of prior research on the liquidity of assets, for example by (Tobin 1965 or Niehans 1978) as well as on bank runs, by (Friedman and Schwartz 1963).

The Bryant-Diamond/Dybvig models have been subject to a large number of follow-up papers, extending or testing the models. Of particular relevance for this study are the papers by Calomiris and Kahn (1991), Qi (1998) and Diamond and Rajan (2001), which develop and emphasize the point that demandable debt has interesting incentive implications for disciplining the bank management. The argument goes like this: on their asset side banks have illiquid loans whose market prices would be below their internal/book values in case of a fire sale. Having to sell or to call loans prematurely would involve a loss. The greater part of the activities which banks undertake – and need to undertake – to monitor their loans, which includes their active involvement in the governance of borrowing



corporations, are not really observable for outsiders. However, at least a certain part of a bank's liability are call or sight deposits which are by definition and by law to be paid back on demand and on a first-come first-serve basis. This rule of distribution makes depositors wary that they might be late or stand too far behind in the waiting line in the case a bank encounters problems, and it makes them even aware of what little information they may have on the monitoring activity of the bank. This situation can lead to a bank run, and the danger of a run is what induces banks to do what their depositors want them to do, namely to be active delegated monitors in the spirit of (Diamond 1984). Based on this argument Diamond and Rajan (2001), raised the question whether or not financial fragility where small shocks lead to can have large effects on assets prices is a desirable state for banks. They argue that the existence of the fragility itself gives banks the right incentives to create liquidity. According to them, any kind of regulation, such as capital standards, impair this liquidity creation and should thus be avoided.

Kashyap et al. (2002) also conducted a related analysis justifying the existence of banks liquidity creation. They argue that because banks carry out lending and deposit taking under the same roof, synergies must exist between these two tasks. These synergies can be found in the way deposits and loan commitments are secured through the holding of liquid assets as collateral against withdrawals. They regard these liquid assets as costly overheads. These overheads can be share by the two separate functions, hence the synergy. A detailed analysis of the link between liquidity shortages and systemic banking crises is given by (Diamond and Rajan, 2005). It is argued that the failure of a single bank can shrink the pool of available liquidity to the extent that other banks could be affected by it. A contagion effect is the result. However, as solvency and liquidity effects interact it is hard to determine the root of a crisis. Generally, liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long term loans. According to Joint Forum of the Basel Committee (2006), banks liquidity risk includes two types of risk: funding liquidity risk and market liquidity risk. Funding liquidity risk is the risk that the bank will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. Market liquidity risk is the risk that a bank cannot easily

offset or eliminate a position at the market price because of inadequate market depth or market disruption. There are strong interactions between funding liquidity risk and market liquidity risk, especially in periods of crisis. Drehmann and Nikolau (2009) pointed to the fact that shock to funding liquidity can lead to asset sales and may lead to decrease of asset prices. Lower market liquidity leads to higher margin which increase funding liquidity risk.

Events in the second half of 2007 and early 2008 highlight the crucial importance of liquidity to the functioning of markets and the banking sector as well as links between funding and market liquidity risk, interrelationships of funding liquidity risk and credit risks, reputation effects on liquidity, and other links among liquidity and other typical banking features. Liquidity risk is not an „isolated risk“ like credit or market risks (although credit risk often arise as a liquidity shortage when the scheduled repayments fall due), but a consequential risk, with its own intrinsic characteristics, that can be triggered or exacerbated by other financial and operating risks within the banking business (Chen et al. 2005).

### **2.1.2. Bank's Risk**

Risk, which we define as any source of uncertainty impacting business operations, comes in various forms. According to Eric Bank, (2005) any taxonomy of risk is subjective, we begin by segregating risk into financial risk, or the risk of loss arising from financial variables that impact balance sheet and off-balance sheet activities, and operating risk, or the risk of loss arising from variables that impact the physical characteristics and operations of a business. While operating risks (including exposure to non-financial inputs/ outputs, property and casualty losses, environmental liability, fiduciary liability, workers' health, safety, and compensation, and so forth) are crucial to understand and manage, we shall not consider them in further detail, except in the context of how they might lead to cash flow pressures. Instead, we focus on financial risks, decomposing them first into three broad classes: market risk, credit risk and liquidity risk.

### **2.1.3. Liquidity risk**

If liquidity is the availability of cash or equivalents, then we can define liquidity risk as the risk of loss arising from lack of cash or equivalents or, more specifically, risk of loss

arising from an inability to obtain funding at economically reasonable levels, or sell or pledge an asset at carrying prices, in order to cover an expected or unexpected obligation. Liquidity risk is, in essence, the risk of economic loss suffered in attempting to secure the cash that is so vital to continuing business operations (Eric Bank, 2005)

Liquidity risk arises from maturity mismatches where liabilities have a shorter tenor than assets. A sudden rise in the borrower's demands above the expected level can lead to shortages of cash or liquid marketable assets (Oldfield and Santamero, 1997). We can also develop more detailed definitions of liquidity risk. It is helpful, for instance, to distinguish between funding (or liability) liquidity, asset liquidity, and joint liquidity. Funding liquidity focuses on the availability of unsecured liabilities that can be drawn on to create cash, including short-term and long-term debt facilities. Funding liquidity risk is, therefore, the risk of loss stemming from an inability to access unsecured funding sources at an economically reasonable cost in order to meet obligations. Asset liquidity focuses on the availability of assets, such as marketable securities, inventories, receivables, and plant and equipment, which can be sold or pledged to generate cash. Asset liquidity risk is thus the risk of loss arising from an inability to convert assets into cash at carrying value in order to meet obligations. In certain instances asset and funding liquidity join together to produce an incremental degree of risk, which we term joint asset/funding liquidity risk – the risk of loss that occurs when funding cannot be accessed and assets cannot be converted into cash in order to meet obligations. It is important to stress those cash-sensitive off-balance sheet commitments and contingencies often supplement cash flow risks generated through balance sheet operations. Indeed, we shall note at various points in the text the crucial role off-balance sheet contracts play in liquidity risk management.

We can also consider liquidity risk in the context of internal and external forces. Some aspects of asset and funding liquidity are specific to an institution, its financial position, and its scope of operations, and are largely or entirely within its direct control. The liquidity features of the firm are not necessarily impacted by, nor do they impact, what happens in an industry or system context; this characteristic is commonly referred to as endogenous liquidity. In some cases, however, liquidity has a broader reach, affecting many institutions in a sector, or contracts in a marketplace; this exogenous liquidity is

outside the direct control of any single institution, although in certain instances the actions of individual firms can contribute to the exogenous pressures. (Eric Bank, 2005)

For additional perspectives on liquidity risk a number of regulators, industry bodies and authors have defined liquidity risk as follows:-

Canadian Institute of Actuaries (Canada) Liquidity risk is the inability to meet financial commitments as they fall due through ongoing cash flow or asset sales at fair market value. Liquidation risk is the potential loss when the sale of an asset is urgently required, which may result in the proceeds being below fair market value. The loss is the difference between the fire sale price and the fair market value. (CIA, 1996, p. 4)

Financial Services Authority (UK) Liquidity risk is the risk that a firm, though solvent, either does not have sufficient financial resources available to it to meet its obligations when they fall due, or can secure them only at excessive cost. It is a basic business risk faced to some degree by most firms, though clearly it is more significant for some than others. (FSA, 2003, p. 3)

International Association of Insurance Supervisors (Supranational) The risk emerging when the insurer fails to make investments (assets) liquid in a proper manner as its financial obligations fall due. (IAIS, 2000)

International Organization of Securities Commissioners (Supranational) The risk to [an institution's] ability to meet commitments in a timely and cost-effective manner while maintaining assets, and in the inability to pursue profitable business opportunities and continue as a viable business due to a lack of access to sufficient cost-effective resources. (IOSCO, 2002, p. 3)

Office of the Controller of the Currency (USA) Liquidity risk is the risk to a bank's earnings and capital arising from its inability to timely meet obligations when they come due without incurring unacceptable losses. (OCC, 2001, p.1)

#### **2.1.4. Liquidity Management**

Managing liquidity is a fundamental component in the safe and sound management of all financial institutions. Sound liquidity management involves prudently managing assets and liabilities (on- and off-balance sheet), both as to cash flow and concentration, to ensure that cash inflows have an appropriate relationship to approaching cash outflows. This needs to be supported by a process of liquidity planning which assesses potential future liquidity needs, taking into account changes in economic, regulatory or other operating conditions. Such planning involves identifying known, expected and potential cash outflows and weighing alternative asset/liability management strategies to ensure that adequate cash inflows will be available to the institution to meet these needs.

According to Bank of Jamaica, 1996, the particulars of liquidity management will differ among institutions depending upon the nature and complexity of their operations and risk profile, a comprehensive liquidity management program requires:

- Establishing and implementing sound and prudent liquidity and funding policies; and
- Developing and implementing effective techniques and procedures to monitor measure and control the institution's liquidity requirements and position.

#### **2.1.5. Measuring liquidity risk**

A financial institution can utilize a number of sources to meet its liquidity needs; these include new deposits, maturing assets, borrowed funds and/or using the discount window (borrowing from the central bank). Given that access to these measurement and management is an important activity in most banks. Before going to see the methods for measuring liquidity risk, sources of liquidity risk and possible ways to mitigate them should be clearly stated. Rochet (2008) states three main sources of liquidity risk: on the liability side, there is a large uncertainty on the volume of withdrawals of deposits or the renewal of rolled-over inter-bank loans, especially when the bank is under suspicion of insolvency or when there is an aggregate liquidity shortage, on the asset side, there is an uncertainty on the volume of new requests for loans that a bank will receive in the future,

and off-balance sheet operations, like credit lines and other commitments, positions taken by banks on derivative markets.

According to Aspach et al. (2005), there are some mechanisms that banks can use to insure against liquidity crises: firstly, banks hold buffer of liquid assets on the asset side of the balance sheet. A large enough buffer of assets such as cash, balances with central banks and other banks, debt securities issued by governments and similar securities or reverse repo trades reduce the probability that liquidity demands threaten the viability of the bank. Second strategy is connected with the liability side of the balance sheet. Banks can rely on the interbank market where they borrow from other banks in case of liquidity demand. However, this strategy is strongly linked with market liquidity risk. The last strategy concerns the liability side of the balance sheet, as well. The central bank typically acts as a Lender of Last Resort/LOLR to provide emergency liquidity assistance to particular illiquid institutions and to provide aggregate liquidity in case of a system-wide shortage.

Liquidity risk of banks can be measured by liquidity gap/flow approach or liquidity ratio/stock approach. The liquidity gap is the difference between assets and liabilities at both present and future dates. At any date, a positive gap between assets and liabilities is equivalent to a deficit that has to be filled (Bessis 2009). Liquidity ratios are various balance sheet ratios which should identify main liquidity trends. These ratios reflect the fact that bank should be sure that appropriate, low-cost funding is available in a short time. This might involve holding a portfolio of assets than can be easily sold (cash reserves, minimum required reserves or government securities), holding significant volumes of stable liabilities (especially deposits from retail depositors) or maintaining credit lines with other financial institutions. Various authors like Moore (2010), Rychtárik (2009), or Praet and Herzberg (2008) provide various liquidity ratios such as liquid assets to total assets, liquid assets to deposits and short term financing, loans to total assets and loans to deposits and short term borrowings. To sum up, the stock approach employs various balance sheet ratios to identify liquidity trends.

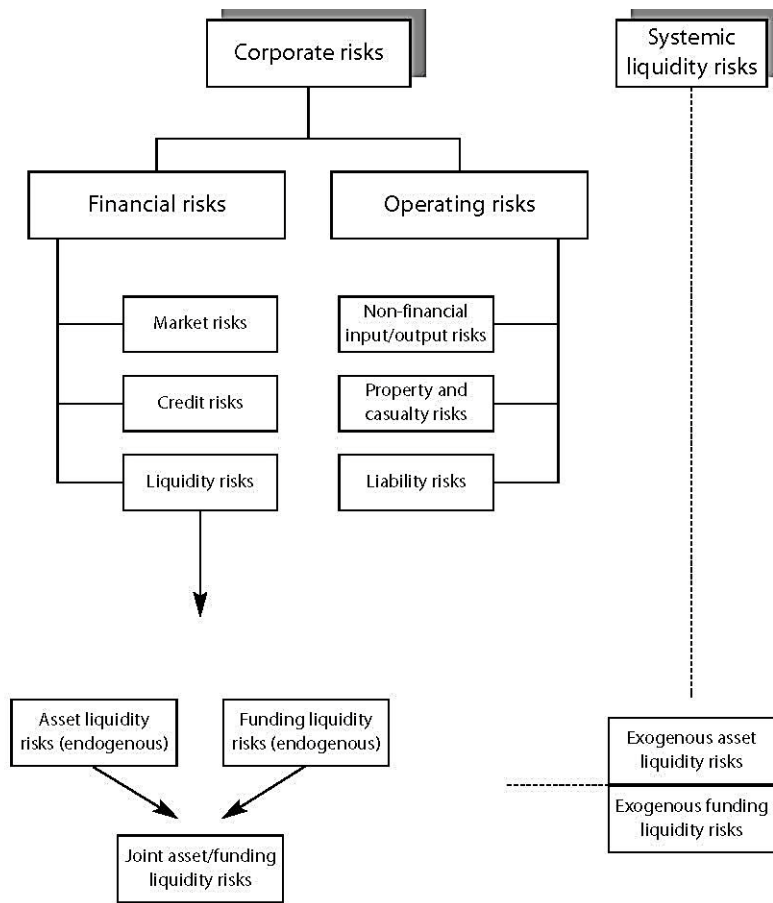
The flow approach, in contrast, treats liquid reserves as a reservoir: the bank assesses its liquidity risk by comparing the variability in inflows and outflows to determine the amount

of reserves that are needed during a period. Although both approaches are intuitively appealing, the flow approach is more data intensive and there is no standard technique to forecast inflows and outflows. As a result, the stock approaches are more popular in practice and in the academic literature (see Crosse and Hempel 1980; Yeager and Seitz 1989; Hempel et al. 1994; Vodova 2011). As per Crosse and Hempel (1980), the two most popular stock ratios are the loan-to-deposit ratio and the liquid asset to total assets ratio, where the higher the loan-to-deposit ratio (or the lower the liquid asset to total assets ratio) the less able a bank to meet any additional loan demands. Both indicators have their shortcomings: the loan-to deposit ratio does not show the other assets available for conversion into cash to meet demands for withdrawals or loans, while the liquid assets ratio ignores the flow of funds from repayments, increases in liabilities and the demand for bank funds. Fortunately, the ratios tend to move together (Crosse and Hempel 1980).

Even though leverage is well-defined in simple stylized models, it is an ill-defined measure in practice. Given derivatives and off-balance sheet vehicles, the standard leverage measure (on-balance sheet debt/equity) is at best noisy, and more likely useless, as a measure of the fragility of the financial sector.

Liquidity refers to many related concepts. Following the banking literature, liquidity mismatch in banks emerges when the market liquidity of assets is less than the funding liquidity on the liability side of banks' balance sheets. However, insurance of demandable deposits since 1934 make the textbook Diamond-Dybvig bank runs unlikely. On the other hand, it is widely understood that run phenomena have been important in the repo market and the shadow banking sector in the 2007-2009 crisis (see Gorton and Metrick (2010)). As another example, when a major financial institution – AIG is a good example here – is downgraded, its derivative counterparties will require that the institution post a large amount of collateral. This is a liquidity drain for the institution that is conceptually similar to the run by a number of short-term lenders.

Overall, traditional measures that arise from stylized theoretical models are ill-equipped to reflect true fundamental and liquidity risk in today's financial world. Therefore, for the purpose of this research the above two ratios of the stock approach were used.



**Figure 2.1** A general taxonomy of risks (Erik Banks, 2005, pp 9)



## **2.2.Determinants of Corporate Liquidity Risk**

### **2.2.1. Macroeconomic factors**

#### **2.2.1.1. GDP Growth**

Where the country's macro economy is in periods of economic expansion, which are characterized by high degree of confidence of the economic units about their profitability, there is a rise in the level of investment. During this expansion, economic units decrease their liquidity preference, preferring more risky capital assets with higher return. In this environment, economic units are more likely to hold less liquid capital assets and to incur short-term debt with higher interest rates (Painceira 2010). Aspachs et al. (2005) indicated that banks hoard liquidity during periods of economic downturn, when lending opportunities may not be as good and they run down liquidity buffers during economic expansions when lending opportunities may have picked up. Thus, it can be expected that higher economic growth make banks run down their liquidity buffer and induce banks to lend more.

#### **2.2.1.2. Interest rate**

Interest rate is the price that has to be paid by a borrower of money to a lender of money in return for the use of the funds. Short term/money market interest rate is the rate paid on money market instruments. Money market instruments are securities that when issued have a year or less to maturity, which includes Treasury bills, commercial papers, bankers' acceptances, certificates of deposit, repurchase agreements and Eurocurrency deposits. Treasury bills are the most important since they provide the basis for all other domestic short term interest rates. The money market is important because many of these instruments are held by banks as part of their eligible reserves, that is, they may be used (are eligible) as collateral if bank wishes to raise funds from central bank because they are short maturing and have less default risk. Therefore, the higher short term interest rate prompts banks to invest more in the short term instruments and enhance their liquidity position (Pilbeam 2005). According to the NBE investments in the Treasury bill are considered as liquid assets to the banks.

### **2.2.1.3. Inflation**

A growing theoretical literature describes mechanisms whereby even predictable increases in the rate of inflation interfere with the ability of the financial sector to allocate resources effectively. More specifically, recent theories emphasize the importance of informational asymmetries in credit markets and demonstrate how increases in the rate of inflation adversely affect credit market frictions with negative repercussions for financial sector (both banks and equity market) performance and therefore long-run real activity (Huybens and Smith 1998, 1999). The common feature of these theories is that there is an informational friction whose severity is endogenous. Given this feature, an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. In turn, the amount of liquid or short term assets held by economic agents including banks will rise with the rise in inflation. Hence, there is positive relationship between increase in inflation rate and banks liquidity.

## **2.2.2. Bank factors**

### **2.2.2.1. Capital adequacy**

Patheja (1994) has defined banks capital as common stock plus surplus plus undivided profits plus reserves for contingencies and other capital reserves. In addition since a bank's loan-loss reserves also serves as a buffer for absorbing losses, a broader definition of bank capital include this account. Opposing to the standard view of liquidity creation in which banks create liquidity by transforming liquid liabilities into illiquid assets, the recent theories indicate the creation of liquidity by changing asset mixes. Diamond and Rajan (2000, 2001) and Gorton and Winton (2000) showed that banks can create more or less liquidity by simply changing their funding mix on the liability side. Thakor (1996) shows that capital may also affect banks' asset portfolio composition, thereby affecting liquidity creation through a change in the asset mix.

Liquidity creation increases the bank's exposure to risk as its losses increase with the level of illiquid assets to satisfy the liquidity demands of customers (Allen and Gale 2004). The more liquidity that is created, the greater is the likelihood and severity of losses associated with having to dispose of illiquid assets to meet the liquidity demands of customers. Bank capital allows the bank to absorb greater risk (Repullo 2004). Thus, under the second view, the higher is the bank's capital ratio, the higher is its liquidity creation.

#### **2.2.2.2. Loan growth & liquidity**

Comptroller's Handbook (1998), states that lending is the principal business activity for most commercial banks. The loan portfolio is typically the largest asset and the predominate source of revenue. As such, it is one of the greatest sources of risk to a bank's safety and soundness. Since loans are illiquid assets, increase in the amount of loans means increase in illiquid assets in the asset portfolio of a bank. According to Pilbeam (2005, p. 42), in practice the amount of liquidity held by banks is heavily influenced by loan demand that is the base for loan growth. If demand for loans is weak, then the bank tends to hold more liquid assets (i.e. short term assets), whereas if demand for loans is high they tend to hold less liquid assets since long term loans are generally more profitable. Therefore, a growth in loans and advances has negative impact on banks liquidity.

#### **2.2.2.3. Non-performing loans and liquidity**

Non-performing loans are loans that are outstanding in both principal and interest for a long time contrary to the terms and conditions contained in the loan contract. It follows that any loan facility that is not up to date in terms of payment of both principal and interest contrary to the terms of the loan agreement, is non-performing. Therefore, the amount of non-performing loan measures the quality of bank assets. Non-performing loans can lead to efficiency problem for banking sector. It is found by a number of economists that failing banks tend to be located far from the most-efficient frontier because banks do not optimize their portfolio decisions by lending less than demanded (Barr et al. 1994). According to Bloem and Gorter (2001), though issues relating to non-performing loans may affect all sectors, the most serious impact is on financial institutions such as commercial banks and mortgage financing institutions which tend to have large loan portfolios. Besides, the large

bad loans portfolios will affect the ability of banks to provide credit. Huge non-performing loans could result in loss of confidence on the part of depositors and foreign investors who may start a run on banks, leading to liquidity problems. Therefore, the amount of non-performing loans has a negative impact on banks liquidity.

### **2.2.3. Bank liquidity impact on financial performance**

Profitability accounts for the impact of better financial soundness on bank risk bearing capacity and on their ability to perform liquidity transformation (Rauch et al. 2008 and Shen et al. 2010). Loans are among the highest yielding assets a bank can add to its balance sheet, and they provide the largest portion of operating revenue. In this respect, the banks are faced with liquidity risk since loans are advanced from funds deposited by customers. However, the higher the volume of loans extended the higher the interest income and hence the profit potentials for banks. At this point, it is also worth noting that banks with a high volume of loans will also be faced with higher liquidity risk. Thus, banks need to strike a balance between liquidity and profitability.

## **2.3. Review of related empirical studies**

### **2.3.1. Determinants of banks liquidity-empirical studies**

Vodova (2011) aimed to identify important factors affecting commercial banks liquidity of Czech Republic. In order to meet its objective the researcher considered bank specific and macroeconomic data over the period from 2001 to 2009 and analyzed them with panel data regression analysis by using EViews 6 software package. The study considered four firm specific and eight macroeconomic independent variables which affect banks liquidity. The expected impact of the independent variables on bank liquidity were: capital adequacy, inflation rate and interest rate on interbank transaction/money market interest rate were positive and for the share of non-performing loans on total volume of loans, bank profitability, GDP growth, interest rate on loans, interest rate margin, monetary policy interest rate/repo rate, unemployment rate and dummy variable of financial crisis for the year 2009 were negative whereas, the expected sign for bank size was ambiguous (+/-). The dependent variable (i.e. liquidity of commercial banks) was measured by using four liquidity ratios such as liquid asset to total assets, liquid assets to total deposits and

borrowings, loan to total assets and loan to deposits and short term financing. The study by Vodova (2011) revealed that bank liquidity was positively related to capital adequacy, interest rates on loans, share of non-performing loans and interest rate on interbank transaction. In contrast, financial crisis, higher inflation rate and growth rate of gross domestic product have negative impact on bank liquidity. The relation between the size of the bank and its liquidity was ambiguous as it was expected. The study also found that unemployment, interest margin, bank profitability and monetary policy interest rate/repo rate have no statistically significant effect on the liquidity of Czech commercial banks.

An empirical study made by Fadare (2011), on the banking sector liquidity and financial crisis in Nigeria with the aim of identifying the key determinants of banking liquidity in Nigeria, and assessing the relationship between determinants of banking liquidity and financial frictions within the economy. It was employed a linear least square model and time series data from 1980 to 2009. The study found that only liquidity ratio, monetary policy rate and lagged loan-to-deposit ratio were significant for predicting banking sector liquidity. Secondly, it showed that a decrease in monetary policy rate, liquidity ratios, volatility of output in relation to trend output, and the demand for cash, leads to an increase in current loan-to-deposit ratios; while a decrease in currency in circulation in proportion to banking sector deposits; and lagged loan-to-deposit ratios leads to a decline in current loan-to-deposit ratios. Generally, the result suggested that during periods of economic or financial crises, deposit money banks were significantly illiquid relative to benchmarks, and getting liquidity monetary policies right during these periods is crucial in ensuring the survival of the banking sector.

Moore (2010) investigated the effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries. The study had three main goals: discussing the behavior of commercial bank liquidity during crises in Latin America and the Caribbean; identifying the key determinants of liquidity, and; to provide an assessment of whether commercial bank liquidity during crises is higher or lower than what is consistent with economic fundamentals. Liquidity which was measured by loan-to-deposit ratio should depend on: cash requirements of customers, captured by fluctuations in the cash-to-deposit ratio expected to have negative impact, the macroeconomic situation,

where a cyclical downturn should lower banks' expected transactions demand for money and therefore lead to decreased liquidity expected to have positive impact on liquidity, and money market/short term interest rate as a measure of opportunity costs of holding liquidity expected to have negative effect on liquidity. The regression model was estimated using ordinary least squares. The result of the study showed that the volatility of cash-to-deposit ratio and money market interest rate have negative and significant effect on liquidity. Whereas, liquidity tends to be inversely related to the business cycle in half of the countries studied, suggesting that commercial banks tend to error on the side of caution by holding relatively more excess reserves during downturns. Generally, the results showed that on average, bank liquidity is about 8% less than what is consistent with economic fundamentals.

Liquidity created by Germany's state-owned savings banks and its determinants has been analyzed by (Rauch et al. 2009). The study had twofold goals: first, it attempted to measure the liquidity creation of all 457 state owned savings banks in Germany over the period 1997 to 2006. In a second step, it analyzed the influence of monetary policy on bank liquidity creation. The study measure the created liquidity using the calculation method set forth by (Berger and Bouwman 2007 and Deep and Schaefer 2004). To measure the monetary policy influence, the study developed a dynamic panel regression model. According to this study, following factors can determine bank liquidity: monetary policy interest rate, where tightening monetary policy expected to reduces bank liquidity, level of unemployment, which is connected with demand for loans having negative impact on liquidity, savings quota affect banks liquidity positively, level of liquidity in previous period has positive impact, size of the bank measured by total number of bank customers have negative impact, and bank profitability expected to reduce banks liquidity. To perform the tests of measuring liquidity and analyzing influential factors on bank liquidity the researcher used bank balance sheet data and general macroeconomic data.

The control variable for the general macroeconomic influence shows that there is a positive relationship between the general health of the economy and the bank liquidity creation. The healthier the economy is the more liquidity is created. It was also found that banks with a higher ratio of interest to provision income create more liquidity. Other bank-related

variables, such as size or performance revealed no statistically significant influence on the creation of liquidity by the banks. Determinants of liquidity risk of banks from emerging economies for a sample of commercial banks in 36 emerging countries between 1995 and 2000 with panel data regression analysis were analyzed by (Bunda and Desquilbet 2008). The study was aimed to explore how the liquidity of commercial bank assets is affected by the exchange rate regime of the country in which they operate.

Liquidity ratio as a measure of bank's liquidity assumed to be dependent on individual behavior of banks, their market and macroeconomic environment and the exchange rate regime, i.e. on following factors: total assets as a measure of the size of the bank, the lending interest rate as a measure of lending profitability, and the realization of a financial crisis, which could be caused by poor bank liquidity expected to have negative impact on banks liquidity whereas, the ratio of equity to assets as a measure of capital adequacy, the presence of prudential regulation, which means the obligation for banks to be liquid enough, the share of public expenditures on gross domestic product as a measure of supply of relatively liquid assets, the rate of inflation, which increases the vulnerability of banks to nominal values of loans provided to customers, and the exchange rate regime, where banks in countries with extreme regimes (the independently floating exchange rate regime and hard pegs) were more liquid than in countries with intermediate regimes are expected to have positive impact on banks liquidity.

The result of the study by Bunda and Desquilbet (2008) showed there is positive and statistically significant effect of capital adequacy, lending interest rate, public expenditure to GDP, and growth on liquidity of banks under five liquidity measures. On the other hand, the presence of prudential regulation and financial crises showed negative and significant impact on bank liquidity position. It also revealed that in hard pegs and in pure floats, commercial banks are more liquid than in intermediary regimes (bank liquidity smile).

However, the effect of bank size is insignificant. Lucchetta (2007) made empirical analysis of the hypothesis that interest rates affect bank risk taking and the decision to hold liquidity across European countries. The liquidity measured by different liquidity ratios should be influenced by: behavior of the bank on the interbank market – the more liquid the

bank is the more it lends in the interbank market, interbank rate as a measure of incentives of banks to hold liquidity, monetary policy interest rate as a measure of banks ability to provide loans to customers, share of loans on total assets and share of loan loss provisions on net interest revenues, both as a measure of risk-taking behavior of the bank, where liquid banks should reduce the risk-taking behavior, and bank size measured by logarithm of total bank assets. The results of the study revealed that the risk-free interest rate negatively affects the liquidity retained by banks and the decision of a bank to be a lender in the inter-bank market. Conversely, the inter-bank interest rate has a positive effect on such decisions. Typically, it is the smaller, risk-averse banks that lend in the inter-bank markets.

Meanwhile, the risk-free interest rate is positively correlated with loans investment and bank risk-taking behavior. Bank-specific and macroeconomic determinants of liquidity of English banks were studied by (Aspachs et al. 2005). The researchers used unconsolidated balance sheet and profit and loss data, for a panel of 57 UK-resident banks, on a quarterly basis, over the period 1985Q1 to 2003Q4. They assumed that the liquidity ratio as a measure of the liquidity should be dependent on following factors: Probability of obtaining the support from LOLR, which should lower the incentive for holding liquid assets, interest margin as a measure of opportunity costs of holding liquid assets expected to have negative impact, bank profitability, which is according to finance theory negatively correlated with liquidity, loan growth, where higher loan growth signals increase in illiquid assets, size of the bank expected to have positive or negative impact, gross domestic product growth as an indicator of business cycle negatively correlated with bank liquidity, and short term interest rate, which should capture the monetary policy effect with expected negative impact on liquidity.

The output of the regression analysis showed that probability of getting support from LOLR, interest margin, and loan growth have negative and significant effect on banks liquidity whereas, profitability and bank size had statistically insignificant impact on liquidity. Using a measure of support expectations based on the Fitch support rating, the researchers also found strong evidence of the existence of such an effect, which may point to a rationale for regulatory liquidity requirements as a quid pro quo for LOLR support.



Entirely unique is the approach of (Fielding and Shortland 2005). The researchers estimated a time-series model of excess liquidity in the Egyptian banking sector. They considered these determinants of liquidity: level of economic output, discount rate, rate of depreciation of the black market exchange rate and violent political incidence expected to have positive impact on bank liquidity whereas, cash-to-deposit ratio and impact of economic reform expected to have negative impact on bank liquidity. The expected impact of reserve requirements was ambiguous. According to the result of the study while financial liberalization and financial stability are found to have reduced excess liquidity, these effects have been offset by an increase in the number of violent political incidents arising from conflict between radical Islamic groups and the Egyptian state.

The study made by Bordeleau and Graham (2010), presented empirical evidence regarding the relationship between liquid asset holdings and profitability for a panel of Canadian and U.S. banks over the period of 1997 to 2009. In short, results suggested that a nonlinear relationship exists, whereby profitability was improved for banks that hold some liquid assets, however, there was a point beyond which holding further liquid assets diminishes a banks' profitability, all else equal. Conceptually, this result is consistent with the idea that funding markets reward a bank, to some extent, for holding liquid assets, thereby reducing its liquidity risk. However, this benefit can eventually be outweighed by the opportunity cost of holding such comparatively low yielding liquid assets on the balance sheet. At the same time, estimation results provide some evidence that the relationship between liquid assets and profitability depends on the bank's business model and the risk of funding market difficulties. The researchers recommended that adopting a more traditional i.e., deposit and loan based business model allows a bank to optimize profits with a lower level of liquid assets.

Shen et al. (2009) empirically investigate the causes of liquidity risk and the relationship between bank liquidity risk and performance. The study aimed to employ alternative liquidity risk measures besides liquidity ratios (i.e. financial gap measures provided by (Saunders and Cornett 2006)). The study further aimed to investigate the determinants of bank performance in terms of the perspective of the bank liquidity risk (bank liquidity risk and performance model). The study used an unbalanced panel dataset of 12 advanced

economies commercial banks over the period 1994-2006. The panel data applied to instrumental variables regression, using two-stage least squares (2SLS) estimators to estimate bank liquidity risk and performance model. The researchers classified countries as bank-based or market-based system, and investigate the difference of causes of liquidity risk in different financial systems. The empirical results indicated that the bank-specific variable had the same effect on bank liquidity risk in two financial systems and liquidity risk was the endogenous determinant of bank performance.

### **2.3.2. Related empirical studies in Ethiopia**

Some related studies were conducted by different researchers in Ethiopia. The study conducted by Semu (2010) intended to assess the impact of reducing or restricting loan disbursement on the performance of commercial banks in Ethiopia. It also attempts to examine the possible factors that compel the banks to reduce or restrict lending. Quantitative method particularly survey design approach was adopted for the study. The findings of the study showed that deposit and capital have statistically significant relationship with banks' performance measured in terms of return on equity (ROE). New loan and liquidity have relationship with banks' performance measured in terms of both return on asset (ROA) and ROE. However, the relationship was found to be statistically insignificant. Deposit and capital have no statistically significant relationship with banks' performance in terms of ROA. The study suggested that when banks face lending constraints, they have to use their funds like by purchasing treasury bills and bonds. Moreover, banks must develop non-interest generating services. Excess cash maintained by banks should be used by diversifying credit options and to avoid inefficiencies.

Worku (2006) argued that liquidity has an impact on the performance of commercial banks in Ethiopia and there was an inverse relation between deposit/net loan and ROE. And the coefficient of liquid asset to total asset was positive and directly related with ROE. Worku (2006) also studied capital adequacy and found that the capital adequacy of all commercial banks in Ethiopia were above threshold, means there was sufficient capital that can cover the risk-weighted assets. Depositors who deposit their money in all banks were safe because all the studied banks fulfilled NBE requirement (Worku, 2006). Worku used

different ratios when analyzing liquidity effect on banks performance and these ratios were liquid asset/net profit, liquid asset/total assets, net loans/net deposits, interest income/net deposit and interest income/interest expense (Worku, 2006).

Ayalew (2005) used ratio analysis with the help of DEA model and the ratios were capital ratio, liquidity ratio and loan loss provision to total assets when studied the financial performance of private banks in Ethiopia. The study revealed that banks were becoming leveraged, the growth of deposits from depositors increased, efficiency was also increased from year to year. Generally, Ayalew (2005) concluded that the growth rate was positively related to efficiency scores.

Seyoum (2005) revealed that private banks performance in terms of managerial earning and operating efficiency was an average and less than that of the biggest government bank i.e. Commercial Bank of Ethiopia (CBE). Seyoum (2005) also noted that in Ethiopia the banking sector was still dominated by state owned banks especially CBE, no stiff competition and compared performance of banks using managerial earning and operating efficiency.

Berhanu (2004) studied financial performance of Ethiopian commercial banks and found the following results. The banking system in general increased their assets position, private banks increased their market share, and liquidity condition of commercial banks was reliable. Finally commercial banks were operating at profit. Berhanu (2004) used profitability ratios and liquidity ratios to evaluate financial performance of commercial banks in Ethiopia.

## **2.4. Summary**

The above theoretical as well as empirical review showed that liquidity is important to all businesses specially for banking industry since their purpose is to avail loanable fund through mobilization of idle fund from the public and other funding organizations. It also revealed that banks liquidity can be affected by different factors such as bank specific, macroeconomic and regulatory factors, while this study focused on some of the bank specific and macroeconomic factors affecting liquidity.

Studies cited above suggest that commercial banks' liquidity is determined both by bank specific factors (such as size of the bank, profitability, capital adequacy and factors describing risk position of the bank), macroeconomic factors (such as different types of interest rates and indicators of economic environment) as well as the central bank decisions. There are also very limited number of studies appears to include liquidity as an explanatory variable for bank profitability, this relationship is not the focus of those papers and the empirical results were mixed. To the knowledge of the researcher there is no empirical studies done regarding to determinants of development bank liquidity and their impact on financial performance in Ethiopia. Although the researches made by Worku (2006) and Semu (2010) focused on the impact of bank liquidity on financial performance, the method used in these study is through the significant factors affecting liquidity. Since the Development bank is specialized bank in the banking industry and has significant market share in the banking industry of Ethiopia, it is important to notify the important determinants of the bank's liquidity and its impact on financial performance by making empirical investigation to Development Bank of Ethiopia. Therefore, the study investigated some of bank specific and macroeconomic factors affecting Development bank of Ethiopia's liquidity and their impact on profitability.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODOLOGY**

In this chapter, research design, sample and sampling technique, type of data and tools, variable description, and methods of data analysis will be discussed.

#### **3.1. Research Design**

According to Leedy and Ormrod (2005) research methodology is a means to extract the meaning of data. Data and methodology are highly interdependent. Therefore, the methodology to be used for a particular research problem must always take into consideration about the nature of data that will be collected to resolve the research problem.

There are three types of research approaches namely; quantitative, qualitative and mixed methods approach (Leedy & Ormrod, 2005). Considering the research problem and objective and the philosophy of the different research approaches, quantitative research approach was found to be appropriate for this study.

#### **3.2. Sample and Sampling Technique**

Sampling is a technique for choosing representative population in the study for determining the character of the whole population (Mugo F. 2002 pp 1). As James M. (1996 pp. 85) described population is a collection of elements that conform to specific criteria and we intend to generalize the result of the research. Development Bank is the sole development finance institution in the country, which is specialized in project finance. Accordingly, the total population of the study is solely taken as the Development Bank of Ethiopia.

#### **3.3. Types of Data and Tools**

Only secondary sources of data were used for the study. From the secondary sources, audited reports, books, journals, unpublished manuscripts, thesis, and reports prepared by different organizations have been used. Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of research findings (Koul 2006). Accordingly, structured document review was used for this research to collect required information, which is relevant for addressing the

objectives of the study. Data were collected from audited financial statements (balance sheet and income statement) of development Bank of Ethiopia and various journals and publications of NBE and MoFED for the macroeconomic data from 1990 – 2013, which were of importance to identify the determinant factor that affect the liquidity of DBE. All data were collected on annual base and figures for the variables were on Jun 30 of each year under study.

### **3.4. Method of Data Collection**

This research relied mainly on the secondary data like already published financial reports, journals and publications etc. Secondary data sources are documented works of others (authors) that are related to the subject matter of study.

In view of the nature of this study, the extensive use of relevant data from previous works of other authors in the field such as materials like financial journals, national Bank of Ethiopia publications, economic and financial reviews, economic and financial indicator briefs and DBE statistical bulletin. Also, Annual Reports of DBE for various years will be of great importance.

In the meantime questionnaires will be distributed for selected senior management and executive managers for assessing how decisions are carried out for the last decades and what challenge they face.

### **3.5. Variable description**

This research work attempted to see the relationship between the dependent and independent variables through testing the presumption regarding to the relationships between liquidity of DBE's firm specific and macroeconomic factors affecting it and the impact of liquidity on profitability.

#### **3.5.1. Dependent variable**

**Liquidity of bank:** liquidity is the ability of a bank to fund increases in assets and decrease in liability without affecting their day to day operation or incurrance of unacceptable losses. Generally, there are two methods of measuring liquidity of banks which are liquidity ratios and funding gap. The first approach uses different balance sheet ratios and it

is easy to compute. Whereas, the second approach funding gap is the difference between inflows and outflows which is difficult to measure because it is more data intensive and there is no standard technique to forecast inflows and outflows. For this study it was intended to use liquidity ratios due to the availability of data to measure liquidity. The following ratio was used:-

- **Liquid assets to total assets ratio**

Liquid assets to total assets ratio should give us information about the general liquidity shock absorption capacity of a bank. As a general rule, the higher the share of liquid assets in total assets, the higher the capacity to absorb liquidity shock, given that market liquidity is the same. Nevertheless, high value of this ratio may be also interpreted as inefficiency. Since liquid assets yield lower income liquidity bears high opportunity costs for the bank. Therefore it is necessary to optimize the relation between liquidity and profitability. According to the NBE establishment proclamation (No. 591, pp. 4168) liquid assets of banks include cash on hand, deposit in other banks, and short term government securities that are acceptable by the NBE as collateral (for instance, Treasury bills). This measure of liquidity was taken as benchmark measure.

### **3.5.2. Independent variables**

#### **3.5.2.1. Capital adequacy**

Capital of banks consists of common stocks plus surplus funds plus undivided profit plus reserve for contingencies and other capital reserves. As it is discussed in the literature review part, there are two opposing theoretical views regarding to the relationship between banks liquidity and capital adequacy. These are financial fragility-crowding of deposit hypothesis and risk absorption hypothesis. The first argument suggests that there is negative relationship between capital adequacy and bank liquidity whereas, the second argument is opposing to this. This study considered the second hypothesis since it has been used by various empirical studies reviewed under this study. The proxy for capital adequacy used in this study was the ratio of equity to total assets.

### **3.5.2.2. Loan growth**

Provision of loan is one of the major functions of banks by which banks create liquidity to the external public. Generally loans are considered as illiquid assets and generate higher revenue to banks. Therefore, the increase in loan means increase in illiquid assets and decrease in short term/liquid assets. As it was made by various empirical studies as well as the above argument the study expected negative relationship between bank's loan growth and liquidity. The proxy for loan growth was annual growth rate of gross loans and advances to customers.

### **3.5.2.3. Non-performing loans**

Non-performing loans are loans that are outstanding in both principal and interest for a long time contrary to the terms and conditions contained in the loan contract. This measures the quality of banks asset. Unlike other firms banks assets are composed of large amount of loans. If this loan is considered to be uncollectable that leads to reduction in banks profitability and make large number of depositors to fear and run against the bank. Therefore, it is expected that there is negative relationship between bank's liquidity and the amount of non-performing loans. The proxy used for non-performing loans was the percentage of non-performing loans in the total amount of bank loan.

### **3.5.2.4. Gross domestic products (GDP)**

Gross domestic product indicates the overall economic wellbeing of a country. According to the theory of bank liquidity and financial fragility, when the economy is at boom or goes out of recession, economic units including banks are optimistic and increase their long term investment and decrease their holding of liquid assets while in the period of recession the opposite is true. Therefore, the study expected negative relationship between bank's liquidity and economic cycle. To proxy the economic cycle the real gross domestic products/GDP growth rate was used.

### **3.5.2.5. Inflation rate**

According to the recent theory of information asymmetry in the credit market an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since



these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. In turn, the amount of liquid or short term assets held by economic agents including bank rise with the rise in inflation. To proxy inflation the annual gross inflation rate was used.

### **3.5.2.6. Short term/money market interest rate**

As short term interest rate increases and since it has less default risk, banks tend to invest more in Treasury bill and other short term instruments and enhance their liquidity position. Treasury bill is considered as liquid asset according to the NBE. Treasury bill market is the only regular primary market where securities are transacted on a fortnightly basis. Therefore, the proxy for short term/money market interest rate in this study was the weighted average yield on all types of Treasury bills annually (28 days, 91 days and 182 days). The annual rate was used due to the form of data used in this study (i.e. annual base).

### **3.5.3. Liquidity and financial performance**

This final assumption was used to test the second research question. According to the bankruptcy cost hypothesis of Bergers (1995) we expect positive impact of liquidity on financial performance whereas, negative impact according to the argument stating the opportunity cost of holding liquid assets as high return on investment. Hence, we can expect positive or negative impact of bank liquidity on financial performance. But for this study it was expected as negative impact on financial performance. To proxy liquidity the variables explaining liquidity significantly among the above independent variables were used.

**Table 3.1 Summary of explanatory variables and their expected effect on the dependent variables**

<b>Independent variables</b>	<b>Proxies and Definition</b>	<b>Expected effect</b>
Gross Domestic Product	GDP: growth rate of real gross domestic product	Negative
Inflation	INF: annual general inflation rate	Positive
Short term interest rate	STIR: weighted average annual T-bill rate	Positive
Loan growth	LG: annual loan growth rate	Negative
Capital adequacy	CAP: the share of own capital on total assets of the bank	Positive
Non- performing loan	NPL: the percentage of non-performing loans on total volume of loans	Negative
Liquidity	LIQ: significant factors explaining bank's liquidity among the above six factors in Ethiopia	Negative

### **3.6. Research approach adopted**

Quantitative methods approach was used to meet the overall objective of the study and to answer research questions. According to Loose (1993), a quantitative (deductive) research entails the development of a conceptual and theoretical structure prior to its testing through empirical observation. Deductive or quantitative research conventionally commences by analyzing the literature to identify a single selected problem/knowledge gap leading to the isolation of the major research question(s) in which the existing knowledge may be inadequate (could be identified gaps between existing theories or evidence, contradictions to be explored, or new contexts for applying previous findings) (Sutrisna 2009). Therefore, the purpose of using quantitative approach in this study was to apply previous findings in the context of Development Bank of Ethiopia.

The goal is to measure and analyze causal relationships between variables within a value-free framework (Denzin and Lincoln 1994). In this study, this approach enabled the researcher to see the relationship between the liquidity of DBE and the major firm specific and macroeconomic factors affecting bank's liquidity in Ethiopia by establishing causal relationship. In addition, it is also intend to see the impact of bank liquidity on financial performance through those significant factors affecting banks liquidity. In turn, this enabled to test the theory in the context of Ethiopia.

### 3.7. Methods of Data Analyses

The data gathered were mostly in numerical ways, the data analysis technique is quantitative. Statistical analyses carried out using the following methods: First, descriptive statistics of the variables (both dependent and independent) were calculated over the sample period. This is in line with Malhotra (2007), which states using descriptive statistics methods helps the researcher in picturing the existing situation and allows relevant information. Then, correlation analyses between dependent and independent variables were made. Finally, ordinary least square/OLS regression approach including all of its assumptions was employed. The assumptions were tested to see the applicability of the regression models developed first to test the relationship between banks liquidity and independent variables and then to see the impact of banks liquidity on financial performance through the significant factors explaining liquidity of development bank of Ethiopia. Data collected from different sources were analyzed by using Eviews-7 software package.

#### 3.7.1. Regression model

Regression is more powerful than correlation. According to Brooks (2008), unlike correlation, in the case of regression if x has significant impact on y, thus change in y is influenced by change in x. Therefore, to see the impact of banks liquidity on financial performance, the significant factors affecting liquidity were used as the representatives for the variation in liquidity. Therefore the general models which incorporate all of the variables to test the hypotheses of the study were:-

$$LIQ_{i,t} = \alpha + \beta_1 CAPI_{i,t} + \beta_2 LG_{i,t} + \beta_3 NPL_{i,t} + \beta_4 GDP_t + \beta_5 IRM_t + \beta_6 STIR_t + \beta_7 INF_t + u_{i,t} \dots \dots \dots (D1)$$

Where,

**LIQ<sub>i,t</sub>**: is liquidity ratio of *i*th bank on year *t*

**CAPI<sub>i,t</sub>**: is capital adequacy of *i*th bank on the year *t*. the proxy was the ratio of total bank capital to total assets.

**LG<sub>i,t</sub>**: is the loan growth of *i*th bank on the year *t*. The proxy was percentage change in loan. *L* is total loans and advances to customers

**NPL<sub>i,t</sub>**: is the non-performing loan of *i*th bank on the year *t*. The proxy was the share of non-performing loan from the total loan portfolio of a bank.

**GDPT**: is the real domestic product/GDP growth of Ethiopia on the year *t*. The proxy was growth rate of real GDP.

**INF<sub>t</sub>**: is the overall inflation rate in Ethiopia on the year *t*.

**STIR<sub>t</sub>**: is the short term (monetary) interest rate on the year *t*. The proxy was the weighted average annual Ethiopian government Treasury bill rate.

**u<sub>i,t</sub>**: is a random error term

$$ROA_{i,t} = \alpha + \beta_1 NPL_{i,t} + \beta_2 GDPT + \beta_3 INF_t + \beta_4 STIR_t + u_{i,t} \quad \dots \dots \dots (2)$$

Where,

**ROA<sub>i,t</sub>**: is return on total assets of bank *i* on year *t*

**Sfal** : are significant factors affecting banks liquidity

**u<sub>i,t</sub>**: is a random error term

## Chapter four

### DATA PRESENTATION AND ANALYSIS

In this chapter the data collected were presented and important correlation and regression analysis findings were discussed. The current chapter has five sections. Under the first section (section 4.1.) the descriptive statistics of the dependent and independent variables were presented followed by correlation analysis under section 4.2. Section 4.3 presents the test for the classical linear regression model/CLRM. Then, the results of the regression analysis were presented under section 4.4. Finally, discussions for the results of the regression analysis were made under section 4.5.

#### 4.1. Descriptive statistics of the data

The descriptive statistics for the dependent and independent variables are presented below. The dependent variables are liquidity measured by liquid assets to total assets ratio(D1) and financial performance measured by ROA. The remaining are the independent variables such as: capital adequacy, loan growth, non-performing loans, real GDP growth, short term interest rate and general inflation rate. Table 4.1 below Present the descriptive statistics of the dependent and independent variables.

Table 4.1 Descriptive statistics of dependent and independent variables

	LIQUID_ASSET_TO_TOTAL_AS	ROA	GDP_GROWTH	INFLATION	WEIGHTED_AVERAGE_OF_BORR	CAPITAL_ADEQUENCY	LOAN_GROWTH	NON_PERFORMING_LOAN
Mean	0.264925	0.010846	0.064179	0.183126	0.035625	0.200894	0.093959	0.314054
Median	0.252950	0.006350	0.068400	0.169228	0.037500	0.164865	0.084900	0.314000
Maximum	0.380000	0.036900	0.136000	0.400000	0.050000	0.405642	0.278500	0.603100
Minimum	0.151000	-0.004600	-0.022000	-0.072000	0.020000	0.005642	-0.010600	0.075400
Std. Dev.	0.052573	0.010268	0.044662	0.127394	0.007689	0.115125	0.080371	0.115470
Probability	0.969431	0.228070	0.489532	0.920801	0.867782	0.573465	0.354906	0.347667
Sum	6.358200	0.260300	1.540300	4.395024	0.855000	4.821454	2.255017	7.537300
Sum Sq. Dev.	0.063571	0.002425	0.045878	0.373272	0.001360	0.304837	0.148568	0.306667
Observations	24	24	24	24	24	24	24	24

**Source:** Financial statement of DBE and own computation through Eviews-7

Liquidity measures the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. The mean value of liquid asset to

total asset D1 was 26% that was above the NBE requirement that is 25%. The standard deviations of 5% show little dispersion of liquid assets to total assets ratio from its mean for development bank of Ethiopia. The maximum and minimum values of D1 were 38% and 15% respectively. The mean value of ROA was 1.08%. The value of standard deviation (i.e. 1.03%) indicates less dispersion from the mean value of ROA in the case of DBE.

The mean value of capital adequacy was 20% which was above the international standard for capital adequacy ADFFI standard i.e. 15%. The standard deviation for CAP was 30% revealing there is high dispersion towards the mean. The mean value of the variable loan growth was 9.4% with maximum and minimum values of 28% and -1.1% respectively. The value of standard deviation (i.e. 8.04%) indicates less dispersion from the mean value of loan growth.

The other bank specific factor affecting liquidity was NPL that measures the asset/loan quality of bank. The mean value of the percentage of non-performing loans in the total amount of loans and advances to customers/NPL was 31.4% with the maximum and minimum of 60.3% and 7.5% respectively. The maximum value of 60.3% indicates the presence of high credit risk in some years of the bank operation. There was moderate dispersion of NPL from the mean value during the observed period that is shown by the standard deviation of 11.5%.

The mean value of the macroeconomic indicator of real GDP growth rate was 6.4% indicating the average real growth rate of the country's economy over the past 24 years. The maximum growth of the economy was recorded in the year 2004 (i.e. 13.6%) and the minimum was in the year 2003 (i.e. -2.1%). Since the year 2004 the country has been recording steady growth during the last two decades with little dispersion towards the average over the period under study with the standard deviation of 4.4%.

The general inflation rate (i.e. 18%) of the country on average over the past twenty four years was more than the average GDP. The maximum inflation was recorded in the year 2009 (i.e. 40%) and the minimum was in the year 2002 (i.e. -7.2%). The rate of inflation was highly dispersed over the periods under study towards its mean with standard deviation of 12.7%.

The other macroeconomic factors were related with short term interest rate (the annual weighted average interest rate on Treasury bill). On average the rate on government Treasury bill was 3.5% with maximum rate of 4.3% in the year 2003 and the minimum rate of 0.04% in the year 2006. There was also little dispersion of short term interest rate towards its mean over the periods under study with standard deviation of 1%.

## 4.2. Correlation analysis

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. The most widely used bi-variant correlation statistics is the Pearson product-movement coefficient, commonly called the Pearson correlation which was used in this study. Correlation coefficient between two variables ranges from +1 (i.e. perfect positive relationship) to -1 (i.e. perfect negative relationship). The sample size is the key element to determine whether or not the correlation coefficient is different from zero/statistically significant. Table 4.2 below shows the correlation coefficient between the dependent variables and independent variables.

Table 4.2 Correlation matrix among the dependent and independent variables

Covariance Analysis: Spearman rank-order  
 Date: 10/10/13 Time: 03:32  
 Sample: 1990 2013  
 Included observations: 24

Correlation	LIQUID_AS SET_TO_TO TAL_AS	ROA	GDP_GRO WTH	WEIGHTED _AVERAGE INFLATION_OF_BORR	LOAN_GR OWTH	NON_PERF ORMING_L OAN	CAPITAL_ ADEQUEN CY
LIQUID_ASSET_TO_TOTAL_AS	1.000000						
ROA	-0.364151	1.000000					
GDP_GROWTH	-0.562010	0.441785	1.000000				
INFLATION	0.115259	0.274893	0.171436	1.000000			
WEIGHTED_AVERAGE_OF_BORR	0.150811	0.011214	-0.220377	-0.481036	1.000000		
LOAN_GROWTH	-0.382692	0.574598	0.412878	0.389789	-0.222431	1.000000	
NON_PERFORMING_LOAN	0.219988	-0.411743	-0.321999	-0.445358	0.266756	0.573776	1.000000
CAPITAL_ADEQUENCY	0.006523	-0.089169	-0.228410	0.244873	-0.342438	0.373043	-0.153212

**Source:** Financial statement of DBE & own computation through Eviews-7

According to Brooks (2008), if it is stated that  $y$  and  $x$  are correlated, it means that  $y$  and  $x$  are being treated in a completely symmetrical way. Thus, it is not implied that changes in  $x$  cause changes in  $y$ , or indeed that changes in  $y$  cause changes in  $x$  rather, it is simply stated that there is evidence for a linear relationship between the two variables, and that movements in the two are on average related to an extent given by the correlation coefficient.

A liquid asset to total asset ratio/D1 was positively correlated with CAP with the coefficient of correlation 0.0065. But the linear relationship between CAP and D1 was statistically not different from zero. Loan growth had negative and statistically significant relationship with bank's liquidity measured by D1 with correlation coefficient of -0.383. On the other hand, among bank specific factors NPL had positive linear relationship with liquidity as per D1 and statistically significant. Among the macroeconomic factors affecting liquidity, real GDP growth rate had negative and significant correlation with liquidity of Development Bank of Ethiopia. The short term interest rate with bank's liquidity was also has a positive and significant relation with DBE liquidity. The positive relationship of inflation rate on bank's liquidity was in line with the expectation of the study. Except loan growth all variables had statistically significant linear relationship with ROA. Among the significant variables only NPL and capital adequacy has had negative linear relationship with ROA.



### 4.3. Diagnostic Test

Before regression analysis and hypothesis testing heteroskedasticity, autocorrelation and normality testing are tested to know if the assumptions of CLRM violated or not. Accordingly, the output of the tests which are displayed by EViews-7 software are presented and interpreted.

#### ➤ Homoscedasticity Test

Table 4.3 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.186934	Prob. F(5,18)	0.9638
Obs*R-squared	1.184711	Prob. Chi-Square(5)	0.9463
Scaled explained SS	0.478976	Prob. Chi-Square(5)	0.9929

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 10/10/13 Time: 16:56

Sample: 1990 2013

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003277	0.003090	1.060437	0.3030
INFLATION	-0.000288	0.003349	-0.086047	0.9324
GDP_GROWTH	0.001601	0.009375	0.170825	0.8663
LOAN_GROWTH	-0.003007	0.006017	-0.499725	0.6233
NON_PERFORMING_LOAN	-0.001643	0.004527	-0.363035	0.7208
WEIGHTED_AVERAGE_OF_BORR	-0.036303	0.050248	-0.722472	0.4793
R-squared	0.049363	Mean dependent var		0.001235
Adjusted R-squared	-0.214703	S.D. dependent var		0.001512
S.E. of regression	0.001667	Akaike info criterion		-9.743325
Sum squared resid	5.00E-05	Schwarz criterion		-9.448812
Log likelihood	122.9199	Hannan-Quinn criter.		-9.665191
F-statistic	0.186934	Durbin-Watson stat		2.206321
Prob(F-statistic)	0.963802			

It has been assumed thus far that the variance of the errors is constant. This is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic. To test this assumption the whit's test was used having the null hypothesis of heteroscedasticity. Both F-statistic and chi-square ( $\chi^2$ ) tests statistic were used. In the case of D1 and ROA both the  $F$ - and  $\chi^2$ -test statistic give the same conclusion that there is evidence for the absence of heteroscedasticity. Since the  $p$ -values in

all of the cases were above 0.05, the null hypothesis of heteroscedasticity should be rejected. The null hypothesis of heteroscedasticity should be rejected at 5% level for the F-statistics (D1) and at 10% level for the  $\chi^2$  test statistic. In the case of ROA the null hypothesis of heteroscedasticity should be rejected even at 10% level of significance in both F- and  $\chi^2$  test statistic. The third version of the test statistic, “Scaled explained SS”, which as the name suggests is based on a normalized version of the explained sum of squares from the auxiliary regression, also give the same conclusion. Generally, in all of the regression models used in this study it was proved that the variance of the error term is constant or homoscedastic and we had sufficient evidence to reject the null hypothesis of heteroscedasticity.

### ➤ **Autocorrelation Test**

The Durbin-Watson test only tests the first order autocorrelation. For further test of autocorrelation the researcher uses Breusch-Godfrey test so that the autocorrelation that are not detected by DW test will be found. Moreover, BG test tests the autocorrelation of the residual and several lagged values of it.

Ho: There is no autocorrelation

H1: There is autocorrelation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.571673	Prob. F(5,13)	0.7208
Obs*R-squared	4.325840	Prob. Chi-Square(5)	0.5035

### **Source: EViews-7 output of test for autocorrelation**

As per the DW table in the appendix (5) for observations with 5 explanatory variables at 1% level of significance, the dL and dU values are 1.358 and 1.715 respectively. The DW values for D1 observations were 1.409631. The DW value of D1 lies in the inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. With the presence of autocorrelation also coefficient estimates are consistent but they are not best linear unbiased estimator/ BLUE (Brooks 2008). In the case of ROA equation the dL and dU values are 1.381 and 1.690 respectively. Hence, the DW value of ROA equation (i.e. 1.258395) lies in the non-rejection region and indicates the absence of

autocorrelation. Generally, there is not first order autocorrelation in the regression model in D1 and ROA. Hence, we focused up on the results of D1 for the determinants of liquidity.

#### ➤ **Normality Test**

A normal distribution is not skewed and is defined to have a coefficient of kurtosis 3. Bera-Jarque formalizes this by testing the residuals for normality and testing whether the coefficient of skewness and kurtosis are zero and three respectively. Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how fat the tails of the distribution are. The Bera-Jarque probability statistics/P-value is also expected not to be significant even at 10% significant level (Brooks 2008). According to Gujarati (2004), the JB is a large sample test & our sample test was equal to the frame was large; we considered the JB test also.

As shown in the histogram in the appendix (2) kurtosis approaches to 3 (i.e. 2.459304 for D1, and 3.709824 for ROA), and the Jarque-Bera statistics was not significant even at 10% level of significance as per the P-values shown in the histogram in the appendix (i.e. 0.454258 for D1, and 0.173495 for ROA). Hence, the null hypothesis that is the error term is normally distributed should not be rejected and it seems that the error term in all of the cases follows the normal distribution.

#### ➤ **Multicollinearity Test**

This assumption is concerned with the relationship exist between explanatory variables. If an independent variable is an exact linear combination of the other independent variables, then we say the model suffers from perfect collinearity, and it cannot be estimated by OLS (Brooks 2008). Multicollinearity condition exists where there is high, but not perfect, correlation between two or more explanatory variables (Cameron and Trivedi 2009; Wooldridge 2006). According to Churchill and Iacobucci (2005), when there is multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases. As a result, many of the explanatory variables could be judged as not related to the dependent variables when in fact they are. This assumption does allow the independent variables to be correlated; they just cannot be perfectly correlated. If we did not allow for any correlation among the independent variables, then multiple regressions would not be very useful for econometric analysis.

How much correlation causes multicollinearity however, is not clearly defined. While Hair et al (2006) argue that correlation coefficient below 0.9 may not cause serious multicollinearity problem. Malhotra (2007) stated that multicollinearity problem exists when the correlation coefficient among variables is greater than 0.75. Kennedy (2008) suggests that any correlation coefficient above 0.7 could cause a serious multi collinearity problem leading to inefficient estimation and less reliable results. This indicates that there is no consistent argument on the level of correlation that causes multicollinearity. According to Gujarati (2004), the standard statistical method for testing data for multicollinearity is analyzing the explanatory variables correlation coefficients (CC); condition index (CI) and variance inflation factor (VIF). Therefore, in this study correlation matrix for five of the independent variables shown below in the table had been estimated. The results in the following correlation matrix show that the highest correlation of 0.693 which is between loan growth and NPL. Since is no correlation above 0.7, 0.75 and 0.9 according to Kennedy (2008), Malhotra (2007) and Hair et al (2006) respectively, we can conclude in this study that there is no problem of multicollinearity.

**Table 4. 2** correlation matrix of explanatory variables

Covariance Analysis: Ordinary  
Date: 10/11/13 Time: 03:24  
Sample: 1990 2013  
Included observations: 24

Correlation	GDP_GROWTH	INFLATION	LOAN_GROWTH	NON_PERFORMING_LOAN	WEIGHTED_AVERAGE_OF_BORR
GDP_GROWTH	1.000000				
INFLATION	0.199063	1.000000			
LOAN_GROWTH	0.430695	0.448955	1.000000		
NON_PERFORMING_LOAN	-0.494256	-0.511153	0.672074	1.000000	
WEIGHTED_AVERAGE_OF_BORR	-0.324400	-0.346536	-0.280736	0.278294	1.000000

**Source:** Financial statement of DBE and own computation through Eviews-7

#### 4.4. Results of the regression analysis

Under the following regression outputs the beta coefficient may be negative or positive; beta indicates that each variable's level of influence on the dependent variable. P-value indicates at what percentage or precession level of each variable is significant. R<sup>2</sup> values indicate the explanatory power of the model and in this study adjusted R<sup>2</sup> value which takes into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the models.

##### ➤ Determinants of bank liquidity-results

**Operational model:** the regression model used to find the statistically significant determinants of DBE liquidity measured by D1 was:

$$LIQ_{i,t} = \alpha + \beta_1 CAPI_{i,t} + \beta_3 LG_{i,t} + \beta_4 NPL_{i,t} + \beta_5 GDP_t + \beta_7 STIR_t + \beta_8 INF_t + u_{i,t}$$

**Table 3.4** Regression results for determinants of liquidity measured by liquid assets to total assets ratio (D1)

Dependent Variable: LIQUID\_ASSET\_TO\_TOTAL\_AS  
 Method: Least Squares  
 Date: 10/10/13 Time: 04:05  
 Sample: 1990 2013  
 Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_GROWTH	-0.497583	0.228208	-2.180397	0.0427
INFLATION	0.182098	0.081517	2.233864	0.0384
LOAN_GROWTH	-0.295290	0.146460	-2.016191	0.0590
NON_PERFORMING_LOAN	0.008743	0.110190	0.079347	0.9376
WEIGHTED_AVERAGE_OF_BORR	0.695035	1.223163	0.568228	0.5769
C	0.263751	0.075220	3.506418	0.0025
R-squared	0.533777	Mean dependent var		0.264925
Adjusted R-squared	0.404271	S.D. dependent var		0.052573
S.E. of regression	0.040578	Akaike info criterion		-3.358867
Sum squared resid	0.029638	Schwarz criterion		-3.064353
Log likelihood	46.30640	Hannan-Quinn criter.		-3.280732
F-statistic	4.121630	Durbin-Watson stat		1.769928
Prob(F-statistic)	0.011374			

**Source:** Financial statement of DBE and own computation through Eviews-7

The above table presents results of liquid assets to total assets ratio (D1) as dependent variable and bank specific and macroeconomic explanatory variables for Development Bank of Ethiopia. The explanatory power of this model is high (i.e. around 53%). The regression  $F$ -statistic takes a value 4.1216.  $F$ -statistics tests the null hypothesis that all of the slope parameters ( $\beta$ s') are jointly zero. In the above case  $p$ -value of zero attached to the test statistic shows that this null hypothesis should be rejected even at 1% level of significance. As it is shown in the above table GDP growth rate, general inflation rate and loan growth were the statistically significant factors affecting liquidity of DBE. GDP growth and Loan growth had negative significant impact on liquidity at 5% level while, inflation has positive and statistically significant impact on liquidity at 5% level. Whereas, NPL and short term interest rate were statistically insignificant. The coefficient signs of non-performing loan, was opposite to the expectation and in line with the findings of Czech's (Vodova 2011).

➤ **The impact of bank liquidity on financial performance-results**

**Operational model:** the model used to see the impact of bank liquidity up on financial performance through the significant factors explaining bank's liquidity was:

$$ROA_{i,t} = \alpha + \beta_1 \text{GDP}_{i,t} + \beta_2 \text{INFLATION}_{i,t} + \beta_3 \text{LOAN\_GROWTH}_{i,t} + \beta_4 C + u_{i,t}$$

From the results of D1 the significant factors affecting bank liquidity in DBE were gdp growth, general inflation rate and loan growth.

**Table 4. 4** Regression result of the impact of statistically significant factors affecting bank's liquidity on financial performance

Dependent Variable: ROA  
 Method: Least Squares  
 Date: 10/10/13 Time: 04:30  
 Sample: 1990 2013  
 Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_GROWTH	0.070966	0.039798	1.783181	0.0897
INFLATION	0.003935	0.014092	0.279233	0.7829
LOAN_GROWTH	0.070913	0.024255	2.923682	0.0084
C	-0.001386	0.003374	-0.410948	0.6855
R-squared	0.544580	Mean dependent var		0.010552
Adjusted R-squared	0.476267	S.D. dependent var		0.010630
S.E. of regression	0.007693	Akaike info criterion		-6.746008
Sum squared resid	0.001184	Schwarz criterion		-6.549665
Log likelihood	84.95209	Hannan-Quinn criter.		-6.693918
F-statistic	7.971837	Durbin-Watson stat		1.258816
Prob(F-statistic)	0.001087			

**Source:** Financial statement of DBE and own computation through Eviews-7

The explanatory power of the above model is high with the value of adjusted R<sup>2</sup> of 54.5% with no first order autocorrelation. This indicates that 48% of the variation in ROA can be explained by the variation in those factors that can explain the variation in liquidity. Among the statistically significant factors affecting the liquidity of Development Bank of Ethiopia, two of them had statistically significant impact on DBE's financial performance. GDP growth and Loan growth had positive and statistically significant impact on financial performance at 10% and 1% level of significance. On the other hand, inflation had positive but statistically insignificant impact on financial performance.

## **4.5. Discussion**

### **4.5.1. Determinants of DBE's liquidity**

#### **4.5.1.1. Capital adequacy and liquidity**

The positive impact of capital adequacy on liquidity as of D1 is not as expected and findings of Czech commercial banks analysis (Vodova 2011) this is because capital adequacy unit root test is found to be the statistically insignificant. Thus is based on the argument of risk absorption. As Development Bank is government owned Bank the Bank's taking full of risk and most of the risk are covered by the government guarantee. However, DBE is operating with government fund majorly and soft loans obtained from multilateral development agencies like IDA, IFAD, ADB...etc. According to this argument the higher capital to total assets ratio of banks the higher the capacity of the bank to absorb risks and create higher level of liquidity to the external public through deposits and loans. In other words, higher capital ratio of banks create positive signal to the external public and attract more soft loan. In turn this enable banks to hold more liquid assets that create better potential to liquidity creation to the external financing agencies. Capital adequacy had positive but statistically insignificant impact on banks liquidity measured. Since the coefficient was statistically insignificant it is difficult to conclude that it show positive impact on banks liquidity. Hence, in conclusion for the impact of capital adequacy on banks liquidity in the case of DBE is insignificant.

#### **4.5.1.2. Inflation**

Inflation had positive impact on banks liquidity measured by D1. The positive and statistically significant impact of inflation in the case of D1 was in line with the expectation which was based on the argument that is based on the theory of information asymmetry, stating in the inflationary economy economic units including Development Bank of Ethiopia are refraining from long term investments due to the decline in the real value of their investments that exacerbate the credit market rationing and prefer to hold risk free/liquid assets. The value of the coefficient (i.e. 0.182098) indicates for a percentage rise in the general inflation rate of the country, DBE's holding of liquid assets rise/decline by



0.18% (reduce long term/ capital investments by 0.18%). Hence, INF has positive and significant impact on banks liquidity.

#### **4.5.1.3. None-performing loans**

Another surprising result was the case of non-performing loan. Although it was estimated negative results of non-performing loans, the results of the analysis showed the opposite effect. This could be a sign of prudent policy of the bank: that DBE offset the higher credit risk with cautious liquidity risk management. This result is consistent with the results identified by (Vodova 2011). The coefficient value of the variable in D1 (i.e. 0.008743) indicate the adjustment of banks liquidity position with the rise/decline in NPL/credit risk. For a 1% increase (decrease) in NPL in the total loan portfolio of banks, the banks increase (decrease) their liquid asset holding in the total assets portfolio by 0.8%. Generally, NPL has positive and significant impact on liquidity.

#### **4.5.1.4. Short term interest rate**

Short term interest rate had positive and statistically insignificant impact on banks liquidity measured by D1. The coefficient sign of short term interest rate in D1 was in line with expectation. Its insignificance in the case of D1 may be due to the decline in the dominance of DBE participation in the Treasury Bills market due to the entrance of non-bank participants. This is consistent with the NBE report (2010), stating that the dominance of banks especially in the Treasury bills market continued to diminish owing to enhanced participation of non-bank institutions. At the end of 2009/10 the non-bank institutions held 62% of the total outstanding T-bills'. Therefore, STIR has positive and significant impact on liquidity.

#### **4.5.1.5. Loan growth**

The coefficient signs of loan growth in D1 show negative impact of loan growth on banks liquidity position. The negative impact of loan growth on banks liquidity was in line with the expectation which is based on the argument of taking loans as illiquid assets of banks. According to this argument when the amount of loans provided by banks increase, the amount of illiquid assets in the total assets portfolio of banks increase and lead to the reduction in the level of liquid assets held by banks. The coefficient value of the variable in

D1 (i.e. 0.295290) indicate the adjustment of banks liquidity position with the rise/decline in loan growth. For a 1% increase (decrease) in loan of DBE, the bank increase (decrease) their liquid asset holding in the total assets portfolio by 0.30%. Thus, loan growth has negative and significant impact on liquidity of DBE.

#### **4.5.1.6. Real GDP growth rate**

The coefficient sign for real GDP growth rate was negative in line with the expectation. DEB's mission to support the development of the country is verified here that DBE's liquidity holding is opposite in according to the country's GDP growth. Therefore, there exist negative and significant relationship between real GDP growth rate and DBE's liquidity.

### 4.5.2. Impact of bank liquidity on financial performance

GDP growth, Inflation, and Loan growth have statistically significant impact on the financial performance of DBE. While loan growth and GDP growth have positive impact, inflation has negative impact on the financial performance.

The coefficient signs of GDP growth and loan growth rate were negative in the liquidity equation whereas, positive in the ROA equation. These results indicate the negative relationship between liquidity of the Bank's and its financial performance. In other words, when GDP growth and loan growth increase bank's holding of liquid assets decrease (as more money will be ejected to the economy) and increase the profitability of Development Bank of Ethiopia. The coefficient values indicate for a percentage rise/decline in GDP and loan growth, banks holding of liquid assets rise/decline by 0.5% and 0.3% respectively whereas, profitability of banks decline/rise by 0.07% and 0.07% respectively. The other statistically significant factor affecting banks liquidity (inflation) had statistically insignificant impact on financial performance. But its coefficient sign was similar to the case in liquidity of Development Bank of Ethiopia shown in the summery regression results table 4.7. In other words, general inflation rate had positive and statistically significant impact on liquidity and had positive impact on financial performance though its statistically insignificant.

Therefore, from the above results it can be concluded that the impact of bank liquidity on financial performance was non-linear (i.e. positive and negative). This result indicate that there is some level of liquidity up to which liquidity enhances financial performance and beyond that point it hinders financial performance.

**Table 4.5** Summary of actual & expected signs of explanatory variables on the dependent variables

<b>Independent variables</b>	<b>Expected effect</b>	<b>Actual impact</b>	
Gross Domestic Product	Negative and significant	Negative	Significant
Inflation	Positive and significant	Positive	Significant
Short term interest rate	Positive and significant	Positive	Significant
Loan growth	Negative and significant	Negative	Significant
Capital adequacy	Positive and significant	Positive	Insignificant
Non- performing loan	Negative and significant	Positive	Significant

## **CHAPTER FIVE**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.1. Conclusion**

Development Bank of Ethiopia's mission is to mobilize financial resource and support the socio economic development of the country through project finance. Thus, DBE has to meet its financial obligation and be able to further mobilize development fund to sustain its Banking service. Liquidity creation is the primary reason why Banks exist as it is stated in the literature part. The aim of this paper was on twofold: first to identify determinants of liquidity of Development Bank of Ethiopia and secondly to see the impact of banks liquidity on financial performance through the factors explaining liquidity. Six variables affecting banks liquidity were chosen and analyzed. The panel data of 24 years was used for case of development Bank of Ethiopia from 1990 to 2013. Data was presented by using descriptive statistics. The balanced correlation and regression analysis for liquidity ratio and financial performance was conducted. Before performing OLS regression the models were tested for the classical linear regression model assumptions. Accordingly, five factors affecting banks liquidity were chosen and analyzed. From the list of possible explanatory variables, most of them proved to be statistically significant. With the only exception of capital adequacy of the bank, relations of all factors and the bank's liquidity were consistent in the model D1. The results of model enabled the researcher to make following conclusions.

- Both NPL and inflation had positive and significant impact on DBE's liquidity as per D1.
- Short term interest rate on banks liquidity was statistically significant and had positive impact on liquidity measured by short term financing ratio.
- Loan growth rate and real GDP growth rate had statistically significant effect on the liquidity of DBE both in the case of D1 and ROE.

It could be useful to use another proxy to measure capital adequacy than capital to asset ratio used in this study. Generally, the researcher have failed to reject four hypotheses that indicate the relationship between bank liquidity, general inflation rate, GDP growth rate, Average weighed short term interest rate, NPL ratio and loan growth whereas, we rejected

the expectation of capital adequacy in relation to liquidity. Short term interest rate and NPL ratio had insignificant impact on bank liquidity of development Bank of Ethiopia. Three of the statistically significant variables affecting banks liquidity affect banks performance. These are GDP growth, general inflation and loan growth. GDP growth rate and Loan growth had positive and significant impact on financial performance just like on liquidity of banks. Whereas, general inflation has insignificant impact on financial performance of banks opposing to the result in the case of banks liquidity. Therefore, it can be concluded that the impact of banks liquidity on financial performance was non-linear (positive and negative).

## **5.2. Recommendation**

Based on the findings of the research the following recommendations were given:

- Since adjusting their liquidity position for managing credit risk has negative impact on financial performance, DBE have to adopt other ways of managing credit risk. For instance; minimizing adverse selection during the time of credit approval, undertaking rigorous project feasibility study and strict follow up of borrowers to minimize the problem of moral hazards after the provision of credit.
- DBE's liquidity is highly mingled with macroeconomic effects thus further research on the area of factors affecting bank's liquidity performance in other aspect by incorporating regulatory factors and other bank specific and macroeconomic factors.
- The Bank has to undertake prudent liquidity management policy in relation to the credit service and have to establish macroeconomic analysis section in the research department or the fund management process.
- There has to be also empirical research to reveal whether or not there is credit crunch and credit rationing in the economy. And if there is really credit crunch in the economy what are the causes? If the presence of credit crunch known by depositors, it can cause run on banks by their depositors. Hence, focus has to be given for this issue.

- In addition to this the impact of banks liquidity on financial performance of banks has to be seen by grouping banks as highly liquid, liquid and less liquid.
- DBE has to diversify its source of fund and strengthen its liquidity position as the project finance is increasing more risk taking ventures are to be entertained which the current government finance is limited to entertain. Thus raising its capital structure is paramount. DBE is solely dependent on finance from the government that is why the capital is not responding to the liquidity demand. Thus the bank has to raise its fund by itself through its reputation and balance sheet structure.
- As the Bank is getting in to saving bond mobilization and management gaining further insight into the liquidity made available is crucial. Liquidity is not only of importance for banks but also for the health and functioning of the real economy. The management of DBE have not been engaged in deposit mobilization for long period. However, currently the saving bond scheme has triggered the necessity of managing liquidity cautiously.

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# APPENDICES

## APPENDICES-1

### Pairwise Granger Causality Tests

Date: 10/16/13 Time: 11:03

Sample: 1990 2013

Lags: 5

Null Hypothesis:		F-Statistic	Prob.
GDP_GROWTH does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		0.87785	0.5364
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause GDP_GROWTH	0.79956	0.5797	
INFLATION does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		1.18050	0.3966
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause INFLATION	11.4006	0.0018	
LOAN_GROWTH does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		0.85296	0.5499
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause LOAN_GROWTH	1.22386	0.3799	
NON_PERFORMING_LOAN does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		0.50962	0.7626
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause NON_PERFORMING_LOAN	6.79273	0.0093	
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		6.11059	0.0128
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	3.65020	0.0513	
INFLATION does not Granger Cause GDP_GROWTH		5.46206	0.0176
GDP_GROWTH does not Granger Cause INFLATION	1.40577	0.3178	
LOAN_GROWTH does not Granger Cause GDP_GROWTH		0.47070	0.7888
GDP_GROWTH does not Granger Cause LOAN_GROWTH	0.91368	0.5176	
NON_PERFORMING_LOAN does not Granger Cause GDP_GROWTH		2.22818	0.1501
GDP_GROWTH does not Granger Cause NON_PERFORMING_LOAN	1.58912	0.2666	
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause GDP_GROWTH		1.91869	0.1968
GDP_GROWTH does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	0.52068	0.7552	

LOAN_GROWTH does not Granger Cause INFLATION			4.39698	0.0319
INFLATION does not Granger Cause LOAN_GROWTH	0.21845	0.9447		
NON_PERFORMING_LOAN does not Granger Cause INFLATION			1.92722	0.1953
INFLATION does not Granger Cause NON_PERFORMING_LOAN	3.58284	0.0536		
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause INFLATION			11.1705	0.0019
INFLATION does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	1.33289	0.3412		
NON_PERFORMING_LOAN does not Granger Cause LOAN_GROWTH			2.17349	0.1573
LOAN_GROWTH does not Granger Cause NON_PERFORMING_LOAN	0.70169	0.6379		
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause LOAN_GROWTH			0.22334	0.9423
LOAN_GROWTH does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	0.23581	0.9359		
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause NON_PERFORMING_LOAN			1.60328	0.2631
NON_PERFORMING_LOAN does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	0.43861	0.8104		

**Durbin-Watson Statistic: 1 Per Cent Significance Points of dL and dU**

\*k' is the number of regressors excluding the intercept

N	k'=1		k'=2		k'=3		k'=4		k'=5		k'=6		k'=7		k'=8		k'=9		k'=10		
	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	
6	0.390	1.142																			
7	0.435	1.036	0.294	1.676																	
8	0.497	1.003	0.345	1.489	0.229	2.102															
9	0.554	0.998	0.408	1.389	0.279	1.875	0.183	2.433													
10	0.604	1.001	0.466	1.333	0.340	1.733	0.230	2.193	0.150	2.690											
11	0.653	1.010	0.519	1.297	0.396	1.640	0.286	2.030	0.193	2.453	0.124	2.892									
12	0.697	1.023	0.569	1.274	0.449	1.575	0.339	1.913	0.244	2.280	0.164	2.665	0.105	3.053							
13	0.738	1.038	0.616	1.261	0.499	1.526	0.391	1.826	0.294	2.150	0.211	2.490	0.140	2.838	0.090	3.182					
14	0.776	1.054	0.660	1.254	0.547	1.490	0.441	1.757	0.343	2.049	0.257	2.354	0.183	2.667	0.122	2.981	0.078	3.287			
15	0.811	1.070	0.700	1.252	0.591	1.465	0.487	1.705	0.390	1.967	0.303	2.244	0.226	2.530	0.161	2.817	0.107	3.101	0.068	3.374	
16	0.844	1.086	0.738	1.253	0.633	1.447	0.532	1.664	0.437	1.901	0.349	2.153	0.269	2.416	0.200	2.681	0.142	2.944	0.094	3.201	
17	0.873	1.102	0.773	1.255	0.672	1.432	0.574	1.631	0.481	1.847	0.393	2.078	0.313	2.319	0.241	2.566	0.179	2.811	0.127	3.053	
18	0.902	1.118	0.805	1.259	0.708	1.422	0.614	1.604	0.522	1.803	0.435	2.015	0.355	2.238	0.282	2.467	0.216	2.697	0.160	2.925	
19	0.928	1.133	0.835	1.264	0.742	1.416	0.650	1.583	0.561	1.767	0.476	1.963	0.396	2.169	0.322	2.381	0.255	2.597	0.196	2.813	
20	0.952	1.147	0.862	1.270	0.774	1.410	0.684	1.567	0.598	1.736	0.515	1.918	0.436	2.110	0.362	2.308	0.294	2.510	0.232	2.174	
21	0.975	1.161	0.889	1.276	0.803	1.408	0.718	1.554	0.634	1.712	0.552	1.881	0.474	2.059	0.400	2.244	0.331	2.434	0.268	2.625	
22	0.997	1.174	0.915	1.284	0.832	1.407	0.748	1.543	0.666	1.691	0.587	1.849	0.510	2.015	0.437	2.188	0.368	2.367	0.304	2.548	
23	1.017	1.186	0.938	1.290	0.858	1.407	0.777	1.535	0.699	1.674	0.620	1.821	0.545	1.977	0.473	2.140	0.404	2.308	0.340	2.479	
24	1.037	1.199	0.959	1.298	0.881	1.407	0.805	1.527	0.728	1.659	0.652	1.797	0.578	1.944	0.507	2.097	0.439	2.255	0.375	2.417	
25	1.055	1.210	0.981	1.305	0.906	1.408	0.832	1.521	0.756	1.645	0.682	1.776	0.610	1.915	0.540	2.059	0.473	2.209	0.409	2.362	
26	1.072	1.222	1.000	1.311	0.928	1.410	0.855	1.517	0.782	1.635	0.711	1.759	0.640	1.889	0.572	2.026	0.505	2.168	0.441	2.313	
27	1.088	1.232	1.019	1.318	0.948	1.413	0.878	1.514	0.808	1.625	0.738	1.743	0.669	1.867	0.602	1.997	0.536	2.131	0.473	2.269	

28	1.104	1.244	1.036	1.325	0.969	1.414	0.901	1.512	0.832	1.618	0.764	1.729	0.696	1.847	0.630	1.970	0.566	2.098	0.504	2.229
29	1.119	1.254	1.053	1.332	0.988	1.418	0.921	1.511	0.855	1.611	0.788	1.718	0.723	1.830	0.658	1.947	0.595	2.068	0.533	2.193
30	1.134	1.264	1.070	1.339	1.006	1.421	0.941	1.510	0.877	1.606	0.812	1.707	0.748	1.814	0.684	1.925	0.622	2.041	0.562	2.160
31	1.147	1.274	1.085	1.345	1.022	1.425	0.960	1.509	0.897	1.601	0.834	1.698	0.772	1.800	0.710	1.906	0.649	2.017	0.589	2.131
32	1.160	1.283	1.100	1.351	1.039	1.428	0.978	1.509	0.917	1.597	0.856	1.690	0.794	1.788	0.734	1.889	0.674	1.995	0.615	2.104
33	1.171	1.291	1.114	1.358	1.055	1.432	0.995	1.510	0.935	1.594	0.876	1.683	0.816	1.776	0.757	1.874	0.698	1.975	0.641	2.080
34	1.184	1.298	1.128	1.364	1.070	1.436	1.012	1.511	0.954	1.591	0.896	1.677	0.837	1.766	0.779	1.860	0.722	1.957	0.665	2.057
35	1.195	1.307	1.141	1.370	1.085	1.439	1.028	1.512	0.971	1.589	0.914	1.671	0.857	1.757	0.800	1.847	0.744	1.940	0.689	2.037
36	1.205	1.315	1.153	1.376	1.098	1.442	1.043	1.513	0.987	1.587	0.932	1.666	0.877	1.749	0.821	1.836	0.766	1.925	0.711	2.018
37	1.217	1.322	1.164	1.383	1.112	1.446	1.058	1.514	1.004	1.585	0.950	1.662	0.895	1.742	0.841	1.825	0.787	1.911	0.733	2.001
38	1.227	1.330	1.176	1.388	1.124	1.449	1.072	1.515	1.019	1.584	0.966	1.658	0.913	1.735	0.860	1.816	0.807	1.899	0.754	1.985
39	1.237	1.337	1.187	1.392	1.137	1.452	1.085	1.517	1.033	1.583	0.982	1.655	0.930	1.729	0.878	1.807	0.826	1.887	0.774	1.970
40	1.246	1.344	1.197	1.398	1.149	1.456	1.098	1.518	1.047	1.583	0.997	1.652	0.946	1.724	0.895	1.799	0.844	1.876	0.749	1.956
45	1.288	1.376	1.245	1.424	1.201	1.474	1.156	1.528	1.111	1.583	1.065	1.643	1.019	1.704	0.974	1.768	0.927	1.834	0.881	1.902
50	1.324	1.403	1.285	1.445	1.245	1.491	1.206	1.537	1.164	1.587	1.123	1.639	1.081	1.692	1.039	1.748	0.997	1.805	0.955	1.864
55	1.356	1.428	1.320	1.466	1.284	1.505	1.246	1.548	1.209	1.592	1.172	1.638	1.134	1.685	1.095	1.734	1.057	1.785	1.018	1.837
60	1.382	1.449	1.351	1.484	1.317	1.520	1.283	1.559	1.248	1.598	1.214	1.639	1.179	1.682	1.144	1.726	1.108	1.771	1.072	1.817
65	1.407	1.467	1.377	1.500	1.346	1.534	1.314	1.568	1.283	1.604	1.251	1.642	1.218	1.680	1.186	1.720	1.153	1.761	1.120	1.802
70	1.429	1.485	1.400	1.514	1.372	1.546	1.343	1.577	1.313	1.611	1.283	1.645	1.253	1.680	1.223	1.716	1.192	1.754	1.162	1.792
75	1.448	1.501	1.422	1.529	1.395	1.557	1.368	1.586	1.340	1.617	1.313	1.649	1.284	1.682	1.256	1.714	1.227	1.748	1.199	1.783
80	1.465	1.514	1.440	1.541	1.416	1.568	1.390	1.595	1.364	1.624	1.338	1.653	1.312	1.683	1.285	1.714	1.259	1.745	1.232	1.777
85	1.481	1.529	1.458	1.553	1.434	1.577	1.411	1.603	1.386	1.630	1.362	1.657	1.337	1.685	1.312	1.714	1.287	1.743	1.262	1.773
90	1.496	1.541	1.474	1.563	1.452	1.587	1.429	1.611	1.406	1.636	1.383	1.661	1.360	1.687	1.336	1.714	1.312	1.741	1.288	1.769
95	1.510	1.552	1.489	1.573	1.468	1.596	1.446	1.618	1.425	1.641	1.403	1.666	1.381	1.690	1.358	1.715	1.336	1.741	1.313	1.767
100	1.522	1.562	1.502	1.582	1.482	1.604	1.461	1.625	1.441	1.647	1.421	1.670	1.400	1.693	1.378	1.717	1.357	1.741	1.335	1.765
150	1.611	1.637	1.598	1.651	1.584	1.665	1.571	1.679	1.557	1.693	1.543	1.708	1.530	1.722	1.515	1.737	1.501	1.752	1.486	1.767
200	1.664	1.684	1.653	1.693	1.643	1.704	1.633	1.715	1.623	1.725	1.613	1.735	1.603	1.746	1.592	1.757	1.582	1.768	1.571	1.779

## APPENDICES-3

Dependent Variable: LIQUID\_ASSET\_TO\_TOTAL\_AS

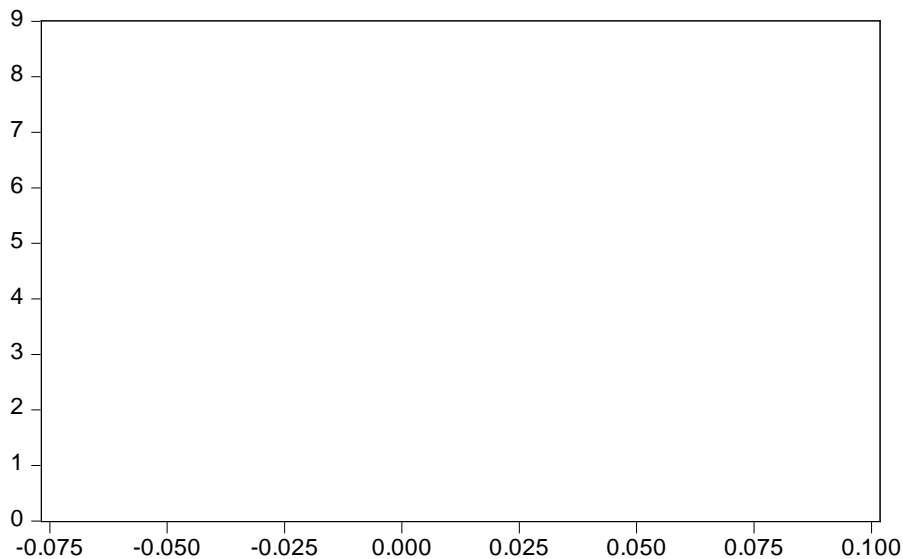
Method: Least Squares

Date: 10/11/13 Time: 04:27

Sample: 1990 2013

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION	0.182098	0.081517	2.233864	0.0384
GDP_GROWTH	-0.497583	0.228208	-2.180397	0.0427
LOAN_GROWTH	-0.295290	0.146460	-2.016191	0.0590
NON_PERFORMING_LOAN	0.008743	0.110190	0.079347	0.9376
WEIGHTED_AVERAGE_OF_BORR	0.695035	1.223163	0.568228	0.5769
C	0.263751	0.075220	3.506418	0.0025
R-squared	0.533777	Mean dependent var		0.264925
Adjusted R-squared	0.404271	S.D. dependent var		0.052573
S.E. of regression	0.040578	Akaike info criterion		-3.358867
Sum squared resid	0.029638	Schwarz criterion		-3.064353
Log likelihood	46.30640	Hannan-Quinn criter.		-3.280732
F-statistic	4.121630	Durbin-Watson stat		1.769928
Prob(F-statistic)	0.011374			



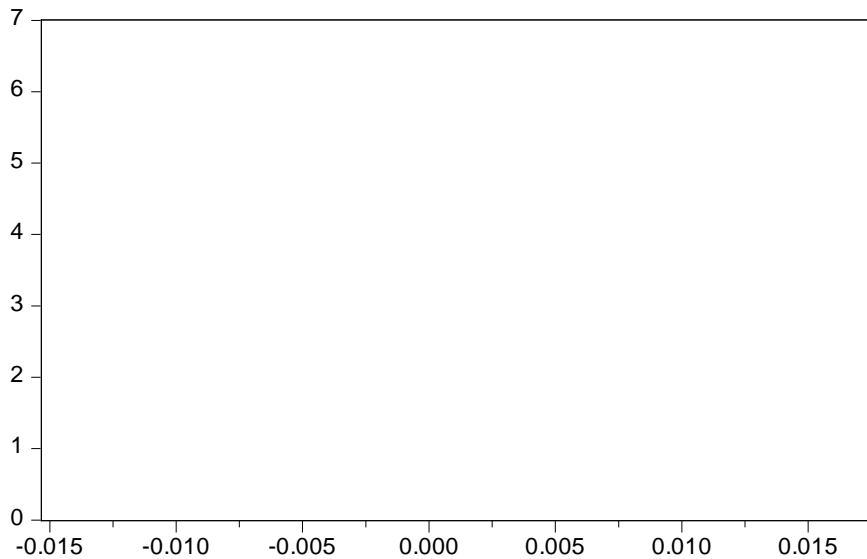
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Sample 1990 2013	
Observations 24	
Mean	1.16e-16
Median	-0.003149
Maximum	0.079570
Minimum	-0.062949
Std. Dev.	0.035897
Skewness	0.215368
Kurtosis	2.437504
Jarque-Bera	0.501935
Probability	0.778048



## APPENDICES-4

Dependent Variable: ROA  
 Method: Least Squares  
 Date: 10/11/13 Time: 04:41  
 Sample: 1990 2013  
 Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_GROWTH	0.070966	0.039798	1.783181	0.0897
INFLATION	0.003935	0.014092	0.279233	0.7829
LOAN_GROWTH	0.070913	0.024255	2.923682	0.0084
C	-0.001386	0.003374	-0.410948	0.6855
R-squared	0.544580	Mean dependent var		0.010552
Adjusted R-squared	0.476267	S.D. dependent var		0.010630
S.E. of regression	0.007693	Akaike info criterion		-6.746008
Sum squared resid	0.001184	Schwarz criterion		-6.549665
Log likelihood	84.95209	Hannan-Quinn criter.		-6.693918
F-statistic	7.971837	Durbin-Watson stat		1.258816
Prob(F-statistic)	0.001087			



Series: Residuals	
Sample 1990 2013	
Observations 24	
Mean	-9.76e-19
Median	-0.000655
Maximum	0.017038
Minimum	-0.012704
Std. Dev.	0.007174
Skewness	0.419815
Kurtosis	2.811824
Jarque-Bera	0.740390
Probability	0.690600



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SCHOOL OF GRADUATE STUDIES**

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**OCTOBER, 2013  
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**A THESIS IS SUBMITTED TO ST.MARY'S UNIVERSITY,  
SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF  
BUSINESS ADMINISTRATION**

**OCTOBER, 2013  
ADDIS ABABA, ETHIOPIA**

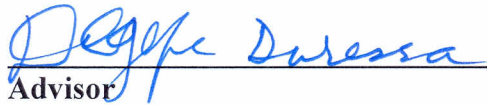
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FACULTY OF BUSINESS

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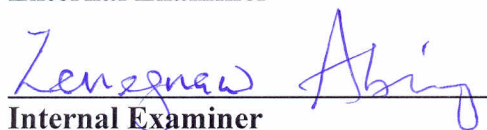
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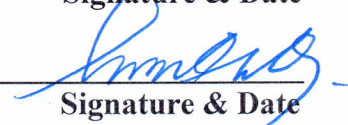
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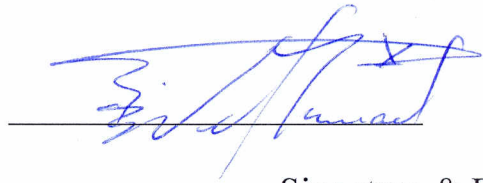
# DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Degefe Duressa Obo. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Nathnael Hailu Tessema

Name

St. Mart's University, Addis Ababa

A handwritten signature in blue ink, appearing to read 'Nathnael Hailu Tessema', written over a horizontal line.

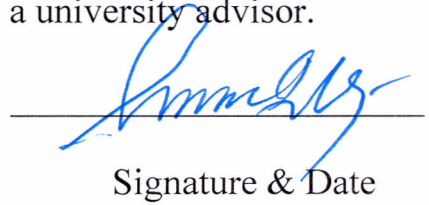
Signature & Date

October, 2013

# ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

  
Advisor

  
Signature & Date

St. Mart's University, Addis Ababa

October, 2013

## **DEDICATION**

I wish to dedicate this thesis to my late mother Sister Zenebech G/Yesus (1927 – 2002 e.c.). She taught me to persevere and prepared me to face challenges with faith and humility. Her encouraging word and belief in hard work is always my inspiration. Although she is not here to give me strength and support I always feel her presence that used to urge me to strive to achieve my goals in life.

## **ACKNOWLEDGEMENT**

A research report requires not only substantial commitment and personal sacrifice of the researcher but also it depends on support and encouragement of many others including family, colleagues and associates. I would like to express my appreciation to the following persons for their suggestion, support and contribution. Moreover, this thesis is also the result of many experiences I have encountered from dozens of remarkable literatures, journals and individuals who I wish to acknowledge.

First, I would like to thank my supervisor Dr. Degefe Duressa Obo for his unreserved assistance in giving me relevant comments and guidance throughout the study.

Then my heartfelt gratitude goes to my wife, Yemiserach kassu for her continuous encouragement and my sons' and daughter for their understanding and creating conducive environment where I can focus on my study.

I also would like to thank to the staff and management of development Bank of Ethiopia for completing the research survey questionnaire and providing financial data.

Finally, I would like to thank ST. Mary university school of graduate studies for giving me the chance to be partaker of the academic endeavor. My indebtedness also goes to my employer, Development Bank of Ethiopia, for My Msc study would have just remained a dream without obtaining priceless support from my employer.



## **ABSTRACT**

(Erik Banks 2005, pp3), described the term liquidity as “the availability of cash or equivalent resources and is the lifeblood of every commercial and sovereign entity”. This paper has two purposes: firstly to identify determinants of Development Bank of Ethiopia’s liquidity and then see the impact of bank’s liquidity on financial profitability through the significant variables explaining liquidity. Ordinary least square regression model was used to analyze the data covering twenty four years (1990 – 2013). Six factors affecting bank’s liquidity were selected and analyzed. The results of regression analysis showed that short term interest rate and inflation had positive and insignificant impact on DBE’s liquidity. While, NPL ratio impact on liquidity was statistically significant and has positive impact. Loan growth rate and real GDP growth rate had statistically significant effect on the liquidity of DBE and has a negative impact. Among the statistically significant factors affecting bank’s liquidity like real GDP growth rate and loan growth rate had positive impact on financial performance whereas, inflation had positive but statistically insignificant impact on financial performance. Therefore, the impact of bank liquidity on financial performance was non-linear/positive and negative.

## **ACRONYMS**

DBE – Development Bank of Ethiopia

MOFED – Ministry of Finance and Development

CBE - Commercial Bank of Ethiopia

LMI – Liquidity Mismatch Index

IDA – International Development Agency

WB – World Bank

IFAD – International Fund for Agricultural Development

CDB – China Development Bank

EU – European Union

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# CHAPTER ONE

## INTRODUCTION

### 1.1. Background of the Study

Ethiopian modern commercial Banking history dates back to the turn of the twentieth century when, 1905, the Bank of Abyssinia was established in Addis Ababa by the agreement between Emperor Menelik II and a representative of British owned National Bank of Egypt. After the bank was bought and owned by the Ethiopian government, it was disintegrated into two different banks forming the National Bank of Ethiopia and the Commercial Bank of Ethiopia (Mauri, 2003). Four years later Emperor Menelik II on 1909 established a specialized bank that promote agriculture and trade to support the development of the society under the name of The Societe Nationale d'Ethiopie pour le Development de l'agriculture et de Commerce. This Bank has renamed itself several times along with the changing of government economic policy, serving the same mission. Development Bank of Ethiopia (DBE) with its current name is specialized bank with a mission of providing medium and long term loan for priority projects. In the Banking industry DBE's market share stood second compared to other public and private Banks in Ethiopian financial sector (NBE Quarterly Bulletin, 2012).

Banks are among the financial intermediaries that raise funds, as traditionally perceived, primarily by issuing checkable/demand deposits, saving deposits, and time/fixed deposits (Mishikin, 2004). Development banks fill a gap left by undeveloped capital markets and the reluctance of commercial banks to offer long-term financing. Because the financial system of Ethiopia is at its infancy stage, DBE is authorized to bridge the market where commercial banks fear to take risks. This is done through mobilizing financial resource from local and foreign sources. That will make the Bank riskier than regular Banks. Thus DBE's financial stability has a paramount for the country's economic stability.

The market turmoil that began in mid-2007 re-emphasized the importance of liquidity to the functioning of financial markets and the banking sector. In advance of the turmoil, asset markets were buoyant and funding was readily available at low cost. The reversal in market conditions illustrated how quickly liquidity can evaporate and that illiquidity can last for an

extended period of time. The banking system came under severe stress, which necessitated central bank action to support both the functioning of money markets and, in a few cases, individual institutions.

Ethiopia is one of the fastest growing economies in the world, registering double digit growth for a consecutive seven years. The country has liberalized its banking industry for private firms beginning 1990's, and from there on the number of Banks have increased to nineteen as of June, 2013 (NBE Annual Report, 2013). These have created conducive market for investors to put their money in more rewarding financial institutions. Formerly, public organizations as well as private investors were forced to put their excess money only in government owned banks. However, these have sifted on competitive and attractive incentives that the banks offer. This particularly has affected the cost of fund for time deposit mobilizes.

During its history DBE faced different liquidity problem in financing its projects repeatedly, however, the depth and dimension of risk it would face with its current strategic position would be by-implicated at country level. Therefore, DBE's ability to settle its obligation with immediacy is paramount. Consequently, by understanding and using the dimensions of liquidity of DBE this thesis, will identify the determinants of liquidity in development bank of Ethiopia to help in reviewing effective liquidity management system in the Bank and which will further help replicate to other similar financial institutions in Africa where DBE is member to tackle factors hindering their performance.

### **1.1.1. Overview of banking history in Ethiopia**

Modern banking in Ethiopia was introduced in 1905. At the time, an agreement was reached between Emperor Menelik II and a representative of the British owned National Bank of Egypt to open a new bank in Ethiopia. February 15, 1906 marked the beginning of banking in Ethiopia history when the first Bank of Abyssinia was inaugurated by Emperor Menelik II. It was a private bank whose shares were sold in Addis Ababa, New York, Paris, London, and Vienna (NBE 2010). In 1931, Emperor Haile Selassie introduced reforms into the banking system and the Bank of Abyssinia was liquidated and became the Bank of Ethiopia, a fully government-owned bank providing central and commercial banking



services until the Italian invasion of 1936. During the Italian invasion, Bank of Italy was formed a legal tender in Ethiopia. In 1943, after Ethiopia regains its sovereignty, the State Bank of Ethiopia was established, with two departments performing the separate functions of an issuing bank and a commercial bank. In 1963, these functions were formally separated and the National Bank of Ethiopia (the central and issuing bank) and the Commercial Bank of Ethiopia are formed (Mauri, 2003). In the period up to 1974, several other financial institutions emerged including the state owned as well as private financial institution.

Further, as per the NBE (2010), following the declaration of command economy by Derge regime in 1974 the government extended its control and nationalized all of previously established private banks and merged into one bank. After nationalization the Derge regime leave only three government banks; the National Bank of Ethiopia, the Commercial Bank of Ethiopia and Agricultural and Industrial Development Bank (now DBE). This was reversed when the socialist regime was overthrown in 1991. Subsequently, the licensing and supervision of Banking Business Proclamation No. 84/1994 was issued in 1994 which led to the beginning of a new era for Ethiopia banking sector. Following the enactment of the banking legislations in the country in the 1990s, a fairly good number of private banks have been established. For example, in the 2010/11 fiscal year the total number of banks already operational in the country reached fifteen. Of these banks, twelve were private and the other three were government owned. There is also a sign of interest in establishing other new banks by different individuals and groups. Accordingly, at present, there are at least four banks under the process of establishment through issuing their shares. Currently, commercial banks work for profit and the NBE controls and gives license for commercial banks NBE, (2010). It is the reserve or central bank of Ethiopia. According to proclamation No 591/2008 NBE establishment proclamation article 4 the purpose of the NBE is to maintain stable rate of price and exchange, to foster a healthy financial system and undertake other relative activities that are conducive to rapid economic development of Ethiopia. Meanwhile, Development Bank of Ethiopia as part and parcel of the Banking industry is given a mission to lead the banking industry by focusing on development finance, maintaining its sustainability.

### **1.1.2. Development Bank of Ethiopia**

The history of Development Bank of Ethiopia (DBE) goes back to 1909 when it was first established under the name of The Societe Nationale d' Ethiopie pour le Development de l'agriculture et de Commerce (The Society for the promotion of Agriculture and Trade). Since then the Bank has taken different names at different times even though its mission and business purposes have not made significant changes except for occasional adjustments to suit the changing government policies.

After undergoing a series of changes for about six decades, the Bank became a government owned Share Company in August, 1971 by Decree No. 55 under the name or Agricultural and Industrial Development Bank. However, after its nationalization in 1975 the Bank with the same name was re-organized and re-established as a public Finance Agency under proclamation No. 158 of March 1979. In 1994 the Bank was further reorganized and established as a public enterprise with its present name of Development Bank of Ethiopia supervised by the Board of Directors under the Ministerial Council Decree No. 2000/1994.

Furthermore, DBE was re-established under the Council of Ministers' Regulation No. 83/2003 and supervised by the public enterprise proclamation No. 25/1992. Owing to this, the Bank is mandated to operate with a wider business mission who promotes the national economic development through the provision of mainly medium and long-term investment loans by mobilizing financial resource from local and foreign financing agencies.

At present, Development Bank of Ethiopia (DBE) is one of the strategic institutions of Ethiopia for implementation of huge projects that support the economic development of the country, like the Ethiopian renaissance dam. DBE finances 15% of the dam construction through its different financing scheme (Strategic Plan of DBE, 2008). Apart from the renaissance dam, DBE is currently financing huge strategic projects like sugar factory and textile industries which requires substantial amount of finance. In order, to meet this huge financial requirement DBE follows different resource mobilization strategies. One of which recently introduced financing scheme is the renaissance dam saving bond. Saving bond is newly introduced finance mobilization strategy to support the construction of the great renaissance dam. DBE has issued different bonds with different par value ranging from

Birr 5 to 1 million, and which ranges from one year to five years. Accordingly, two years from its introduction DBE have mobilized more than three billion birr bond from the public. Moreover, DBE has also different resource mobilization scheme like soft loan from IDA, WB, IFAD, CDB, EU... as foreign sources, and from local it covers its short term financial requirement by purchasing bond or time deposit from local sources like social security fund, CBE, and other liquid local organizations.

## **1.2.Statement of the Problem**

Liquidity creation itself is seen as the primary source of economic welfare contribution by banks but also as their primary source of risk (see e.g. Bryant 1980; Diamond and Dybvig 1983; Calomiris and Kahn 1991). Since the public loss of confidence as a result of bank distress has tormented the financial sector in the last decade; and the intensity of competition in the banking sector due to the emergence of large number of new banks, every bank should ensure that it operates on profit and at the same time meets the financial demands of its creditors by maintaining adequate liquidity.

Banks have to maintain their optimal liquidity so as to undertake their operations properly and profitably. When we say banks are liquid, they are able to serve the demand of new borrowers and meet its financial obligation on time without affecting their day to day activities. To do so they have to keep sufficient liquid assets on their balance sheet. What is more necessary behind maintaining their liquidity is that properly identifying and managing important factors affecting the liquidity position of banks. According to Asphachs et al. (2005), banks have three possible layers of insurance; a buffer of liquid assets in banks' individual portfolios, unsecured lending/borrowing in the interbank market and a lender of last resort/LOLR safety net. The first one is internal and the remaining two are external sources of liquidity. Like the sources of their liquidity the liquidity position of banks can be affected by bank specific factors, macroeconomic factors and government/central bank regulations.

The problem then becomes how to select or identify the optimum point or the level at which a bank can maintain its assets in order to optimize these two objectives since each of the liquidity has a different effect on the level of profitability. This problem becomes more

pronounced as most banks in general and DBE in particular where engrossed with profit maximization through excessive loan disbursement and as such they tend to neglect the importance of liquidity management. However, financing projects become a myth as the resulted liquidity can lead to both technical and legal insolvency with the consequence of low support, deposit flight, erosion of asset base.

The banking sector has a long year of history in Ethiopia, however it has been playing important role in the economic development of the country recently. Ethiopia's financial sector is largely bank-based as the secondary market is still not found in the country. The financial sector in Ethiopia and as such the process of financial intermediation in the country depends heavily on banks. Hence, keeping their optimal liquidity for banks in Ethiopia is very important to meet the demand by their present and potential customers. Studies made by Wubitu (2012) in her study tried to address factors determining of commercial banks depositors in her case study of CBE, Zewdu (2010) tried to assess the impact of reducing or restricting loan disbursement on the performance of commercial banks in Ethiopia. Worku (2006) and Semu (2010) indicated the presence of excess liquidity held by Commercial Banks in Ethiopia. However, to the knowledge of the researcher the empirical studies on the area of determinants of Development Bank's liquidity and their impact on its profitability were not done. Therefore, empirical studies are important to identify determinants of liquidity and their impact on profitability of DBE. Thus, this study aimed to contribute to the current literature by providing some evidence on the factors that contributes to the liquidity of DBE & the impact of liquidity on financial performance.

### **1.3. Research Question**

In line with the above problem statements, the following research questions need to be addressed.

RQ1: What are the significant determinants of Development Bank of Ethiopia liquidity?

RQ2: What is the impact of liquidity on the financial performance of Development Bank of Ethiopia?

## **1.4.Objective of the Study**

### **1.4.1. General Objective**

The general objective of the study is largely centered on improving liquidity management which enables DBE to determine its liquidity requirement and ensures its ability to meet up its customer demand on time while fulfilling its financial obligations, thereby maximizing its value.

### **1.4.2. Specific Objective**

The specific objective of the study is to: -

- Determine Capital adequacy has impact on the DBE's liquidity.
- Examine the credit growth impact on the DBE's liquidity.
- Assess NPL portfolio composition & its challenge on the liquidity of the Bank.
- Review the adopted liquidity measures of DBE & attempt to see how it has been achieved.
- Examine the effect of changes in liquidity levels on profitability of DBE.

## **1.5.Significance of the Study**

Development Bank of Ethiopia is a specialized Bank, one of public financial institutions having second market share of the Banking industry of Ethiopia. The study has great contribution to the existing knowledge in the area of factors determining Development Bank's liquidity and their impact and sustainability of the Bank. This in turn contributes to the wellbeing of the financial sector of the economy and the society as a whole. Therefore, the major beneficiaries from this study are each DBE, NBE, MOFED, the academic staff of the country and the society as a whole in the country.

## **1.6.Scope of the Study**

The scope of the study was limited to see the impact of capital adequacy, loan growth, and share of non-performing loans from the total volume of loans and advances, and to see the impact of bank's liquidity on financial performance through the significant factors affecting liquidity from 1990 to 2013 of DBE.

### **1.7.Limitation of the Study**

Due to the confidential policy, access to customer and bank's information except officially disclosed financial information, was not possible. The study was limited to bank officials' personal perception and officially disclosed financial data of DBE.

Moreover, DBE has a long year of service in the country in different project finance schemes to bridge market risk for the national socio economic development, following the government development strategy. Accordingly, its name and mission has been changing in accordance with the changing government policy. As a result, the availability of data from the beginning of its establishment year is far-off. Hence, recent twenty four years data of DBE is included in the study.

## **1.8. Definition of Terms**

Definition of terms comprises of conceptual and operational definitions. Conceptual definitions of terms are definitions from the theoretical perspectives which requires descriptions of cites. Whereas, operational definitions is practical definitions given by the researcher as per the context of the text. Accordingly, for this thesis, conceptual definitions of words are used and are described below:-

**Liquidity:** - is define broadly as the availability of cash or equivalent resources, is the lifeblood of every commercial and sovereign entity. (Erik Banks 2005 pp3)

**Risk:** Risk is defined as uncertainty, that is, as the deviation from an expected outcome. (Johanning (1998), p. 47. As per (Steiner and Bruns (1995), pp. 49–50, and Perridon and Steiner (1995), pp. 95–98)) We can differentiate uncertainty into:

**General uncertainty:** Complete ignorance about any potential outcome makes both rational decision making and any quantification impossible.

**Specific uncertainty:** Objective, or at least subjective, probabilities can be assigned to the potential outcomes and hence allow for quantification.

**Liquidity Risk:** as the risk of loss arising from a lack of cash or equivalents or, more specifically, the risk of loss arising from an inability to obtain funding at economically reasonable levels, or sell or pledge an asset at carrying prices, in order to cover an expected or unexpected obligation.

**Joint Asset/Funding Risk:** is the risk of loss arising when funding cannot be accessed and assets cannot be converted into cash at a reasonable cost and within a necessary time frame.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1. Theoretical review of Liquidity**

Different authors defined the concept liquidity in different ways. To begin with, (Erik Banks 2005, pp3), described the term liquidity broadly as “the availability of cash or equivalent resources, is the lifeblood of every commercial and sovereign entity”. This shows that, liquidity includes resources such as cash for a healthy functioning of a commercial firm as well as country. Accordingly, the proper handling of these resource using different measures should be employed.

On the other hand, American Academy of Actuaries (USA) Liquidity is the ability to meet expected and unexpected demands for cash. Specifically, it is a company’s ability to meet the cash demands of its policy and contract holders without suffering any (or a very minimal) loss. The liquidity profile of a company is a function of both its assets and liabilities. (AAA, 2000, p. 4)

Bank for International Settlements (Supranational) A liquid market is a market where participants can rapidly execute large volume transactions with a small impact on prices. (BIS, 2000, p. 5)

Federal Deposit Insurance Corporation (USA) Liquidity represents the ability to efficiently and economically accommodate a decrease in deposits and other liabilities, as well as fund increases in assets. A bank has liquidity potential when it has the ability to obtain sufficient funds in a timely manner, at a reasonable cost. (FDIC, 1998, p. 1)

HM Treasury (UK) Liquidity is the ease with which one financial claim can be exchanged for another as a result of the willingness of third parties to transact in the assets. (HM Treasury, 1999)

Office of the Superintendent of Financial Institutions (Canada) Liquidity is the ability of an institution to generate or obtain sufficient cash or its equivalents in a timely manner at a reasonable price to meet its commitments as they fall due. (OSFI, 1995, p. 2)



### **2.1.1. Bank's Liquidity**

According to the theory of financial intermediation, an important role of banks in the economy is to provide liquidity by funding long term, illiquid assets with short term, liquid liabilities. Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy.

Diamond and Dybvig (1983) emphasize the “preference for liquidity” under uncertainty of economic agents to justify the existence of banks: banks exist because they provide better liquidity insurance than financial markets. However, as banks are liquidity insurers, they face transformation risk and are exposed to the risk of run on deposits. More generally, the higher is liquidity creation to the external public, the higher is the risk for banks to face losses from having to dispose of illiquid assets to meet the liquidity demands of customers. A natural justification for the existence of deposit-taking institutions, thereby giving also an explanation for the economically important role of banks in providing liquidity, was initially modeled by (Bryant 1980 and Diamond and Dybvig 1983). They showed that by investing in illiquid loans and financing them with demandable deposits, banks can be described as pools of liquidity in order to provide households with insurance against idiosyncratic consumption shocks. However, this structure is also the source of a potential fragility of banks since in case of an unexpected high number of depositors deciding to withdraw their funds for other reasons than liquidity needs, a bank run will result. Both papers stand in the tradition of prior research on the liquidity of assets, for example by (Tobin 1965 or Niehans 1978) as well as on bank runs, by (Friedman and Schwartz 1963).

The Bryant-Diamond/Dybvig models have been subject to a large number of follow-up papers, extending or testing the models. Of particular relevance for this study are the papers by Calomiris and Kahn (1991), Qi (1998) and Diamond and Rajan (2001), which develop and emphasize the point that demandable debt has interesting incentive implications for disciplining the bank management. The argument goes like this: on their asset side banks have illiquid loans whose market prices would be below their internal/book values in case of a fire sale. Having to sell or to call loans prematurely would involve a loss. The greater part of the activities which banks undertake – and need to undertake – to monitor their loans, which includes their active involvement in the governance of borrowing

corporations, are not really observable for outsiders. However, at least a certain part of a bank's liability are call or sight deposits which are by definition and by law to be paid back on demand and on a first-come first-serve basis. This rule of distribution makes depositors wary that they might be late or stand too far behind in the waiting line in the case a bank encounters problems, and it makes them even aware of what little information they may have on the monitoring activity of the bank. This situation can lead to a bank run, and the danger of a run is what induces banks to do what their depositors want them to do, namely to be active delegated monitors in the spirit of (Diamond 1984). Based on this argument Diamond and Rajan (2001), raised the question whether or not financial fragility where small shocks lead to can have large effects on assets prices is a desirable state for banks. They argue that the existence of the fragility itself gives banks the right incentives to create liquidity. According to them, any kind of regulation, such as capital standards, impair this liquidity creation and should thus be avoided.

Kashyap et al. (2002) also conducted a related analysis justifying the existence of banks liquidity creation. They argue that because banks carry out lending and deposit taking under the same roof, synergies must exist between these two tasks. These synergies can be found in the way deposits and loan commitments are secured through the holding of liquid assets as collateral against withdrawals. They regard these liquid assets as costly overheads. These overheads can be share by the two separate functions, hence the synergy. A detailed analysis of the link between liquidity shortages and systemic banking crises is given by (Diamond and Rajan, 2005). It is argued that the failure of a single bank can shrink the pool of available liquidity to the extent that other banks could be affected by it. A contagion effect is the result. However, as solvency and liquidity effects interact it is hard to determine the root of a crisis. Generally, liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long term loans. According to Joint Forum of the Basel Committee (2006), banks liquidity risk includes two types of risk: funding liquidity risk and market liquidity risk. Funding liquidity risk is the risk that the bank will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. Market liquidity risk is the risk that a bank cannot easily

offset or eliminate a position at the market price because of inadequate market depth or market disruption. There are strong interactions between funding liquidity risk and market liquidity risk, especially in periods of crisis. Drehmann and Nikolau (2009) pointed to the fact that shock to funding liquidity can lead to asset sales and may lead to decrease of asset prices. Lower market liquidity leads to higher margin which increase funding liquidity risk.

Events in the second half of 2007 and early 2008 highlight the crucial importance of liquidity to the functioning of markets and the banking sector as well as links between funding and market liquidity risk, interrelationships of funding liquidity risk and credit risks, reputation effects on liquidity, and other links among liquidity and other typical banking features. Liquidity risk is not an „isolated risk“ like credit or market risks (although credit risk often arise as a liquidity shortage when the scheduled repayments fall due), but a consequential risk, with its own intrinsic characteristics, that can be triggered or exacerbated by other financial and operating risks within the banking business (Chen et al. 2005).

### **2.1.2. Bank's Risk**

Risk, which we define as any source of uncertainty impacting business operations, comes in various forms. According to Eric Bank, (2005) any taxonomy of risk is subjective, we begin by segregating risk into financial risk, or the risk of loss arising from financial variables that impact balance sheet and off-balance sheet activities, and operating risk, or the risk of loss arising from variables that impact the physical characteristics and operations of a business. While operating risks (including exposure to non-financial inputs/ outputs, property and casualty losses, environmental liability, fiduciary liability, workers' health, safety, and compensation, and so forth) are crucial to understand and manage, we shall not consider them in further detail, except in the context of how they might lead to cash flow pressures. Instead, we focus on financial risks, decomposing them first into three broad classes: market risk, credit risk and liquidity risk.

### **2.1.3. Liquidity risk**

If liquidity is the availability of cash or equivalents, then we can define liquidity risk as the risk of loss arising from lack of cash or equivalents or, more specifically, risk of loss

arising from an inability to obtain funding at economically reasonable levels, or sell or pledge an asset at carrying prices, in order to cover an expected or unexpected obligation. Liquidity risk is, in essence, the risk of economic loss suffered in attempting to secure the cash that is so vital to continuing business operations (Eric Bank, 2005)

Liquidity risk arises from maturity mismatches where liabilities have a shorter tenor than assets. A sudden rise in the borrower's demands above the expected level can lead to shortages of cash or liquid marketable assets (Oldfield and Santamero, 1997). We can also develop more detailed definitions of liquidity risk. It is helpful, for instance, to distinguish between funding (or liability) liquidity, asset liquidity, and joint liquidity. Funding liquidity focuses on the availability of unsecured liabilities that can be drawn on to create cash, including short-term and long-term debt facilities. Funding liquidity risk is, therefore, the risk of loss stemming from an inability to access unsecured funding sources at an economically reasonable cost in order to meet obligations. Asset liquidity focuses on the availability of assets, such as marketable securities, inventories, receivables, and plant and equipment, which can be sold or pledged to generate cash. Asset liquidity risk is thus the risk of loss arising from an inability to convert assets into cash at carrying value in order to meet obligations. In certain instances asset and funding liquidity join together to produce an incremental degree of risk, which we term joint asset/funding liquidity risk – the risk of loss that occurs when funding cannot be accessed and assets cannot be converted into cash in order to meet obligations. It is important to stress those cash-sensitive off-balance sheet commitments and contingencies often supplement cash flow risks generated through balance sheet operations. Indeed, we shall note at various points in the text the crucial role off-balance sheet contracts play in liquidity risk management.

We can also consider liquidity risk in the context of internal and external forces. Some aspects of asset and funding liquidity are specific to an institution, its financial position, and its scope of operations, and are largely or entirely within its direct control. The liquidity features of the firm are not necessarily impacted by, nor do they impact, what happens in an industry or system context; this characteristic is commonly referred to as endogenous liquidity. In some cases, however, liquidity has a broader reach, affecting many institutions in a sector, or contracts in a marketplace; this exogenous liquidity is

outside the direct control of any single institution, although in certain instances the actions of individual firms can contribute to the exogenous pressures. (Eric Bank, 2005)

For additional perspectives on liquidity risk a number of regulators, industry bodies and authors have defined liquidity risk as follows:-

Canadian Institute of Actuaries (Canada) Liquidity risk is the inability to meet financial commitments as they fall due through ongoing cash flow or asset sales at fair market value. Liquidation risk is the potential loss when the sale of an asset is urgently required, which may result in the proceeds being below fair market value. The loss is the difference between the fire sale price and the fair market value. (CIA, 1996, p. 4)

Financial Services Authority (UK) Liquidity risk is the risk that a firm, though solvent, either does not have sufficient financial resources available to it to meet its obligations when they fall due, or can secure them only at excessive cost. It is a basic business risk faced to some degree by most firms, though clearly it is more significant for some than others. (FSA, 2003, p. 3)

International Association of Insurance Supervisors (Supranational) The risk emerging when the insurer fails to make investments (assets) liquid in a proper manner as its financial obligations fall due. (IAIS, 2000)

International Organization of Securities Commissioners (Supranational) The risk to [an institution's] ability to meet commitments in a timely and cost-effective manner while maintaining assets, and in the inability to pursue profitable business opportunities and continue as a viable business due to a lack of access to sufficient cost-effective resources. (IOSCO, 2002, p. 3)

Office of the Controller of the Currency (USA) Liquidity risk is the risk to a bank's earnings and capital arising from its inability to timely meet obligations when they come due without incurring unacceptable losses. (OCC, 2001, p.1)

#### **2.1.4. Liquidity Management**

Managing liquidity is a fundamental component in the safe and sound management of all financial institutions. Sound liquidity management involves prudently managing assets and liabilities (on- and off-balance sheet), both as to cash flow and concentration, to ensure that cash inflows have an appropriate relationship to approaching cash outflows. This needs to be supported by a process of liquidity planning which assesses potential future liquidity needs, taking into account changes in economic, regulatory or other operating conditions. Such planning involves identifying known, expected and potential cash outflows and weighing alternative asset/liability management strategies to ensure that adequate cash inflows will be available to the institution to meet these needs.

According to Bank of Jamaica, 1996, the particulars of liquidity management will differ among institutions depending upon the nature and complexity of their operations and risk profile, a comprehensive liquidity management program requires:

- Establishing and implementing sound and prudent liquidity and funding policies; and
- Developing and implementing effective techniques and procedures to monitor measure and control the institution's liquidity requirements and position.

#### **2.1.5. Measuring liquidity risk**

A financial institution can utilize a number of sources to meet its liquidity needs; these include new deposits, maturing assets, borrowed funds and/or using the discount window (borrowing from the central bank). Given that access to these measurement and management is an important activity in most banks. Before going to see the methods for measuring liquidity risk, sources of liquidity risk and possible ways to mitigate them should be clearly stated. Rochet (2008) states three main sources of liquidity risk: on the liability side, there is a large uncertainty on the volume of withdrawals of deposits or the renewal of rolled-over inter-bank loans, especially when the bank is under suspicion of insolvency or when there is an aggregate liquidity shortage, on the asset side, there is an uncertainty on the volume of new requests for loans that a bank will receive in the future,

and off-balance sheet operations, like credit lines and other commitments, positions taken by banks on derivative markets.

According to Aspach et al. (2005), there are some mechanisms that banks can use to insure against liquidity crises: firstly, banks hold buffer of liquid assets on the asset side of the balance sheet. A large enough buffer of assets such as cash, balances with central banks and other banks, debt securities issued by governments and similar securities or reverse repo trades reduce the probability that liquidity demands threaten the viability of the bank. Second strategy is connected with the liability side of the balance sheet. Banks can rely on the interbank market where they borrow from other banks in case of liquidity demand. However, this strategy is strongly linked with market liquidity risk. The last strategy concerns the liability side of the balance sheet, as well. The central bank typically acts as a Lender of Last Resort/LOLR to provide emergency liquidity assistance to particular illiquid institutions and to provide aggregate liquidity in case of a system-wide shortage.

Liquidity risk of banks can be measured by liquidity gap/flow approach or liquidity ratio/stock approach. The liquidity gap is the difference between assets and liabilities at both present and future dates. At any date, a positive gap between assets and liabilities is equivalent to a deficit that has to be filled (Bessis 2009). Liquidity ratios are various balance sheet ratios which should identify main liquidity trends. These ratios reflect the fact that bank should be sure that appropriate, low-cost funding is available in a short time. This might involve holding a portfolio of assets than can be easily sold (cash reserves, minimum required reserves or government securities), holding significant volumes of stable liabilities (especially deposits from retail depositors) or maintaining credit lines with other financial institutions. Various authors like Moore (2010), Rychtárik (2009), or Praet and Herzberg (2008) provide various liquidity ratios such as liquid assets to total assets, liquid assets to deposits and short term financing, loans to total assets and loans to deposits and short term borrowings. To sum up, the stock approach employs various balance sheet ratios to identify liquidity trends.

The flow approach, in contrast, treats liquid reserves as a reservoir: the bank assesses its liquidity risk by comparing the variability in inflows and outflows to determine the amount

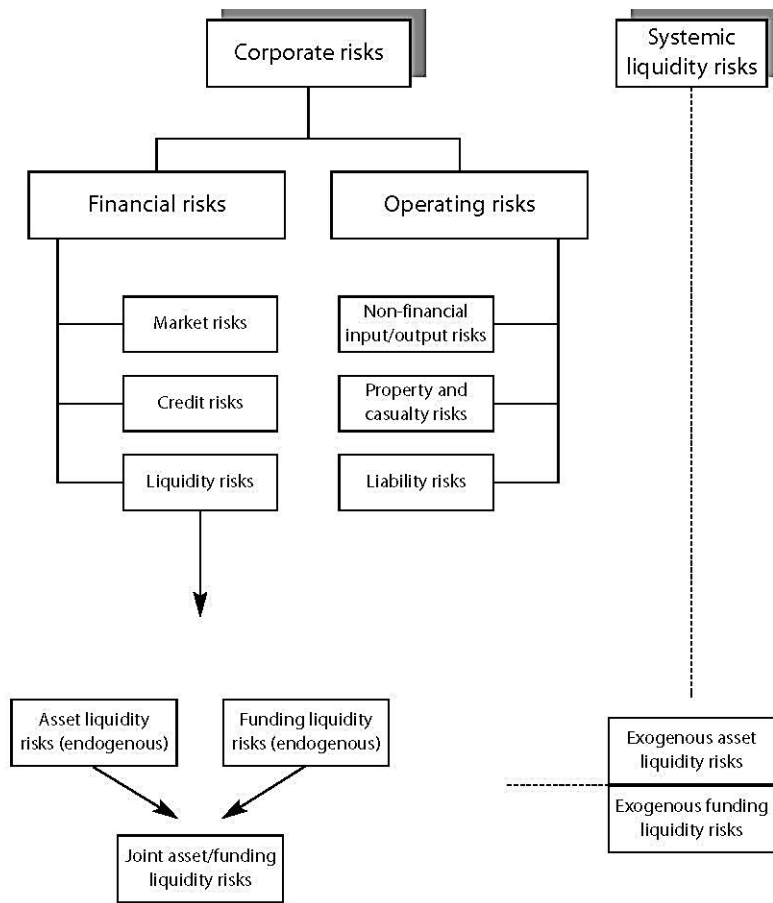
of reserves that are needed during a period. Although both approaches are intuitively appealing, the flow approach is more data intensive and there is no standard technique to forecast inflows and outflows. As a result, the stock approaches are more popular in practice and in the academic literature (see Crosse and Hempel 1980; Yeager and Seitz 1989; Hempel et al. 1994; Vodova 2011). As per Crosse and Hempel (1980), the two most popular stock ratios are the loan-to-deposit ratio and the liquid asset to total assets ratio, where the higher the loan-to-deposit ratio (or the lower the liquid asset to total assets ratio) the less able a bank to meet any additional loan demands. Both indicators have their shortcomings: the loan-to deposit ratio does not show the other assets available for conversion into cash to meet demands for withdrawals or loans, while the liquid assets ratio ignores the flow of funds from repayments, increases in liabilities and the demand for bank funds. Fortunately, the ratios tend to move together (Crosse and Hempel 1980).

Even though leverage is well-defined in simple stylized models, it is an ill-defined measure in practice. Given derivatives and off-balance sheet vehicles, the standard leverage measure (on-balance sheet debt/equity) is at best noisy, and more likely useless, as a measure of the fragility of the financial sector.

Liquidity refers to many related concepts. Following the banking literature, liquidity mismatch in banks emerges when the market liquidity of assets is less than the funding liquidity on the liability side of banks' balance sheets. However, insurance of demandable deposits since 1934 make the textbook Diamond-Dybvig bank runs unlikely. On the other hand, it is widely understood that run phenomena have been important in the repo market and the shadow banking sector in the 2007-2009 crisis (see Gorton and Metrick (2010)). As another example, when a major financial institution – AIG is a good example here – is downgraded, its derivative counterparties will require that the institution post a large amount of collateral. This is a liquidity drain for the institution that is conceptually similar to the run by a number of short-term lenders.

Overall, traditional measures that arise from stylized theoretical models are ill-equipped to reflect true fundamental and liquidity risk in today's financial world. Therefore, for the purpose of this research the above two ratios of the stock approach were used.





**Figure 2.1** A general taxonomy of risks (Erik Banks, 2005, pp 9)

## **2.2.Determinants of Corporate Liquidity Risk**

### **2.2.1. Macroeconomic factors**

#### **2.2.1.1. GDP Growth**

Where the country's macro economy is in periods of economic expansion, which are characterized by high degree of confidence of the economic units about their profitability, there is a rise in the level of investment. During this expansion, economic units decrease their liquidity preference, preferring more risky capital assets with higher return. In this environment, economic units are more likely to hold less liquid capital assets and to incur short-term debt with higher interest rates (Painceira 2010). Aspachs et al. (2005) indicated that banks hoard liquidity during periods of economic downturn, when lending opportunities may not be as good and they run down liquidity buffers during economic expansions when lending opportunities may have picked up. Thus, it can be expected that higher economic growth make banks run down their liquidity buffer and induce banks to lend more.

#### **2.2.1.2. Interest rate**

Interest rate is the price that has to be paid by a borrower of money to a lender of money in return for the use of the funds. Short term/money market interest rate is the rate paid on money market instruments. Money market instruments are securities that when issued have a year or less to maturity, which includes Treasury bills, commercial papers, bankers' acceptances, certificates of deposit, repurchase agreements and Eurocurrency deposits. Treasury bills are the most important since they provide the basis for all other domestic short term interest rates. The money market is important because many of these instruments are held by banks as part of their eligible reserves, that is, they may be used (are eligible) as collateral if bank wishes to raise funds from central bank because they are short maturing and have less default risk. Therefore, the higher short term interest rate prompts banks to invest more in the short term instruments and enhance their liquidity position (Pilbeam 2005). According to the NBE investments in the Treasury bill are considered as liquid assets to the banks.

### **2.2.1.3. Inflation**

A growing theoretical literature describes mechanisms whereby even predictable increases in the rate of inflation interfere with the ability of the financial sector to allocate resources effectively. More specifically, recent theories emphasize the importance of informational asymmetries in credit markets and demonstrate how increases in the rate of inflation adversely affect credit market frictions with negative repercussions for financial sector (both banks and equity market) performance and therefore long-run real activity (Huybens and Smith 1998, 1999). The common feature of these theories is that there is an informational friction whose severity is endogenous. Given this feature, an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. In turn, the amount of liquid or short term assets held by economic agents including banks will rise with the rise in inflation. Hence, there is positive relationship between increase in inflation rate and banks liquidity.

## **2.2.2. Bank factors**

### **2.2.2.1. Capital adequacy**

Patheja (1994) has defined banks capital as common stock plus surplus plus undivided profits plus reserves for contingencies and other capital reserves. In addition since a bank's loan-loss reserves also serves as a buffer for absorbing losses, a broader definition of bank capital include this account. Opposing to the standard view of liquidity creation in which banks create liquidity by transforming liquid liabilities into illiquid assets, the recent theories indicate the creation of liquidity by changing asset mixes. Diamond and Rajan (2000, 2001) and Gorton and Winton (2000) showed that banks can create more or less liquidity by simply changing their funding mix on the liability side. Thakor (1996) shows that capital may also affect banks' asset portfolio composition, thereby affecting liquidity creation through a change in the asset mix.

Liquidity creation increases the bank's exposure to risk as its losses increase with the level of illiquid assets to satisfy the liquidity demands of customers (Allen and Gale 2004). The more liquidity that is created, the greater is the likelihood and severity of losses associated with having to dispose of illiquid assets to meet the liquidity demands of customers. Bank capital allows the bank to absorb greater risk (Repullo 2004). Thus, under the second view, the higher is the bank's capital ratio, the higher is its liquidity creation.

#### **2.2.2.2. Loan growth & liquidity**

Comptroller's Handbook (1998), states that lending is the principal business activity for most commercial banks. The loan portfolio is typically the largest asset and the predominate source of revenue. As such, it is one of the greatest sources of risk to a bank's safety and soundness. Since loans are illiquid assets, increase in the amount of loans means increase in illiquid assets in the asset portfolio of a bank. According to Pilbeam (2005, p. 42), in practice the amount of liquidity held by banks is heavily influenced by loan demand that is the base for loan growth. If demand for loans is weak, then the bank tends to hold more liquid assets (i.e. short term assets), whereas if demand for loans is high they tend to hold less liquid assets since long term loans are generally more profitable. Therefore, a growth in loans and advances has negative impact on banks liquidity.

#### **2.2.2.3. Non-performing loans and liquidity**

Non-performing loans are loans that are outstanding in both principal and interest for a long time contrary to the terms and conditions contained in the loan contract. It follows that any loan facility that is not up to date in terms of payment of both principal and interest contrary to the terms of the loan agreement, is non-performing. Therefore, the amount of non-performing loan measures the quality of bank assets. Non-performing loans can lead to efficiency problem for banking sector. It is found by a number of economists that failing banks tend to be located far from the most-efficient frontier because banks do not optimize their portfolio decisions by lending less than demanded (Barr et al. 1994). According to Bloem and Gorter (2001), though issues relating to non-performing loans may affect all sectors, the most serious impact is on financial institutions such as commercial banks and mortgage financing institutions which tend to have large loan portfolios. Besides, the large

bad loans portfolios will affect the ability of banks to provide credit. Huge non-performing loans could result in loss of confidence on the part of depositors and foreign investors who may start a run on banks, leading to liquidity problems. Therefore, the amount of non-performing loans has a negative impact on banks liquidity.

### **2.2.3. Bank liquidity impact on financial performance**

Profitability accounts for the impact of better financial soundness on bank risk bearing capacity and on their ability to perform liquidity transformation (Rauch et al. 2008 and Shen et al. 2010). Loans are among the highest yielding assets a bank can add to its balance sheet, and they provide the largest portion of operating revenue. In this respect, the banks are faced with liquidity risk since loans are advanced from funds deposited by customers. However, the higher the volume of loans extended the higher the interest income and hence the profit potentials for banks. At this point, it is also worth noting that banks with a high volume of loans will also be faced with higher liquidity risk. Thus, banks need to strike a balance between liquidity and profitability.

## **2.3. Review of related empirical studies**

### **2.3.1. Determinants of banks liquidity-empirical studies**

Vodova (2011) aimed to identify important factors affecting commercial banks liquidity of Czech Republic. In order to meet its objective the researcher considered bank specific and macroeconomic data over the period from 2001 to 2009 and analyzed them with panel data regression analysis by using EViews 6 software package. The study considered four firm specific and eight macroeconomic independent variables which affect banks liquidity. The expected impact of the independent variables on bank liquidity were: capital adequacy, inflation rate and interest rate on interbank transaction/money market interest rate were positive and for the share of non-performing loans on total volume of loans, bank profitability, GDP growth, interest rate on loans, interest rate margin, monetary policy interest rate/repo rate, unemployment rate and dummy variable of financial crisis for the year 2009 were negative whereas, the expected sign for bank size was ambiguous (+/-). The dependent variable (i.e. liquidity of commercial banks) was measured by using four liquidity ratios such as liquid asset to total assets, liquid assets to total deposits and

borrowings, loan to total assets and loan to deposits and short term financing. The study by Vodova (2011) revealed that bank liquidity was positively related to capital adequacy, interest rates on loans, share of non-performing loans and interest rate on interbank transaction. In contrast, financial crisis, higher inflation rate and growth rate of gross domestic product have negative impact on bank liquidity. The relation between the size of the bank and its liquidity was ambiguous as it was expected. The study also found that unemployment, interest margin, bank profitability and monetary policy interest rate/repo rate have no statistically significant effect on the liquidity of Czech commercial banks.

An empirical study made by Fadare (2011), on the banking sector liquidity and financial crisis in Nigeria with the aim of identifying the key determinants of banking liquidity in Nigeria, and assessing the relationship between determinants of banking liquidity and financial frictions within the economy. It was employed a linear least square model and time series data from 1980 to 2009. The study found that only liquidity ratio, monetary policy rate and lagged loan-to-deposit ratio were significant for predicting banking sector liquidity. Secondly, it showed that a decrease in monetary policy rate, liquidity ratios, volatility of output in relation to trend output, and the demand for cash, leads to an increase in current loan-to-deposit ratios; while a decrease in currency in circulation in proportion to banking sector deposits; and lagged loan-to-deposit ratios leads to a decline in current loan-to-deposit ratios. Generally, the result suggested that during periods of economic or financial crises, deposit money banks were significantly illiquid relative to benchmarks, and getting liquidity monetary policies right during these periods is crucial in ensuring the survival of the banking sector.

Moore (2010) investigated the effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries. The study had three main goals: discussing the behavior of commercial bank liquidity during crises in Latin America and the Caribbean; identifying the key determinants of liquidity, and; to provide an assessment of whether commercial bank liquidity during crises is higher or lower than what is consistent with economic fundamentals. Liquidity which was measured by loan-to-deposit ratio should depend on: cash requirements of customers, captured by fluctuations in the cash-to-deposit ratio expected to have negative impact, the macroeconomic situation,

where a cyclical downturn should lower banks' expected transactions demand for money and therefore lead to decreased liquidity expected to have positive impact on liquidity, and money market/short term interest rate as a measure of opportunity costs of holding liquidity expected to have negative effect on liquidity. The regression model was estimated using ordinary least squares. The result of the study showed that the volatility of cash-to-deposit ratio and money market interest rate have negative and significant effect on liquidity. Whereas, liquidity tends to be inversely related to the business cycle in half of the countries studied, suggesting that commercial banks tend to error on the side of caution by holding relatively more excess reserves during downturns. Generally, the results showed that on average, bank liquidity is about 8% less than what is consistent with economic fundamentals.

Liquidity created by Germany's state-owned savings banks and its determinants has been analyzed by (Rauch et al. 2009). The study had twofold goals: first, it attempted to measure the liquidity creation of all 457 state owned savings banks in Germany over the period 1997 to 2006. In a second step, it analyzed the influence of monetary policy on bank liquidity creation. The study measure the created liquidity using the calculation method set forth by (Berger and Bouwman 2007 and Deep and Schaefer 2004). To measure the monetary policy influence, the study developed a dynamic panel regression model. According to this study, following factors can determine bank liquidity: monetary policy interest rate, where tightening monetary policy expected to reduces bank liquidity, level of unemployment, which is connected with demand for loans having negative impact on liquidity, savings quota affect banks liquidity positively, level of liquidity in previous period has positive impact, size of the bank measured by total number of bank customers have negative impact, and bank profitability expected to reduce banks liquidity. To perform the tests of measuring liquidity and analyzing influential factors on bank liquidity the researcher used bank balance sheet data and general macroeconomic data.

The control variable for the general macroeconomic influence shows that there is a positive relationship between the general health of the economy and the bank liquidity creation. The healthier the economy is the more liquidity is created. It was also found that banks with a higher ratio of interest to provision income create more liquidity. Other bank-related

variables, such as size or performance revealed no statistically significant influence on the creation of liquidity by the banks. Determinants of liquidity risk of banks from emerging economies for a sample of commercial banks in 36 emerging countries between 1995 and 2000 with panel data regression analysis were analyzed by (Bunda and Desquilbet 2008). The study was aimed to explore how the liquidity of commercial bank assets is affected by the exchange rate regime of the country in which they operate.

Liquidity ratio as a measure of bank's liquidity assumed to be dependent on individual behavior of banks, their market and macroeconomic environment and the exchange rate regime, i.e. on following factors: total assets as a measure of the size of the bank, the lending interest rate as a measure of lending profitability, and the realization of a financial crisis, which could be caused by poor bank liquidity expected to have negative impact on banks liquidity whereas, the ratio of equity to assets as a measure of capital adequacy, the presence of prudential regulation, which means the obligation for banks to be liquid enough, the share of public expenditures on gross domestic product as a measure of supply of relatively liquid assets, the rate of inflation, which increases the vulnerability of banks to nominal values of loans provided to customers, and the exchange rate regime, where banks in countries with extreme regimes (the independently floating exchange rate regime and hard pegs) were more liquid than in countries with intermediate regimes are expected to have positive impact on banks liquidity.

The result of the study by Bunda and Desquilbet (2008) showed there is positive and statistically significant effect of capital adequacy, lending interest rate, public expenditure to GDP, and growth on liquidity of banks under five liquidity measures. On the other hand, the presence of prudential regulation and financial crises showed negative and significant impact on bank liquidity position. It also revealed that in hard pegs and in pure floats, commercial banks are more liquid than in intermediary regimes (bank liquidity smile).

However, the effect of bank size is insignificant. Lucchetta (2007) made empirical analysis of the hypothesis that interest rates affect bank risk taking and the decision to hold liquidity across European countries. The liquidity measured by different liquidity ratios should be influenced by: behavior of the bank on the interbank market – the more liquid the



bank is the more it lends in the interbank market, interbank rate as a measure of incentives of banks to hold liquidity, monetary policy interest rate as a measure of banks ability to provide loans to customers, share of loans on total assets and share of loan loss provisions on net interest revenues, both as a measure of risk-taking behavior of the bank, where liquid banks should reduce the risk-taking behavior, and bank size measured by logarithm of total bank assets. The results of the study revealed that the risk-free interest rate negatively affects the liquidity retained by banks and the decision of a bank to be a lender in the inter-bank market. Conversely, the inter-bank interest rate has a positive effect on such decisions. Typically, it is the smaller, risk-averse banks that lend in the inter-bank markets.

Meanwhile, the risk-free interest rate is positively correlated with loans investment and bank risk-taking behavior. Bank-specific and macroeconomic determinants of liquidity of English banks were studied by (Aspachs et al. 2005). The researchers used unconsolidated balance sheet and profit and loss data, for a panel of 57 UK-resident banks, on a quarterly basis, over the period 1985Q1 to 2003Q4. They assumed that the liquidity ratio as a measure of the liquidity should be dependent on following factors: Probability of obtaining the support from LOLR, which should lower the incentive for holding liquid assets, interest margin as a measure of opportunity costs of holding liquid assets expected to have negative impact, bank profitability, which is according to finance theory negatively correlated with liquidity, loan growth, where higher loan growth signals increase in illiquid assets, size of the bank expected to have positive or negative impact, gross domestic product growth as an indicator of business cycle negatively correlated with bank liquidity, and short term interest rate, which should capture the monetary policy effect with expected negative impact on liquidity.

The output of the regression analysis showed that probability of getting support from LOLR, interest margin, and loan growth have negative and significant effect on banks liquidity whereas, profitability and bank size had statistically insignificant impact on liquidity. Using a measure of support expectations based on the Fitch support rating, the researchers also found strong evidence of the existence of such an effect, which may point to a rationale for regulatory liquidity requirements as a quid pro quo for LOLR support.

Entirely unique is the approach of (Fielding and Shortland 2005). The researchers estimated a time-series model of excess liquidity in the Egyptian banking sector. They considered these determinants of liquidity: level of economic output, discount rate, rate of depreciation of the black market exchange rate and violent political incidence expected to have positive impact on bank liquidity whereas, cash-to-deposit ratio and impact of economic reform expected to have negative impact on bank liquidity. The expected impact of reserve requirements was ambiguous. According to the result of the study while financial liberalization and financial stability are found to have reduced excess liquidity, these effects have been offset by an increase in the number of violent political incidents arising from conflict between radical Islamic groups and the Egyptian state.

The study made by Bordeleau and Graham (2010), presented empirical evidence regarding the relationship between liquid asset holdings and profitability for a panel of Canadian and U.S. banks over the period of 1997 to 2009. In short, results suggested that a nonlinear relationship exists, whereby profitability was improved for banks that hold some liquid assets, however, there was a point beyond which holding further liquid assets diminishes a banks' profitability, all else equal. Conceptually, this result is consistent with the idea that funding markets reward a bank, to some extent, for holding liquid assets, thereby reducing its liquidity risk. However, this benefit can eventually be outweighed by the opportunity cost of holding such comparatively low yielding liquid assets on the balance sheet. At the same time, estimation results provide some evidence that the relationship between liquid assets and profitability depends on the bank's business model and the risk of funding market difficulties. The researchers recommended that adopting a more traditional i.e., deposit and loan based business model allows a bank to optimize profits with a lower level of liquid assets.

Shen et al. (2009) empirically investigate the causes of liquidity risk and the relationship between bank liquidity risk and performance. The study aimed to employ alternative liquidity risk measures besides liquidity ratios (i.e. financial gap measures provided by (Saunders and Cornett 2006)). The study further aimed to investigate the determinants of bank performance in terms of the perspective of the bank liquidity risk (bank liquidity risk and performance model). The study used an unbalanced panel dataset of 12 advanced

economies commercial banks over the period 1994-2006. The panel data applied to instrumental variables regression, using two-stage least squares (2SLS) estimators to estimate bank liquidity risk and performance model. The researchers classified countries as bank-based or market-based system, and investigate the difference of causes of liquidity risk in different financial systems. The empirical results indicated that the bank-specific variable had the same effect on bank liquidity risk in two financial systems and liquidity risk was the endogenous determinant of bank performance.

### **2.3.2. Related empirical studies in Ethiopia**

Some related studies were conducted by different researchers in Ethiopia. The study conducted by Semu (2010) intended to assess the impact of reducing or restricting loan disbursement on the performance of commercial banks in Ethiopia. It also attempts to examine the possible factors that compel the banks to reduce or restrict lending. Quantitative method particularly survey design approach was adopted for the study. The findings of the study showed that deposit and capital have statistically significant relationship with banks' performance measured in terms of return on equity (ROE). New loan and liquidity have relationship with banks' performance measured in terms of both return on asset (ROA) and ROE. However, the relationship was found to be statistically insignificant. Deposit and capital have no statistically significant relationship with banks' performance in terms of ROA. The study suggested that when banks face lending constraints, they have to use their funds like by purchasing treasury bills and bonds. Moreover, banks must develop non-interest generating services. Excess cash maintained by banks should be used by diversifying credit options and to avoid inefficiencies.

Worku (2006) argued that liquidity has an impact on the performance of commercial banks in Ethiopia and there was an inverse relation between deposit/net loan and ROE. And the coefficient of liquid asset to total asset was positive and directly related with ROE. Worku (2006) also studied capital adequacy and found that the capital adequacy of all commercial banks in Ethiopia were above threshold, means there was sufficient capital that can cover the risk-weighted assets. Depositors who deposit their money in all banks were safe because all the studied banks fulfilled NBE requirement (Worku, 2006). Worku used

different ratios when analyzing liquidity effect on banks performance and these ratios were liquid asset/net profit, liquid asset/total assets, net loans/net deposits, interest income/net deposit and interest income/interest expense (Worku, 2006).

Ayalew (2005) used ratio analysis with the help of DEA model and the ratios were capital ratio, liquidity ratio and loan loss provision to total assets when studied the financial performance of private banks in Ethiopia. The study revealed that banks were becoming leveraged, the growth of deposits from depositors increased, efficiency was also increased from year to year. Generally, Ayalew (2005) concluded that the growth rate was positively related to efficiency scores.

Seyoum (2005) revealed that private banks performance in terms of managerial earning and operating efficiency was an average and less than that of the biggest government bank i.e. Commercial Bank of Ethiopia (CBE). Seyoum (2005) also noted that in Ethiopia the banking sector was still dominated by state owned banks especially CBE, no stiff competition and compared performance of banks using managerial earning and operating efficiency.

Berhanu (2004) studied financial performance of Ethiopian commercial banks and found the following results. The banking system in general increased their assets position, private banks increased their market share, and liquidity condition of commercial banks was reliable. Finally commercial banks were operating at profit. Berhanu (2004) used profitability ratios and liquidity ratios to evaluate financial performance of commercial banks in Ethiopia.

## **2.4. Summary**

The above theoretical as well as empirical review showed that liquidity is important to all businesses specially for banking industry since their purpose is to avail loanable fund through mobilization of idle fund from the public and other funding organizations. It also revealed that banks liquidity can be affected by different factors such as bank specific, macroeconomic and regulatory factors, while this study focused on some of the bank specific and macroeconomic factors affecting liquidity.

Studies cited above suggest that commercial banks' liquidity is determined both by bank specific factors (such as size of the bank, profitability, capital adequacy and factors describing risk position of the bank), macroeconomic factors (such as different types of interest rates and indicators of economic environment) as well as the central bank decisions. There are also very limited number of studies appears to include liquidity as an explanatory variable for bank profitability, this relationship is not the focus of those papers and the empirical results were mixed. To the knowledge of the researcher there is no empirical studies done regarding to determinants of development bank liquidity and their impact on financial performance in Ethiopia. Although the researches made by Worku (2006) and Semu (2010) focused on the impact of bank liquidity on financial performance, the method used in these study is through the significant factors affecting liquidity. Since the Development bank is specialized bank in the banking industry and has significant market share in the banking industry of Ethiopia, it is important to notify the important determinants of the bank's liquidity and its impact on financial performance by making empirical investigation to Development Bank of Ethiopia. Therefore, the study investigated some of bank specific and macroeconomic factors affecting Development bank of Ethiopia's liquidity and their impact on profitability.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODOLOGY**

In this chapter, research design, sample and sampling technique, type of data and tools, variable description, and methods of data analysis will be discussed.

#### **3.1. Research Design**

According to Leedy and Ormrod (2005) research methodology is a means to extract the meaning of data. Data and methodology are highly interdependent. Therefore, the methodology to be used for a particular research problem must always take into consideration about the nature of data that will be collected to resolve the research problem.

There are three types of research approaches namely; quantitative, qualitative and mixed methods approach (Leedy & Ormrod, 2005). Considering the research problem and objective and the philosophy of the different research approaches, quantitative research approach was found to be appropriate for this study.

#### **3.2. Sample and Sampling Technique**

Sampling is a technique for choosing representative population in the study for determining the character of the whole population (Mugo F. 2002 pp 1). As James M. (1996 pp. 85) described population is a collection of elements that conform to specific criteria and we intend to generalize the result of the research. Development Bank is the sole development finance institution in the country, which is specialized in project finance. Accordingly, the total population of the study is solely taken as the Development Bank of Ethiopia.

#### **3.3. Types of Data and Tools**

Only secondary sources of data were used for the study. From the secondary sources, audited reports, books, journals, unpublished manuscripts, thesis, and reports prepared by different organizations have been used. Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of research findings (Koul 2006). Accordingly, structured document review was used for this research to collect required information, which is relevant for addressing the

objectives of the study. Data were collected from audited financial statements (balance sheet and income statement) of development Bank of Ethiopia and various journals and publications of NBE and MoFED for the macroeconomic data from 1990 – 2013, which were of importance to identify the determinant factor that affect the liquidity of DBE. All data were collected on annual base and figures for the variables were on Jun 30 of each year under study.

### **3.4. Method of Data Collection**

This research relied mainly on the secondary data like already published financial reports, journals and publications etc. Secondary data sources are documented works of others (authors) that are related to the subject matter of study.

In view of the nature of this study, the extensive use of relevant data from previous works of other authors in the field such as materials like financial journals, national Bank of Ethiopia publications, economic and financial reviews, economic and financial indicator briefs and DBE statistical bulletin. Also, Annual Reports of DBE for various years will be of great importance.

In the meantime questionnaires will be distributed for selected senior management and executive managers for assessing how decisions are carried out for the last decades and what challenge they face.

### **3.5. Variable description**

This research work attempted to see the relationship between the dependent and independent variables through testing the presumption regarding to the relationships between liquidity of DBE's firm specific and macroeconomic factors affecting it and the impact of liquidity on profitability.

#### **3.5.1. Dependent variable**

**Liquidity of bank:** liquidity is the ability of a bank to fund increases in assets and decrease in liability without affecting their day to day operation or incurrence of unacceptable losses. Generally, there are two methods of measuring liquidity of banks which are liquidity ratios and funding gap. The first approach uses different balance sheet ratios and it

is easy to compute. Whereas, the second approach funding gap is the difference between inflows and outflows which is difficult to measure because it is more data intensive and there is no standard technique to forecast inflows and outflows. For this study it was intended to use liquidity ratios due to the availability of data to measure liquidity. The following ratio was used:-

- **Liquid assets to total assets ratio**

Liquid assets to total assets ratio should give us information about the general liquidity shock absorption capacity of a bank. As a general rule, the higher the share of liquid assets in total assets, the higher the capacity to absorb liquidity shock, given that market liquidity is the same. Nevertheless, high value of this ratio may be also interpreted as inefficiency. Since liquid assets yield lower income liquidity bears high opportunity costs for the bank. Therefore it is necessary to optimize the relation between liquidity and profitability. According to the NBE establishment proclamation (No. 591, pp. 4168) liquid assets of banks include cash on hand, deposit in other banks, and short term government securities that are acceptable by the NBE as collateral (for instance, Treasury bills). This measure of liquidity was taken as benchmark measure.

### **3.5.2. Independent variables**

#### **3.5.2.1. Capital adequacy**

Capital of banks consists of common stocks plus surplus funds plus undivided profit plus reserve for contingencies and other capital reserves. As it is discussed in the literature review part, there are two opposing theoretical views regarding to the relationship between banks liquidity and capital adequacy. These are financial fragility-crowding of deposit hypothesis and risk absorption hypothesis. The first argument suggests that there is negative relationship between capital adequacy and bank liquidity whereas, the second argument is opposing to this. This study considered the second hypothesis since it has been used by various empirical studies reviewed under this study. The proxy for capital adequacy used in this study was the ratio of equity to total assets.



### **3.5.2.2. Loan growth**

Provision of loan is one of the major functions of banks by which banks create liquidity to the external public. Generally loans are considered as illiquid assets and generate higher revenue to banks. Therefore, the increase in loan means increase in illiquid assets and decrease in short term/liquid assets. As it was made by various empirical studies as well as the above argument the study expected negative relationship between bank's loan growth and liquidity. The proxy for loan growth was annual growth rate of gross loans and advances to customers.

### **3.5.2.3. Non-performing loans**

Non-performing loans are loans that are outstanding in both principal and interest for a long time contrary to the terms and conditions contained in the loan contract. This measures the quality of banks asset. Unlike other firms banks assets are composed of large amount of loans. If this loan is considered to be uncollectable that leads to reduction in banks profitability and make large number of depositors to fear and run against the bank. Therefore, it is expected that there is negative relationship between bank's liquidity and the amount of non-performing loans. The proxy used for non-performing loans was the percentage of non-performing loans in the total amount of bank loan.

### **3.5.2.4. Gross domestic products (GDP)**

Gross domestic product indicates the overall economic wellbeing of a country. According to the theory of bank liquidity and financial fragility, when the economy is at boom or goes out of recession, economic units including banks are optimistic and increase their long term investment and decrease their holding of liquid assets while in the period of recession the opposite is true. Therefore, the study expected negative relationship between bank's liquidity and economic cycle. To proxy the economic cycle the real gross domestic products/GDP growth rate was used.

### **3.5.2.5. Inflation rate**

According to the recent theory of information asymmetry in the credit market an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since

these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. In turn, the amount of liquid or short term assets held by economic agents including bank rise with the rise in inflation. To proxy inflation the annual gross inflation rate was used.

### **3.5.2.6. Short term/money market interest rate**

As short term interest rate increases and since it has less default risk, banks tend to invest more in Treasury bill and other short term instruments and enhance their liquidity position. Treasury bill is considered as liquid asset according to the NBE. Treasury bill market is the only regular primary market where securities are transacted on a fortnightly basis. Therefore, the proxy for short term/money market interest rate in this study was the weighted average yield on all types of Treasury bills annually (28 days, 91 days and 182 days). The annual rate was used due to the form of data used in this study (i.e. annual base).

### **3.5.3. Liquidity and financial performance**

This final assumption was used to test the second research question. According to the bankruptcy cost hypothesis of Bergers (1995) we expect positive impact of liquidity on financial performance whereas, negative impact according to the argument stating the opportunity cost of holding liquid assets as high return on investment. Hence, we can expect positive or negative impact of bank liquidity on financial performance. But for this study it was expected as negative impact on financial performance. To proxy liquidity the variables explaining liquidity significantly among the above independent variables were used.

**Table 3.1 Summary of explanatory variables and their expected effect on the dependent variables**

<b>Independent variables</b>	<b>Proxies and Definition</b>	<b>Expected effect</b>
Gross Domestic Product	GDP: growth rate of real gross domestic product	Negative
Inflation	INF: annual general inflation rate	Positive
Short term interest rate	STIR: weighted average annual T-bill rate	Positive
Loan growth	LG: annual loan growth rate	Negative
Capital adequacy	CAP: the share of own capital on total assets of the bank	Positive
Non- performing loan	NPL: the percentage of non-performing loans on total volume of loans	Negative
Liquidity	LIQ: significant factors explaining bank's liquidity among the above six factors in Ethiopia	Negative

### **3.6. Research approach adopted**

Quantitative methods approach was used to meet the overall objective of the study and to answer research questions. According to Loose (1993), a quantitative (deductive) research entails the development of a conceptual and theoretical structure prior to its testing through empirical observation. Deductive or quantitative research conventionally commences by analyzing the literature to identify a single selected problem/knowledge gap leading to the isolation of the major research question(s) in which the existing knowledge may be inadequate (could be identified gaps between existing theories or evidence, contradictions to be explored, or new contexts for applying previous findings) (Sutrisna 2009). Therefore, the purpose of using quantitative approach in this study was to apply previous findings in the context of Development Bank of Ethiopia.

The goal is to measure and analyze causal relationships between variables within a value-free framework (Denzin and Lincoln 1994). In this study, this approach enabled the researcher to see the relationship between the liquidity of DBE and the major firm specific and macroeconomic factors affecting bank's liquidity in Ethiopia by establishing causal relationship. In addition, it is also intend to see the impact of bank liquidity on financial performance through those significant factors affecting banks liquidity. In turn, this enabled to test the theory in the context of Ethiopia.

### 3.7. Methods of Data Analyses

The data gathered were mostly in numerical ways, the data analysis technique is quantitative. Statistical analyses carried out using the following methods: First, descriptive statistics of the variables (both dependent and independent) were calculated over the sample period. This is in line with Malhotra (2007), which states using descriptive statistics methods helps the researcher in picturing the existing situation and allows relevant information. Then, correlation analyses between dependent and independent variables were made. Finally, ordinary least square/OLS regression approach including all of its assumptions was employed. The assumptions were tested to see the applicability of the regression models developed first to test the relationship between banks liquidity and independent variables and then to see the impact of banks liquidity on financial performance through the significant factors explaining liquidity of development bank of Ethiopia. Data collected from different sources were analyzed by using Eviews-7 software package.

#### 3.7.1. Regression model

Regression is more powerful than correlation. According to Brooks (2008), unlike correlation, in the case of regression if x has significant impact on y, thus change in y is influenced by change in x. Therefore, to see the impact of banks liquidity on financial performance, the significant factors affecting liquidity were used as the representatives for the variation in liquidity. Therefore the general models which incorporate all of the variables to test the hypotheses of the study were:-

$$LIQ_{i,t} = \alpha + \beta_1 CAPI_{i,t} + \beta_2 LG_{i,t} + \beta_3 NPL_{i,t} + \beta_4 GDP_t + \beta_5 IRM_t + \beta_6 STIR_t + \beta_7 INF_t + u_{i,t} \dots \dots \dots (D1)$$

Where,

**LIQ<sub>i,t</sub>**: is liquidity ratio of *i*th bank on year *t*

**CAPI<sub>i,t</sub>**: is capital adequacy of *i*th bank on the year *t*. the proxy was the ratio of total bank capital to total assets.

**LG<sub>i,t</sub>**: is the loan growth of *i*th bank on the year *t*. The proxy was percentage change in loan. *L* is total loans and advances to customers

**NPL<sub>i,t</sub>**: is the non-performing loan of *i*th bank on the year *t*. The proxy was the share of non-performing loan from the total loan portfolio of a bank.

**GDPT**: is the real domestic product/GDP growth of Ethiopia on the year *t*. The proxy was growth rate of real GDP.

**INF<sub>t</sub>**: is the overall inflation rate in Ethiopia on the year *t*.

**STIR<sub>t</sub>**: is the short term (monetary) interest rate on the year *t*. The proxy was the weighted average annual Ethiopian government Treasury bill rate.

**u<sub>i,t</sub>**: is a random error term

$$ROA_{i,t} = \alpha + \beta_1 NPL_{i,t} + \beta_2 GDPT + \beta_3 INF_t + \beta_4 STIR_t + u_{i,t} \quad \dots \dots \dots (2)$$

Where,

**ROA<sub>i,t</sub>**: is return on total assets of bank *i* on year *t*

**Sfal** : are significant factors affecting banks liquidity

**u<sub>i,t</sub>**: is a random error term

## Chapter four

### DATA PRESENTATION AND ANALYSIS

In this chapter the data collected were presented and important correlation and regression analysis findings were discussed. The current chapter has five sections. Under the first section (section 4.1.) the descriptive statistics of the dependent and independent variables were presented followed by correlation analysis under section 4.2. Section 4.3 presents the test for the classical linear regression model/CLRM. Then, the results of the regression analysis were presented under section 4.4. Finally, discussions for the results of the regression analysis were made under section 4.5.

#### 4.1. Descriptive statistics of the data

The descriptive statistics for the dependent and independent variables are presented below. The dependent variables are liquidity measured by liquid assets to total assets ratio(D1) and financial performance measured by ROA. The remaining are the independent variables such as: capital adequacy, loan growth, non-performing loans, real GDP growth, short term interest rate and general inflation rate. Table 4.1 below Present the descriptive statistics of the dependent and independent variables.

Table 4.1 Descriptive statistics of dependent and independent variables

	LIQUID_ASSET_TO_TOTAL_AS	ROA	GDP_GROWTH	INFLATION	WEIGHTED_AVERAGE_OF_BORR	CAPITAL_ADEQUENCY	LOAN_GROWTH	NON_PERFORMING_LOAN
Mean	0.264925	0.010846	0.064179	0.183126	0.035625	0.200894	0.093959	0.314054
Median	0.252950	0.006350	0.068400	0.169228	0.037500	0.164865	0.084900	0.314000
Maximum	0.380000	0.036900	0.136000	0.400000	0.050000	0.405642	0.278500	0.603100
Minimum	0.151000	-0.004600	-0.022000	-0.072000	0.020000	0.005642	-0.010600	0.075400
Std. Dev.	0.052573	0.010268	0.044662	0.127394	0.007689	0.115125	0.080371	0.115470
Probability	0.969431	0.228070	0.489532	0.920801	0.867782	0.573465	0.354906	0.347667
Sum	6.358200	0.260300	1.540300	4.395024	0.855000	4.821454	2.255017	7.537300
Sum Sq. Dev.	0.063571	0.002425	0.045878	0.373272	0.001360	0.304837	0.148568	0.306667
Observations	24	24	24	24	24	24	24	24

**Source:** Financial statement of DBE and own computation through Eviews-7

Liquidity measures the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. The mean value of liquid asset to

total asset D1 was 26% that was above the NBE requirement that is 25%. The standard deviations of 5% show little dispersion of liquid assets to total assets ratio from its mean for development bank of Ethiopia. The maximum and minimum values of D1 were 38% and 15% respectively. The mean value of ROA was 1.08%. The value of standard deviation (i.e. 1.03%) indicates less dispersion from the mean value of ROA in the case of DBE.

The mean value of capital adequacy was 20% which was above the international standard for capital adequacy ADFFI standard i.e. 15%. The standard deviation for CAP was 30% revealing there is high dispersion towards the mean. The mean value of the variable loan growth was 9.4% with maximum and minimum values of 28% and -1.1% respectively. The value of standard deviation (i.e. 8.04%) indicates less dispersion from the mean value of loan growth.

The other bank specific factor affecting liquidity was NPL that measures the asset/loan quality of bank. The mean value of the percentage of non-performing loans in the total amount of loans and advances to customers/NPL was 31.4% with the maximum and minimum of 60.3% and 7.5% respectively. The maximum value of 60.3% indicates the presence of high credit risk in some years of the bank operation. There was moderate dispersion of NPL from the mean value during the observed period that is shown by the standard deviation of 11.5%.

The mean value of the macroeconomic indicator of real GDP growth rate was 6.4% indicating the average real growth rate of the country's economy over the past 24 years. The maximum growth of the economy was recorded in the year 2004 (i.e. 13.6%) and the minimum was in the year 2003 (i.e. -2.1%). Since the year 2004 the country has been recording steady growth during the last two decades with little dispersion towards the average over the period under study with the standard deviation of 4.4%.

The general inflation rate (i.e. 18%) of the country on average over the past twenty four years was more than the average GDP. The maximum inflation was recorded in the year 2009 (i.e. 40%) and the minimum was in the year 2002 (i.e. -7.2%). The rate of inflation was highly dispersed over the periods under study towards its mean with standard deviation of 12.7%.

The other macroeconomic factors were related with short term interest rate (the annual weighted average interest rate on Treasury bill). On average the rate on government Treasury bill was 3.5% with maximum rate of 4.3% in the year 2003 and the minimum rate of 0.04% in the year 2006. There was also little dispersion of short term interest rate towards its mean over the periods under study with standard deviation of 1%.

## 4.2. Correlation analysis

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. The most widely used bi-variant correlation statistics is the Pearson product-movement coefficient, commonly called the Pearson correlation which was used in this study. Correlation coefficient between two variables ranges from +1 (i.e. perfect positive relationship) to -1 (i.e. perfect negative relationship). The sample size is the key element to determine whether or not the correlation coefficient is different from zero/statistically significant. Table 4.2 below shows the correlation coefficient between the dependent variables and independent variables.

Table 4.2 Correlation matrix among the dependent and independent variables

Covariance Analysis: Spearman rank-order  
 Date: 10/10/13 Time: 03:32  
 Sample: 1990 2013  
 Included observations: 24

Correlation	LIQUID_AS SET_TO_TO TAL_AS	ROA	GDP_GRO WTH	WEIGHTED _AVERAGE INFLATION_OF_BORR	LOAN_GR OWTH	NON_PERF ORMING_L OAN	CAPITAL_ ADEQUEN CY
LIQUID_ASSET_TO_TOTAL_AS	1.000000						
ROA	-0.364151	1.000000					
GDP_GROWTH	-0.562010	0.441785	1.000000				
INFLATION	0.115259	0.274893	0.171436	1.000000			
WEIGHTED_AVERAGE_OF_BORR	0.150811	0.011214	-0.220377	-0.481036	1.000000		
LOAN_GROWTH	-0.382692	0.574598	0.412878	0.389789	-0.222431	1.000000	
NON_PERFORMING_LOAN	0.219988	-0.411743	-0.321999	-0.445358	0.266756	0.573776	1.000000
CAPITAL_ADEQUENCY	0.006523	-0.089169	-0.228410	0.244873	-0.342438	0.373043	-0.153212

**Source:** Financial statement of DBE & own computation through Eviews-7



According to Brooks (2008), if it is stated that  $y$  and  $x$  are correlated, it means that  $y$  and  $x$  are being treated in a completely symmetrical way. Thus, it is not implied that changes in  $x$  cause changes in  $y$ , or indeed that changes in  $y$  cause changes in  $x$  rather, it is simply stated that there is evidence for a linear relationship between the two variables, and that movements in the two are on average related to an extent given by the correlation coefficient.

A liquid asset to total asset ratio/D1 was positively correlated with CAP with the coefficient of correlation 0.0065. But the linear relationship between CAP and D1 was statistically not different from zero. Loan growth had negative and statistically significant relationship with bank's liquidity measured by D1 with correlation coefficient of -0.383. On the other hand, among bank specific factors NPL had positive linear relationship with liquidity as per D1 and statistically significant. Among the macroeconomic factors affecting liquidity, real GDP growth rate had negative and significant correlation with liquidity of Development Bank of Ethiopia. The short term interest rate with bank's liquidity was also has a positive and significant relation with DBE liquidity. The positive relationship of inflation rate on bank's liquidity was in line with the expectation of the study. Except loan growth all variables had statistically significant linear relationship with ROA. Among the significant variables only NPL and capital adequacy has had negative linear relationship with ROA.

### 4.3. Diagnostic Test

Before regression analysis and hypothesis testing heteroskedasticity, autocorrelation and normality testing are tested to know if the assumptions of CLRM violated or not. Accordingly, the output of the tests which are displayed by EViews-7 software are presented and interpreted.

#### ➤ Homoscedasticity Test

Table 4.3 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.186934	Prob. F(5,18)	0.9638
Obs*R-squared	1.184711	Prob. Chi-Square(5)	0.9463
Scaled explained SS	0.478976	Prob. Chi-Square(5)	0.9929

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 10/10/13 Time: 16:56

Sample: 1990 2013

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003277	0.003090	1.060437	0.3030
INFLATION	-0.000288	0.003349	-0.086047	0.9324
GDP_GROWTH	0.001601	0.009375	0.170825	0.8663
LOAN_GROWTH	-0.003007	0.006017	-0.499725	0.6233
NON_PERFORMING_LOAN	-0.001643	0.004527	-0.363035	0.7208
WEIGHTED_AVERAGE_OF_BORR	-0.036303	0.050248	-0.722472	0.4793
R-squared	0.049363	Mean dependent var		0.001235
Adjusted R-squared	-0.214703	S.D. dependent var		0.001512
S.E. of regression	0.001667	Akaike info criterion		-9.743325
Sum squared resid	5.00E-05	Schwarz criterion		-9.448812
Log likelihood	122.9199	Hannan-Quinn criter.		-9.665191
F-statistic	0.186934	Durbin-Watson stat		2.206321
Prob(F-statistic)	0.963802			

It has been assumed thus far that the variance of the errors is constant. This is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic. To test this assumption the whit's test was used having the null hypothesis of heteroscedasticity. Both F-statistic and chi-square ( $\chi^2$ ) tests statistic were used. In the case of D1 and ROA both the  $F$ - and  $\chi^2$ -test statistic give the same conclusion that there is evidence for the absence of heteroscedasticity. Since the  $p$ -values in

all of the cases were above 0.05, the null hypothesis of heteroscedasticity should be rejected. The null hypothesis of heteroscedasticity should be rejected at 5% level for the F-statistics (D1) and at 10% level for the  $\chi^2$  test statistic. In the case of ROA the null hypothesis of heteroscedasticity should be rejected even at 10% level of significance in both F- and  $\chi^2$  test statistic. The third version of the test statistic, “Scaled explained SS”, which as the name suggests is based on a normalized version of the explained sum of squares from the auxiliary regression, also give the same conclusion. Generally, in all of the regression models used in this study it was proved that the variance of the error term is constant or homoscedastic and we had sufficient evidence to reject the null hypothesis of heteroscedasticity.

### ➤ **Autocorrelation Test**

The Durbin-Watson test only tests the first order autocorrelation. For further test of autocorrelation the researcher uses Breusch-Godfrey test so that the autocorrelation that are not detected by DW test will be found. Moreover, BG test tests the autocorrelation of the residual and several lagged values of it.

Ho: There is no autocorrelation

H1: There is autocorrelation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.571673	Prob. F(5,13)	0.7208
Obs*R-squared	4.325840	Prob. Chi-Square(5)	0.5035

### **Source: EViews-7 output of test for autocorrelation**

As per the DW table in the appendix (5) for observations with 5 explanatory variables at 1% level of significance, the dL and dU values are 1.358 and 1.715 respectively. The DW values for D1 observations were 1.409631. The DW value of D1 lies in the inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. With the presence of autocorrelation also coefficient estimates are consistent but they are not best linear unbiased estimator/ BLUE (Brooks 2008). In the case of ROA equation the dL and dU values are 1.381 and 1.690 respectively. Hence, the DW value of ROA equation (i.e. 1.258395) lies in the non-rejection region and indicates the absence of

autocorrelation. Generally, there is not first order autocorrelation in the regression model in D1 and ROA. Hence, we focused up on the results of D1 for the determinants of liquidity.

#### ➤ **Normality Test**

A normal distribution is not skewed and is defined to have a coefficient of kurtosis 3. Bera-Jarque formalizes this by testing the residuals for normality and testing whether the coefficient of skewness and kurtosis are zero and three respectively. Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how fat the tails of the distribution are. The Bera-Jarque probability statistics/P-value is also expected not to be significant even at 10% significant level (Brooks 2008). According to Gujarati (2004), the JB is a large sample test & our sample test was equal to the frame was large; we considered the JB test also.

As shown in the histogram in the appendix (2) kurtosis approaches to 3 (i.e. 2.459304 for D1, and 3.709824 for ROA), and the Jarque-Bera statistics was not significant even at 10% level of significance as per the P-values shown in the histogram in the appendix (i.e. 0.454258 for D1, and 0.173495 for ROA). Hence, the null hypothesis that is the error term is normally distributed should not be rejected and it seems that the error term in all of the cases follows the normal distribution.

#### ➤ **Multicollinearity Test**

This assumption is concerned with the relationship exist between explanatory variables. If an independent variable is an exact linear combination of the other independent variables, then we say the model suffers from perfect collinearity, and it cannot be estimated by OLS (Brooks 2008). Multicollinearity condition exists where there is high, but not perfect, correlation between two or more explanatory variables (Cameron and Trivedi 2009; Wooldridge 2006). According to Churchill and Iacobucci (2005), when there is multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases. As a result, many of the explanatory variables could be judged as not related to the dependent variables when in fact they are. This assumption does allow the independent variables to be correlated; they just cannot be perfectly correlated. If we did not allow for any correlation among the independent variables, then multiple regressions would not be very useful for econometric analysis.

How much correlation causes multicollinearity however, is not clearly defined. While Hair et al (2006) argue that correlation coefficient below 0.9 may not cause serious multicollinearity problem. Malhotra (2007) stated that multicollinearity problem exists when the correlation coefficient among variables is greater than 0.75. Kennedy (2008) suggests that any correlation coefficient above 0.7 could cause a serious multi collinearity problem leading to inefficient estimation and less reliable results. This indicates that there is no consistent argument on the level of correlation that causes multicollinearity. According to Gujarati (2004), the standard statistical method for testing data for multicollinearity is analyzing the explanatory variables correlation coefficients (CC); condition index (CI) and variance inflation factor (VIF). Therefore, in this study correlation matrix for five of the independent variables shown below in the table had been estimated. The results in the following correlation matrix show that the highest correlation of 0.693 which is between loan growth and NPL. Since is no correlation above 0.7, 0.75 and 0.9 according to Kennedy (2008), Malhotra (2007) and Hair et al (2006) respectively, we can conclude in this study that there is no problem of multicollinearity.

**Table 4. 2** correlation matrix of explanatory variables

Covariance Analysis: Ordinary  
Date: 10/11/13 Time: 03:24  
Sample: 1990 2013  
Included observations: 24

Correlation	GDP_GROWTH	INFLATION	LOAN_GROWTH	NON_PERFORMING_LOAN	WEIGHTED_AVERAGE_OF_BORR
GDP_GROWTH	1.000000				
INFLATION	0.199063	1.000000			
LOAN_GROWTH	0.430695	0.448955	1.000000		
NON_PERFORMING_LOAN	-0.494256	-0.511153	0.672074	1.000000	
WEIGHTED_AVERAGE_OF_BORR	-0.324400	-0.346536	-0.280736	0.278294	1.000000

**Source:** Financial statement of DBE and own computation through Eviews-7

#### 4.4. Results of the regression analysis

Under the following regression outputs the beta coefficient may be negative or positive; beta indicates that each variable's level of influence on the dependent variable. P-value indicates at what percentage or precession level of each variable is significant. R<sup>2</sup> values indicate the explanatory power of the model and in this study adjusted R<sup>2</sup> value which takes into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the models.

##### ➤ Determinants of bank liquidity-results

**Operational model:** the regression model used to find the statistically significant determinants of DBE liquidity measured by D1 was:

$$LIQ_{i,t} = \alpha + \beta_1 CAPI_{i,t} + \beta_3 LG_{i,t} + \beta_4 NPL_{i,t} + \beta_5 GDP_t + \beta_7 STIR_t + \beta_8 INF_t + u_{i,t}$$

**Table 3.4** Regression results for determinants of liquidity measured by liquid assets to total assets ratio (D1)

Dependent Variable: LIQUID\_ASSET\_TO\_TOTAL\_AS  
 Method: Least Squares  
 Date: 10/10/13 Time: 04:05  
 Sample: 1990 2013  
 Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_GROWTH	-0.497583	0.228208	-2.180397	0.0427
INFLATION	0.182098	0.081517	2.233864	0.0384
LOAN_GROWTH	-0.295290	0.146460	-2.016191	0.0590
NON_PERFORMING_LOAN	0.008743	0.110190	0.079347	0.9376
WEIGHTED_AVERAGE_OF_BORR	0.695035	1.223163	0.568228	0.5769
C	0.263751	0.075220	3.506418	0.0025
R-squared	0.533777	Mean dependent var		0.264925
Adjusted R-squared	0.404271	S.D. dependent var		0.052573
S.E. of regression	0.040578	Akaike info criterion		-3.358867
Sum squared resid	0.029638	Schwarz criterion		-3.064353
Log likelihood	46.30640	Hannan-Quinn criter.		-3.280732
F-statistic	4.121630	Durbin-Watson stat		1.769928
Prob(F-statistic)	0.011374			

**Source:** Financial statement of DBE and own computation through Eviews-7

The above table presents results of liquid assets to total assets ratio (D1) as dependent variable and bank specific and macroeconomic explanatory variables for Development Bank of Ethiopia. The explanatory power of this model is high (i.e. around 53%). The regression  $F$ -statistic takes a value 4.1216.  $F$ -statistics tests the null hypothesis that all of the slope parameters ( $\beta$ s') are jointly zero. In the above case  $p$ -value of zero attached to the test statistic shows that this null hypothesis should be rejected even at 1% level of significance. As it is shown in the above table GDP growth rate, general inflation rate and loan growth were the statistically significant factors affecting liquidity of DBE. GDP growth and Loan growth had negative significant impact on liquidity at 5% level while, inflation has positive and statistically significant impact on liquidity at 5% level. Whereas, NPL and short term interest rate were statistically insignificant. The coefficient signs of non-performing loan, was opposite to the expectation and in line with the findings of Czech's (Vodova 2011).

➤ **The impact of bank liquidity on financial performance-results**

**Operational model:** the model used to see the impact of bank liquidity up on financial performance through the significant factors explaining bank’s liquidity was:

$$ROA_{i,t} = \alpha + \beta_1 \text{GDP}_{i,t} + \beta_2 \text{INFLATION}_{i,t} + \beta_3 \text{LOAN\_GROWTH}_{i,t} + \beta_4 C + u_{i,t}$$

From the results of D1 the significant factors affecting bank liquidity in DBE were gdp growth, general inflation rate and loan growth.

**Table 4. 4** Regression result of the impact of statistically significant factors affecting bank’s liquidity on financial performance

Dependent Variable: ROA  
 Method: Least Squares  
 Date: 10/10/13 Time: 04:30  
 Sample: 1990 2013  
 Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_GROWTH	0.070966	0.039798	1.783181	0.0897
INFLATION	0.003935	0.014092	0.279233	0.7829
LOAN_GROWTH	0.070913	0.024255	2.923682	0.0084
C	-0.001386	0.003374	-0.410948	0.6855
R-squared	0.544580	Mean dependent var		0.010552
Adjusted R-squared	0.476267	S.D. dependent var		0.010630
S.E. of regression	0.007693	Akaike info criterion		-6.746008
Sum squared resid	0.001184	Schwarz criterion		-6.549665
Log likelihood	84.95209	Hannan-Quinn criter.		-6.693918
F-statistic	7.971837	Durbin-Watson stat		1.258816
Prob(F-statistic)	0.001087			

**Source:** Financial statement of DBE and own computation through Eviews-7

The explanatory power of the above model is high with the value of adjusted R<sup>2</sup> of 54.5% with no first order autocorrelation. This indicates that 48% of the variation in ROA can be explained by the variation in those factors that can explain the variation in liquidity. Among the statistically significant factors affecting the liquidity of Development Bank of Ethiopia, two of them had statistically significant impact on DBE’s financial performance. GDP growth and Loan growth had positive and statistically significant impact on financial performance at 10% and 1% level of significance. On the other hand, inflation had positive but statistically insignificant impact on financial performance.



## **4.5. Discussion**

### **4.5.1. Determinants of DBE's liquidity**

#### **4.5.1.1. Capital adequacy and liquidity**

The positive impact of capital adequacy on liquidity as of D1 is not as expected and findings of Czech commercial banks analysis (Vodova 2011) this is because capital adequacy unit root test is found to be the statistically insignificant. Thus is based on the argument of risk absorption. As Development Bank is government owned Bank the Bank's taking full of risk and most of the risk are covered by the government guarantee. However, DBE is operating with government fund majorly and soft loans obtained from multilateral development agencies like IDA, IFAD, ADB...etc. According to this argument the higher capital to total assets ratio of banks the higher the capacity of the bank to absorb risks and create higher level of liquidity to the external public through deposits and loans. In other words, higher capital ratio of banks create positive signal to the external public and attract more soft loan. In turn this enable banks to hold more liquid assets that create better potential to liquidity creation to the external financing agencies. Capital adequacy had positive but statistically insignificant impact on banks liquidity measured. Since the coefficient was statistically insignificant it is difficult to conclude that it show positive impact on banks liquidity. Hence, in conclusion for the impact of capital adequacy on banks liquidity in the case of DBE is insignificant.

#### **4.5.1.2. Inflation**

Inflation had positive impact on banks liquidity measured by D1. The positive and statistically significant impact of inflation in the case of D1 was in line with the expectation which was based on the argument that is based on the theory of information asymmetry, stating in the inflationary economy economic units including Development Bank of Ethiopia are refraining from long term investments due to the decline in the real value of their investments that exacerbate the credit market rationing and prefer to hold risk free/liquid assets. The value of the coefficient (i.e. 0.182098) indicates for a percentage rise in the general inflation rate of the country, DBE's holding of liquid assets rise/decline by

0.18% (reduce long term/ capital investments by 0.18%). Hence, INF has positive and significant impact on banks liquidity.

#### **4.5.1.3. None-performing loans**

Another surprising result was the case of non-performing loan. Although it was estimated negative results of non-performing loans, the results of the analysis showed the opposite effect. This could be a sign of prudent policy of the bank: that DBE offset the higher credit risk with cautious liquidity risk management. This result is consistent with the results identified by (Vodova 2011). The coefficient value of the variable in D1 (i.e. 0.008743) indicate the adjustment of banks liquidity position with the rise/decline in NPL/credit risk. For a 1% increase (decrease) in NPL in the total loan portfolio of banks, the banks increase (decrease) their liquid asset holding in the total assets portfolio by 0.8%. Generally, NPL has positive and significant impact on liquidity.

#### **4.5.1.4. Short term interest rate**

Short term interest rate had positive and statistically insignificant impact on banks liquidity measured by D1. The coefficient sign of short term interest rate in D1 was in line with expectation. Its insignificance in the case of D1 may be due to the decline in the dominance of DBE participation in the Treasury Bills market due to the entrance of non-bank participants. This is consistent with the NBE report (2010), stating that the dominance of banks especially in the Treasury bills market continued to diminish owing to enhanced participation of non-bank institutions. At the end of 2009/10 the non-bank institutions held 62% of the total outstanding T-bills'. Therefore, STIR has positive and significant impact on liquidity.

#### **4.5.1.5. Loan growth**

The coefficient signs of loan growth in D1 show negative impact of loan growth on banks liquidity position. The negative impact of loan growth on banks liquidity was in line with the expectation which is based on the argument of taking loans as illiquid assets of banks. According to this argument when the amount of loans provided by banks increase, the amount of illiquid assets in the total assets portfolio of banks increase and lead to the reduction in the level of liquid assets held by banks. The coefficient value of the variable in

D1 (i.e. 0.295290) indicate the adjustment of banks liquidity position with the rise/decline in loan growth. For a 1% increase (decrease) in loan of DBE, the bank increase (decrease) their liquid asset holding in the total assets portfolio by 0.30%. Thus, loan growth has negative and significant impact on liquidity of DBE.

#### **4.5.1.6. Real GDP growth rate**

The coefficient sign for real GDP growth rate was negative in line with the expectation. DEB's mission to support the development of the country is verified here that DBE's liquidity holding is opposite in according to the country's GDP growth. Therefore, there exist negative and significant relationship between real GDP growth rate and DBE's liquidity.

### 4.5.2. Impact of bank liquidity on financial performance

GDP growth, Inflation, and Loan growth have statistically significant impact on the financial performance of DBE. While loan growth and GDP growth have positive impact, inflation has negative impact on the financial performance.

The coefficient signs of GDP growth and loan growth rate were negative in the liquidity equation whereas, positive in the ROA equation. These results indicate the negative relationship between liquidity of the Bank's and its financial performance. In other words, when GDP growth and loan growth increase bank's holding of liquid assets decrease (as more money will be ejected to the economy) and increase the profitability of Development Bank of Ethiopia. The coefficient values indicate for a percentage rise/decline in GDP and loan growth, banks holding of liquid assets rise/decline by 0.5% and 0.3% respectively whereas, profitability of banks decline/rise by 0.07% and 0.07% respectively. The other statistically significant factor affecting banks liquidity (inflation) had statistically insignificant impact on financial performance. But its coefficient sign was similar to the case in liquidity of Development Bank of Ethiopia shown in the summery regression results table 4.7. In other words, general inflation rate had positive and statistically significant impact on liquidity and had positive impact on financial performance though its statistically insignificant.

Therefore, from the above results it can be concluded that the impact of bank liquidity on financial performance was non-linear (i.e. positive and negative). This result indicate that there is some level of liquidity up to which liquidity enhances financial performance and beyond that point it hinders financial performance.

**Table 4.5** Summary of actual & expected signs of explanatory variables on the dependent variables

<b>Independent variables</b>	<b>Expected effect</b>	<b>Actual impact</b>	
Gross Domestic Product	Negative and significant	Negative	Significant
Inflation	Positive and significant	Positive	Significant
Short term interest rate	Positive and significant	Positive	Significant
Loan growth	Negative and significant	Negative	Significant
Capital adequacy	Positive and significant	Positive	Insignificant
Non- performing loan	Negative and significant	Positive	Significant

## **CHAPTER FIVE**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.1. Conclusion**

Development Bank of Ethiopia's mission is to mobilize financial resource and support the socio economic development of the country through project finance. Thus, DBE has to meet its financial obligation and be able to further mobilize development fund to sustain its Banking service. Liquidity creation is the primary reason why Banks exist as it is stated in the literature part. The aim of this paper was on twofold: first to identify determinants of liquidity of Development Bank of Ethiopia and secondly to see the impact of banks liquidity on financial performance through the factors explaining liquidity. Six variables affecting banks liquidity were chosen and analyzed. The panel data of 24 years was used for case of development Bank of Ethiopia from 1990 to 2013. Data was presented by using descriptive statistics. The balanced correlation and regression analysis for liquidity ratio and financial performance was conducted. Before performing OLS regression the models were tested for the classical linear regression model assumptions. Accordingly, five factors affecting banks liquidity were chosen and analyzed. From the list of possible explanatory variables, most of them proved to be statistically significant. With the only exception of capital adequacy of the bank, relations of all factors and the bank's liquidity were consistent in the model D1. The results of model enabled the researcher to make following conclusions.

- Both NPL and inflation had positive and significant impact on DBE's liquidity as per D1.
- Short term interest rate on banks liquidity was statistically significant and had positive impact on liquidity measured by short term financing ratio.
- Loan growth rate and real GDP growth rate had statistically significant effect on the liquidity of DBE both in the case of D1 and ROE.

It could be useful to use another proxy to measure capital adequacy than capital to asset ratio used in this study. Generally, the researcher have failed to reject four hypotheses that indicate the relationship between bank liquidity, general inflation rate, GDP growth rate, Average weighed short term interest rate, NPL ratio and loan growth whereas, we rejected

the expectation of capital adequacy in relation to liquidity. Short term interest rate and NPL ratio had insignificant impact on bank liquidity of development Bank of Ethiopia. Three of the statistically significant variables affecting banks liquidity affect banks performance. These are GDP growth, general inflation and loan growth. GDP growth rate and Loan growth had positive and significant impact on financial performance just like on liquidity of banks. Whereas, general inflation has insignificant impact on financial performance of banks opposing to the result in the case of banks liquidity. Therefore, it can be concluded that the impact of banks liquidity on financial performance was non-linear (positive and negative).

## **5.2. Recommendation**

Based on the findings of the research the following recommendations were given:

- Since adjusting their liquidity position for managing credit risk has negative impact on financial performance, DBE have to adopt other ways of managing credit risk. For instance; minimizing adverse selection during the time of credit approval, undertaking rigorous project feasibility study and strict follow up of borrowers to minimize the problem of moral hazards after the provision of credit.
- DBE's liquidity is highly mingled with macroeconomic effects thus further research on the area of factors affecting bank's liquidity performance in other aspect by incorporating regulatory factors and other bank specific and macroeconomic factors.
- The Bank has to undertake prudent liquidity management policy in relation to the credit service and have to establish macroeconomic analysis section in the research department or the fund management process.
- There has to be also empirical research to reveal whether or not there is credit crunch and credit rationing in the economy. And if there is really credit crunch in the economy what are the causes? If the presence of credit crunch known by depositors, it can cause run on banks by their depositors. Hence, focus has to be given for this issue.

- In addition to this the impact of banks liquidity on financial performance of banks has to be seen by grouping banks as highly liquid, liquid and less liquid.
- DBE has to diversify its source of fund and strengthen its liquidity position as the project finance is increasing more risk taking ventures are to be entertained which the current government finance is limited to entertain. Thus raising its capital structure is paramount. DBE is solely dependent on finance from the government that is why the capital is not responding to the liquidity demand. Thus the bank has to raise its fund by itself through its reputation and balance sheet structure.
- As the Bank is getting in to saving bond mobilization and management gaining further insight into the liquidity made available is crucial. Liquidity is not only of importance for banks but also for the health and functioning of the real economy. The management of DBE have not been engaged in deposit mobilization for long period. However, currently the saving bond scheme has triggered the necessity of managing liquidity cautiously.

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# APPENDICES

## APPENDICES-1

### Pairwise Granger Causality Tests

Date: 10/16/13 Time: 11:03

Sample: 1990 2013

Lags: 5

Null Hypothesis:		F-Statistic	Prob.
GDP_GROWTH does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		0.87785	0.5364
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause GDP_GROWTH	0.79956	0.5797	
INFLATION does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		1.18050	0.3966
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause INFLATION	11.4006	0.0018	
LOAN_GROWTH does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		0.85296	0.5499
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause LOAN_GROWTH	1.22386	0.3799	
NON_PERFORMING_LOAN does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		0.50962	0.7626
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause NON_PERFORMING_LOAN	6.79273	0.0093	
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause LIQUID_ASSET_TO_TOTAL_AS		6.11059	0.0128
LIQUID_ASSET_TO_TOTAL_AS does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	3.65020	0.0513	
INFLATION does not Granger Cause GDP_GROWTH		5.46206	0.0176
GDP_GROWTH does not Granger Cause INFLATION	1.40577	0.3178	
LOAN_GROWTH does not Granger Cause GDP_GROWTH		0.47070	0.7888
GDP_GROWTH does not Granger Cause LOAN_GROWTH	0.91368	0.5176	
NON_PERFORMING_LOAN does not Granger Cause GDP_GROWTH		2.22818	0.1501
GDP_GROWTH does not Granger Cause NON_PERFORMING_LOAN	1.58912	0.2666	
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause GDP_GROWTH		1.91869	0.1968
GDP_GROWTH does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	0.52068	0.7552	

LOAN_GROWTH does not Granger Cause INFLATION		4.39698	0.0319
INFLATION does not Granger Cause LOAN_GROWTH	0.21845	0.9447	
NON_PERFORMING_LOAN does not Granger Cause INFLATION		1.92722	0.1953
INFLATION does not Granger Cause NON_PERFORMING_LOAN	3.58284	0.0536	
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause INFLATION		11.1705	0.0019
INFLATION does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	1.33289	0.3412	
NON_PERFORMING_LOAN does not Granger Cause LOAN_GROWTH		2.17349	0.1573
LOAN_GROWTH does not Granger Cause NON_PERFORMING_LOAN	0.70169	0.6379	
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause LOAN_GROWTH		0.22334	0.9423
LOAN_GROWTH does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	0.23581	0.9359	
WEIGHTED_AVERAGE_OF_BORR does not Granger Cause NON_PERFORMING_LOAN		1.60328	0.2631
NON_PERFORMING_LOAN does not Granger Cause WEIGHTED_AVERAGE_OF_BORR	0.43861	0.8104	

**Durbin-Watson Statistic: 1 Per Cent Significance Points of dL and dU**

\*k' is the number of regressors excluding the intercept

N	k'=1		k'=2		k'=3		k'=4		k'=5		k'=6		k'=7		k'=8		k'=9		k'=10		
	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	
6	0.390	1.142																			
7	0.435	1.036	0.294	1.676																	
8	0.497	1.003	0.345	1.489	0.229	2.102															
9	0.554	0.998	0.408	1.389	0.279	1.875	0.183	2.433													
10	0.604	1.001	0.466	1.333	0.340	1.733	0.230	2.193	0.150	2.690											
11	0.653	1.010	0.519	1.297	0.396	1.640	0.286	2.030	0.193	2.453	0.124	2.892									
12	0.697	1.023	0.569	1.274	0.449	1.575	0.339	1.913	0.244	2.280	0.164	2.665	0.105	3.053							
13	0.738	1.038	0.616	1.261	0.499	1.526	0.391	1.826	0.294	2.150	0.211	2.490	0.140	2.838	0.090	3.182					
14	0.776	1.054	0.660	1.254	0.547	1.490	0.441	1.757	0.343	2.049	0.257	2.354	0.183	2.667	0.122	2.981	0.078	3.287			
15	0.811	1.070	0.700	1.252	0.591	1.465	0.487	1.705	0.390	1.967	0.303	2.244	0.226	2.530	0.161	2.817	0.107	3.101	0.068	3.374	
16	0.844	1.086	0.738	1.253	0.633	1.447	0.532	1.664	0.437	1.901	0.349	2.153	0.269	2.416	0.200	2.681	0.142	2.944	0.094	3.201	
17	0.873	1.102	0.773	1.255	0.672	1.432	0.574	1.631	0.481	1.847	0.393	2.078	0.313	2.319	0.241	2.566	0.179	2.811	0.127	3.053	
18	0.902	1.118	0.805	1.259	0.708	1.422	0.614	1.604	0.522	1.803	0.435	2.015	0.355	2.238	0.282	2.467	0.216	2.697	0.160	2.925	
19	0.928	1.133	0.835	1.264	0.742	1.416	0.650	1.583	0.561	1.767	0.476	1.963	0.396	2.169	0.322	2.381	0.255	2.597	0.196	2.813	
20	0.952	1.147	0.862	1.270	0.774	1.410	0.684	1.567	0.598	1.736	0.515	1.918	0.436	2.110	0.362	2.308	0.294	2.510	0.232	2.174	
21	0.975	1.161	0.889	1.276	0.803	1.408	0.718	1.554	0.634	1.712	0.552	1.881	0.474	2.059	0.400	2.244	0.331	2.434	0.268	2.625	
22	0.997	1.174	0.915	1.284	0.832	1.407	0.748	1.543	0.666	1.691	0.587	1.849	0.510	2.015	0.437	2.188	0.368	2.367	0.304	2.548	
23	1.017	1.186	0.938	1.290	0.858	1.407	0.777	1.535	0.699	1.674	0.620	1.821	0.545	1.977	0.473	2.140	0.404	2.308	0.340	2.479	
24	1.037	1.199	0.959	1.298	0.881	1.407	0.805	1.527	0.728	1.659	0.652	1.797	0.578	1.944	0.507	2.097	0.439	2.255	0.375	2.417	
25	1.055	1.210	0.981	1.305	0.906	1.408	0.832	1.521	0.756	1.645	0.682	1.776	0.610	1.915	0.540	2.059	0.473	2.209	0.409	2.362	
26	1.072	1.222	1.000	1.311	0.928	1.410	0.855	1.517	0.782	1.635	0.711	1.759	0.640	1.889	0.572	2.026	0.505	2.168	0.441	2.313	
27	1.088	1.232	1.019	1.318	0.948	1.413	0.878	1.514	0.808	1.625	0.738	1.743	0.669	1.867	0.602	1.997	0.536	2.131	0.473	2.269	

28	1.104	1.244	1.036	1.325	0.969	1.414	0.901	1.512	0.832	1.618	0.764	1.729	0.696	1.847	0.630	1.970	0.566	2.098	0.504	2.229
29	1.119	1.254	1.053	1.332	0.988	1.418	0.921	1.511	0.855	1.611	0.788	1.718	0.723	1.830	0.658	1.947	0.595	2.068	0.533	2.193
30	1.134	1.264	1.070	1.339	1.006	1.421	0.941	1.510	0.877	1.606	0.812	1.707	0.748	1.814	0.684	1.925	0.622	2.041	0.562	2.160
31	1.147	1.274	1.085	1.345	1.022	1.425	0.960	1.509	0.897	1.601	0.834	1.698	0.772	1.800	0.710	1.906	0.649	2.017	0.589	2.131
32	1.160	1.283	1.100	1.351	1.039	1.428	0.978	1.509	0.917	1.597	0.856	1.690	0.794	1.788	0.734	1.889	0.674	1.995	0.615	2.104
33	1.171	1.291	1.114	1.358	1.055	1.432	0.995	1.510	0.935	1.594	0.876	1.683	0.816	1.776	0.757	1.874	0.698	1.975	0.641	2.080
34	1.184	1.298	1.128	1.364	1.070	1.436	1.012	1.511	0.954	1.591	0.896	1.677	0.837	1.766	0.779	1.860	0.722	1.957	0.665	2.057
35	1.195	1.307	1.141	1.370	1.085	1.439	1.028	1.512	0.971	1.589	0.914	1.671	0.857	1.757	0.800	1.847	0.744	1.940	0.689	2.037
36	1.205	1.315	1.153	1.376	1.098	1.442	1.043	1.513	0.987	1.587	0.932	1.666	0.877	1.749	0.821	1.836	0.766	1.925	0.711	2.018
37	1.217	1.322	1.164	1.383	1.112	1.446	1.058	1.514	1.004	1.585	0.950	1.662	0.895	1.742	0.841	1.825	0.787	1.911	0.733	2.001
38	1.227	1.330	1.176	1.388	1.124	1.449	1.072	1.515	1.019	1.584	0.966	1.658	0.913	1.735	0.860	1.816	0.807	1.899	0.754	1.985
39	1.237	1.337	1.187	1.392	1.137	1.452	1.085	1.517	1.033	1.583	0.982	1.655	0.930	1.729	0.878	1.807	0.826	1.887	0.774	1.970
40	1.246	1.344	1.197	1.398	1.149	1.456	1.098	1.518	1.047	1.583	0.997	1.652	0.946	1.724	0.895	1.799	0.844	1.876	0.749	1.956
45	1.288	1.376	1.245	1.424	1.201	1.474	1.156	1.528	1.111	1.583	1.065	1.643	1.019	1.704	0.974	1.768	0.927	1.834	0.881	1.902
50	1.324	1.403	1.285	1.445	1.245	1.491	1.206	1.537	1.164	1.587	1.123	1.639	1.081	1.692	1.039	1.748	0.997	1.805	0.955	1.864
55	1.356	1.428	1.320	1.466	1.284	1.505	1.246	1.548	1.209	1.592	1.172	1.638	1.134	1.685	1.095	1.734	1.057	1.785	1.018	1.837
60	1.382	1.449	1.351	1.484	1.317	1.520	1.283	1.559	1.248	1.598	1.214	1.639	1.179	1.682	1.144	1.726	1.108	1.771	1.072	1.817
65	1.407	1.467	1.377	1.500	1.346	1.534	1.314	1.568	1.283	1.604	1.251	1.642	1.218	1.680	1.186	1.720	1.153	1.761	1.120	1.802
70	1.429	1.485	1.400	1.514	1.372	1.546	1.343	1.577	1.313	1.611	1.283	1.645	1.253	1.680	1.223	1.716	1.192	1.754	1.162	1.792
75	1.448	1.501	1.422	1.529	1.395	1.557	1.368	1.586	1.340	1.617	1.313	1.649	1.284	1.682	1.256	1.714	1.227	1.748	1.199	1.783
80	1.465	1.514	1.440	1.541	1.416	1.568	1.390	1.595	1.364	1.624	1.338	1.653	1.312	1.683	1.285	1.714	1.259	1.745	1.232	1.777
85	1.481	1.529	1.458	1.553	1.434	1.577	1.411	1.603	1.386	1.630	1.362	1.657	1.337	1.685	1.312	1.714	1.287	1.743	1.262	1.773
90	1.496	1.541	1.474	1.563	1.452	1.587	1.429	1.611	1.406	1.636	1.383	1.661	1.360	1.687	1.336	1.714	1.312	1.741	1.288	1.769
95	1.510	1.552	1.489	1.573	1.468	1.596	1.446	1.618	1.425	1.641	1.403	1.666	1.381	1.690	1.358	1.715	1.336	1.741	1.313	1.767
100	1.522	1.562	1.502	1.582	1.482	1.604	1.461	1.625	1.441	1.647	1.421	1.670	1.400	1.693	1.378	1.717	1.357	1.741	1.335	1.765
150	1.611	1.637	1.598	1.651	1.584	1.665	1.571	1.679	1.557	1.693	1.543	1.708	1.530	1.722	1.515	1.737	1.501	1.752	1.486	1.767
200	1.664	1.684	1.653	1.693	1.643	1.704	1.633	1.715	1.623	1.725	1.613	1.735	1.603	1.746	1.592	1.757	1.582	1.768	1.571	1.779



## APPENDICES-3

Dependent Variable: LIQUID\_ASSET\_TO\_TOTAL\_AS

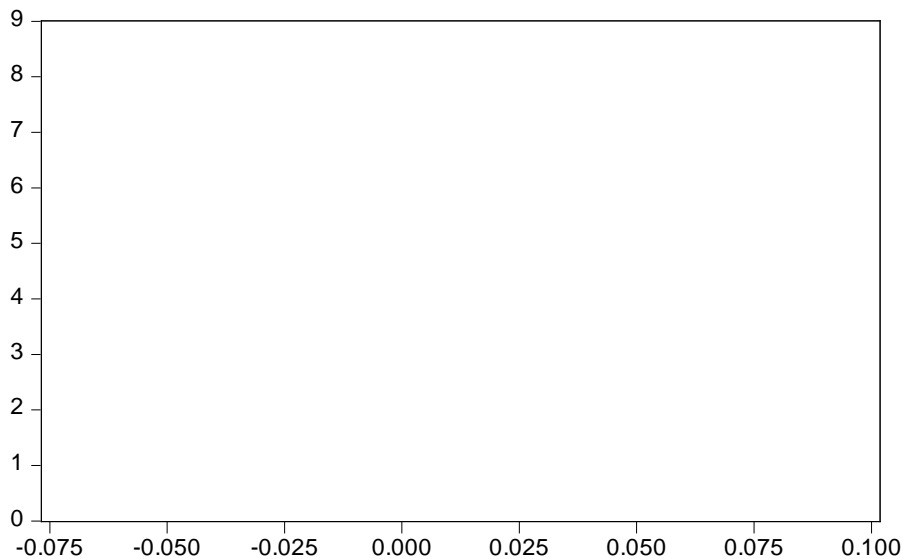
Method: Least Squares

Date: 10/11/13 Time: 04:27

Sample: 1990 2013

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION	0.182098	0.081517	2.233864	0.0384
GDP_GROWTH	-0.497583	0.228208	-2.180397	0.0427
LOAN_GROWTH	-0.295290	0.146460	-2.016191	0.0590
NON_PERFORMING_LOAN	0.008743	0.110190	0.079347	0.9376
WEIGHTED_AVERAGE_OF_BORR	0.695035	1.223163	0.568228	0.5769
C	0.263751	0.075220	3.506418	0.0025
R-squared	0.533777	Mean dependent var		0.264925
Adjusted R-squared	0.404271	S.D. dependent var		0.052573
S.E. of regression	0.040578	Akaike info criterion		-3.358867
Sum squared resid	0.029638	Schwarz criterion		-3.064353
Log likelihood	46.30640	Hannan-Quinn criter.		-3.280732
F-statistic	4.121630	Durbin-Watson stat		1.769928
Prob(F-statistic)	0.011374			

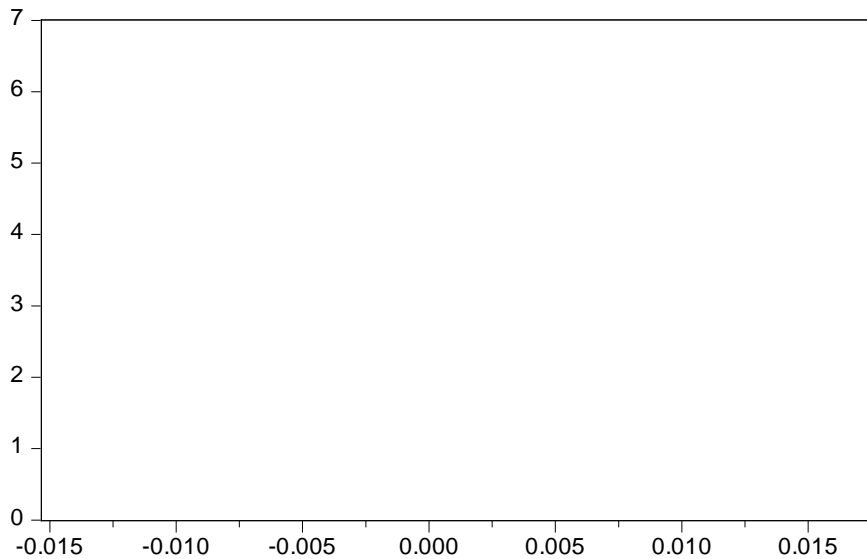


Series: Residuals	
Sample 1990 2013	
Observations 24	
Mean	1.16e-16
Median	-0.003149
Maximum	0.079570
Minimum	-0.062949
Std. Dev.	0.035897
Skewness	0.215368
Kurtosis	2.437504
Jarque-Bera	0.501935
Probability	0.778048

APPENDICES-4

Dependent Variable: ROA  
 Method: Least Squares  
 Date: 10/11/13 Time: 04:41  
 Sample: 1990 2013  
 Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_GROWTH	0.070966	0.039798	1.783181	0.0897
INFLATION	0.003935	0.014092	0.279233	0.7829
LOAN_GROWTH	0.070913	0.024255	2.923682	0.0084
C	-0.001386	0.003374	-0.410948	0.6855
R-squared	0.544580	Mean dependent var		0.010552
Adjusted R-squared	0.476267	S.D. dependent var		0.010630
S.E. of regression	0.007693	Akaike info criterion		-6.746008
Sum squared resid	0.001184	Schwarz criterion		-6.549665
Log likelihood	84.95209	Hannan-Quinn criter.		-6.693918
F-statistic	7.971837	Durbin-Watson stat		1.258816
Prob(F-statistic)	0.001087			



Series: Residuals	
Sample 1990 2013	
Observations 24	
Mean	-9.76e-19
Median	-0.000655
Maximum	0.017038
Minimum	-0.012704
Std. Dev.	0.007174
Skewness	0.419815
Kurtosis	2.811824
Jarque-Bera	0.740390
Probability	0.690600