Determinants of liquidity of Commercial Banks of Ethiopia

Alemayehu Fekadu

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Statement of Declaration

I, Alemayehu Fekadu, declare that this thesis entitled: Determinants of liquidity of Commercial Banks of Ethiopia and submitted in partial fulfillment of the requirements for the Degree of Master of Science in Accounting and Finance, is outcome of my own effort & study and that all sources of materials used for the study have been duly acknowledged. I have produced it independently with only guidance and suggestion of the thesis Advisor. The study complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Name: Alemayehu Fekadu

Signature_____

Date_____

Addis Ababa University

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Abstract

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The purpose of this research is to identify the factors significant to explain Ethiopian commercial Banks liquidity. This study has categorized the independent factors into bank specific factors and macroeconomic factors. The bank specific factors include Bank Size, Capital Adequacy, Profitability, Non-Performing Loans, and Loan Growth while the macroeconomic factors include Gross Domestic Product, General Inflation and National bank Bill. The panel data was used for the sample of eight commercial banks in Ethiopia from 2002 to 2013 year and estimated using Fixed Effect Model(FEM), data was present by using descriptive statistics and the balanced correlation and regression analysis for liquidity ratios was conducted. The findings of the study show that capital strength and profitability had statistically significant and positive relationship with banks' liquidity. On the other hand, loan growth and national bank bill had a negative and statistically significant relationship with banks' liquidity. However, the relationship for inflation, non-performing loans, bank size and gross domestic product were found to be statistically insignificant. The study suggests banks must have increase their outreach to tens of millions of people by openings up more and more branches every year through country, and have significantly improve their banking service by introducing new product and services like Agent banking, Mobile banking and Internet Banking through the application of modern technology. Moreover, banks in Ethiopia should not only be concerned about internal structures and policies, but they must consider both the government regulation and the macroeconomic environment together in developing strategies to improve the liquidity position of the banks.

Key words: Ethiopian commercial banks, determinants of liquidity, liquidity ratios, liquidity risk, panel data regression analysis.

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List of Acronyms and Abbreviations

AB: Abay Bank

AdIB: Addis International Bank

AIB: Awash International Bank

BBI: Berhan International Bank

BIB: Bunna International Bank

BIS: Bank for International Settlement

BLR: Bank Liquidity Ratio

BoA: Bank of Abyssinia

BSIZE: Bank Size

CAP: Capital adequacy

CBB: Construction and Business Bank

CBE: Commercial Bank of Ethiopia

CBO: Cooperative Bank of Oromia

CLRM: Classical Linear Regression Model

DBE : Development Bank of Ethiopia

DB: Dashen Bank

DGB: Debub Global Bank

d_L : a lower critical value

d_U : an upper critical

DW: Durbin-Watson

EB: Enat bank

EPRDF: Ethiopian People Revolutionary Democratic Front

FEM: Fixed Effect Model

GDP: Gross Domestic Product

HO: Null Hypotheses

HI: Alternative Hypothesis

INFL: Inflation

IRM: Interest rate margin

JB: Jarque-Bera

LG: Loan growth

LIB: Lion International Bank

LIQ: Liquidity

LOLR: Lender of last resort

MoFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

NBEB: National Bank Bill

NIB: Nib International Bank

NPLs: Non-performing loans

OECD: Organization for Economic Cooperation and Development

OIB: Oromia International Bank

OLS: Ordinary Least Square

POR: Profitability

REM: Random Effect Model

RQ: Research Question

ROE: Return on Equity

TOL: Tolerance

UB: United Bank

US: United States

VIF: Variance inflating factor

WB: Wegagen Bank

ZB: Zemen Bank

Chapter One: Introduction

I. Background

Banks are financial institutions that play intermediary role in the economy through channeling financial resources from surplus economic units to deficit economic units. In turn, banks facilitate the saving and capital formation in the economy. Bank for International Settlements/BIS (2008) defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Hence, liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans. Therefore, banks have to hold optimal level of liquidity that can maximize their profit and enable them to meet their obligation.

Without the existence of a sound and efficient banking system, the economy can't function well. When a bank fails, the whole of a nation's payment system is thrown in to jeopardy (Ikhide, 2000). Diamand and Rajan (2001) asserts that banking engage in reliable economic activities and have major primary concerns to address in order to ensure their survival and profitability Apart from these, one of the central role of banks is being financial intermediation that facilities credit to difficult users by chancing fund from surplus economic unity by this banks are actually collecting short term deposit and issuing loans for long terms. This will create liquidity problem to the bank.

Bank liquidity simply means the ability of the bank to maintain sufficient funds to pay for its maturing obligations. It is the bank's ability to immediately meet cash, cheques, other withdrawals obligation and legitimate new loan demand while abiding by existing reserve requirements. When a bank does not have enough liquidity to fulfill its obligation, the bank is said to face liquidity risk. The Basel Committee (2009) explained that the viability of commercial banks depends on the liquidity position of the bank. Diamond and Dybvig (1983) were the first to provide the evidence on the importance of role of the bank in the creation of liquidity. In addition, the optimal level of liquidity is strongly linked to effective banking operations if liquidity is not generated properly, which can lead to insolvency (in case of low

liquidity) and low profitability (in the case of high liquidity) and finally destroyed shareholders value and may be harmful to other banks and because of the contagion effect.

Iion and Dragos (2006) explain liquidity risk for a bank as the expression of the probability of losing the capacity of financing its transaction, or the probability that the bank cannot honor its daily obligation to its clients which includes the withdrawal of deposit, maturity of other debt, and cover additional funding requirements for the portfolio and investment. According to Crowe (2009), a bank having good assets quality, strong earnings and sufficient capital may fail if it is not maintaining adequate liquidity. As a consequence, banks fundamental needed to hold not only an optimal level of capital but also liquidity to maintain efficient and operational excellence.

Over the past years, the subject of bank liquidity creation has become more and more in focus of resource in financial intermediation. Prior to "Liquidity Phase" of financial crisis happen at 2007, a lot of banks still experienced financial distress despite having adequate capital as a consequence of poor liquidity management. The crisis highlights the importance of proper liquidity management on both financial market and banking sectors. The widely accepted view today is that banks create liquidity on both the assets and liability side of the balance sheet items. This process allows banks to hold illiquid monetary items for the non-bank public and give out liquid monetary items to both depositors and borrowers. The idea of bank liquidity is therefore an extension of the classic maturity transformation as the bank creates liquidity on both side of the balance sheet by offering access to long-term loans and contemporaneous access to short-term deposit.

Banks behavior in pooling and allocating funds determines the level of liquidity. Afterward, banking liquidity influence monetary policy. In addition, volatility in a bank's liquidity could induce systemic risk of the banking system. Therefore, it is necessary to understand the determinants of banking liquidity. By understanding the determinants of banking liquidity, as the monetary authorities, central bank determines proper monetary policy, particularly in prevailing or managing banking crisis. Due to the unexpected shock and grievous loss in financial markets, determining liquidity is vital for a better understanding of the concepts of liquidity risk in

relation with other financial risk. Then, without hesitation financial organization liquidity is utterly crucial to the economic excellence of a country. For aforementioned reason, any bank operating in Ethiopia shall statutorily require to comply with the reserve and liquidity requirement directive of the National Bank of Ethiopia (NBE) as a means of effectively managing the liquidity positions of banks. As a matter of fact, the first strategy to liquidity management in Ethiopia is compliance with these statutory reserve requirement and liquidity ratios as stipulated by the NBE directives. To this regard, strategic measures has been employed by the NBE to improve banking system liquidity & stability and a steady flow of credit to the real sector of the economy includes the continuous reduction of the statutory reserve requirement and liquidity ratio. For instance, NBE has reduced statutory reserve requirement from 15% to 10% and then to 5% and liquidity ratio requirement from 25% to 20%and then to 15% under Directives No. SBB/45/2008, SBB/46/2012 & SBB/55/2013 and Directives No. SBB/44/2008, SBB/45/2012 & SBB/57/2014, respectively.

As per NBE's last replaced liquidity requirement directives No. SBB/57/2014, "liquid assets" includes cash, deposits with the National Bank and other local and foreign banks having acceptance by the National Bank, other assets readily convertible into cash expressed and payable in Birr or foreign currency having acceptance by the National Bank, deposits held in Organization for Economic Cooperation and Development (OECD) member countries' currencies and payable by banks of OECD member countries and in such other currencies as may be approved by the National Bank as well as securities issued by OECD member countries denominated in currencies of such countries and such other assets as the National Bank may from time to time declare to be liquid assets; and "current liabilities" refers to the sum of demand (current) deposits, savings deposits and time deposits and similar liabilities with less than one month maturity.

As liquidity problems of some banks during global financial crisis showed, liquidity is very important for functioning of financial market and the banking sector (Vodova, 2013). In the context of Ethiopia, to the knowledge of the researcher, there appears to be only one work on the assessment of determinants of the banks' liquidity which was conducted by Tseganesh (2012). The study conducted by her examined determinants of liquidity of Ethiopia, by adopting a

quantitative approach, overlooked some important variables that can significantly affect Ethiopian banks' liquidity like profitability and national bank bill. There was other study Worku(2006) in considering liquidity as one factor that has an impact on the performance of commercial bank in Ethiopia. Therefore there is interesting to examine the determinants of bank liquidity how might the size of the bank liquidity buffers be influenced by bank specific factors and by macro factors? This study enable banks and regulators to keep control to the issue of liquidity which very important to the well being of their operation as well as the economy as a whole in the country. This chapter consists of seven section that include: brief overview of banking history in Ethiopia, statement of problem, the research objective, research question and hypothesis, scope of the study, significance of the study and structure of the study.

1.1 Ethiopian Banking History

The history of banking in Ethiopia dates back to the turn of the century, when, in 1905 modern banking introduces to the country. February 15, 1906 marked the beginning of banking in Ethiopia history when the first Bank of Abyssinia was inaugurated by Emperor Menelik II. According to the agreement, the bank was allowed to engage in commercial banking (Selling shares, accepting deposit and effecting payment in cheques) and to issue currency notes. The Bank, which started operation a year after its establishment agreement was signed, opened branches in Harar, Dire Dawa, Gore and Dembi- Dolo as well as an agency office in Gambela and a transit office in Djibouti and It was a private bank whose shares were sold in Addis Ababa, New York, Paris, London, and Vienna (NBE, 2010).

Under Emperor Haile Selassie, in agreement with national Bank of Egypt, decided liquidation of the bank of Abyssinia, paid compensation to its shareholders and established the Bank of Ethiopia which was fully owned by Ethiopians, with a capital of pound Sterling 750,000. The bank started operation in 1932 and retained management staff, premises and clients of the old bank. The majority shareholders of the bank of Ethiopia were the Emperor and Political elites of the time. The bank of Ethiopian provides Central and Commercial banking service to the country. With the Italian occupation (1936-1941), the operation of the Bank of Ethiopia came to a halt, but a number of Italian financial institutions were working in the country. These were

Banco Di Roma, Banco Di Napoli and Banca Nazionale del Lavora. It should also be mentioned that Barclays Bank had opened a branch and operated in Ethiopia during 1942-43. (NBE, 2010)

With the departure of the Italians and the restoration of Emperor Haile Selassie's government, 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. In 1963, the State Bank of Ethiopia split into the National Bank of Ethiopia and the Commercial Bank of Ethiopia S.C. with the purpose of segregating the functions of central banking from those of commercial banking. In the period up to 1974, several other financial institutions emerged including the state owned as well as private financial institution.

Following the 1974 Revolution, on January 1, 1975 all private banks and 13 insurance companies were nationalized and along with state owned banks, placed under the coordination, supervision and control of the National Bank of Ethiopia (NBE, 2010). In 1976, the Ethiopian Investment and Savings S.C. was merged with the Ethiopian government Saving and Mortgage Company to form the Housing and Savings Bank .The Agricultural and Industrial Development Bank continued under the same name until 1994 when it was renamed as the Development Bank of Ethiopia.

After the overthrow of the Dergue regime by the EPRDF, the Transitional Government of Ethiopia was established and the New Economic Policy for the period of transition was issued. This new economic policy replaced centrally planned economic system with a market-oriented system and ushered in the private sector. The new banking law [Proclamation no. 84/1914] was passed in January 1994. This established the minimum capital requirement for establishing a commercial bank (Br. 10 million, US$ 1.7 million at end-1994) and capital adequacy ratio (8% of risk weighted assets). As a result, currently, the country has three public-owned and sixteen private banks, which are operating throughout the country (NBE 2013/2014). The three governments owned banks are Development Bank of Ethiopia (DBE), Commercial Bank of Ethiopia (CBE) and Construction & Business Bank (CBB). The sixteen privately owned banks are Dashen Bank S.C (DB), Awash International Bank S.C (AIB), Wegagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion

International Bank S.C (LIB), Cooperative Bank of Oromia S.C (CBO), Berhan International Bank S.C (BBI), Bunna International Bank S.C (BIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Abay Bank S.C. (AB), Addis international Bank SC. (AdIB), Debub Global Bank S.C. (DGB) and Enat Bank S.C. (EB).

1.2. Statement of Problem

Said and Tumin (2011) suggested that revising the determinants of the liquidity of banks is an essential subject matter which could help in banks' appreciation of the contemporary conditions of the banking industry and the critical factors to be considered in fashioning out plans and policies towards improvement, profitability and growth. Until recently, liquidity risk was not the main focus of banking regulation. The 2007-2009 financial crises showed, however, how rapidly market condition can change exposing several liquidity risks in institution, many times un-related to capital level. Until February 2008, though the Basel Committee (1998) had set out regulatory standards for the management of both Credit and market risks in the Basel I Accord and that for operational risk in the Basel II Accord in 2004, regulatory standards for liquidity risk were seldom mentioned.

Landskroner and Paroush (2008) also indicated that there has been extensive academic and regulatory discussion on major banking risks including credit risk, market risk and operational risk while little attention has however been paid to liquidity risk that has also become one of the major risks faced by banks and other financial institution in recent years. Now, there is wide agreement that insufficient liquidity buffers were a roof cause of this crisis and on-going disruption of the world financial system, making the importance of liquidity risk analysis and supervision a key issue for the years to come. The fundamental role of banks in the maturity transformation of short-term deposit into long-term loans makes banks inherently vulnerable to liquidity risk, both of an institution-specific nature and that which affects market as a whole. 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 Dybring 1983 or Calomiros and Kahn 1991). Therefore, virtually every financial transaction or commitment has implication for a bank’s liquidity.

Globally, the adequacy of liquidity plays very crucial roles in the successful functioning of all business firms. However, the issue of liquidity though important to other business, is most paramount to banking institution and that explains why banks showcase cash and other liquid securities in their balance sheet statement annually. Unlike other conventional firms, bank assets are arranged in terms of the most liquid assets beginning with cash. With respect to finance and financial institution, liquidity may be defined as the bank's ability to meet maturing obligation without incurring unacceptable losses.

In order to avoid liquidity crisis, management of business and financial institution in particular need to have a well-defined policy and established procedures for measuring, monitoring, and managing liquidity. Episodes of failure of many conventional banks from the past and the present provide the testimony to this claim. For instance, as United States/U.S. subprime mortgage crisis reached its peak in the years 2008/9 unprecedented levels of liquidity support were required from central banks in order to sustain the financial system. Even with such extensive support, a number of banks failed, were forced into mergers or required resolution. A reduction in funding liquidity then caused significant distress. In response to the freezing up of the interbank market, the European Central Bank and U.S. Federal Reserve injected billions in overnight credit into the interbank market. Some banks needed extra liquidity supports (Longworth 2010; Bernanke 2008). It is evident that liquidity and liquidity risk is very up-to-date and important topic, therefore banks and more so their regulators are keen to keep a control on liquidity position of banks.

Liquidity in general is vulnerable and could be drained suddenly from a bank. Shortage in liquidity of a bank could spread out to other banks as by way of interbank transactions and create systemic risk. Shock in the financial market could spur spiral liquidity that deplete the liquidity in the market and create a financial crisis. Historically, banking crisis usually emerges from liquidity crisis that form banks default for the majority of their liabilities. In the financial safety net as well as Bagehot (1873) view, as lender of the last resort, central bank lends temporary liquidity with specific prerequisite to buttress banking stability. Central bank provides liquidity financing particularly to a bank which potentially will create contagion effect and systemic risk. Goodhart (1987) stated that there is no difference between illiquid bank and insolvent bank.

Essentially, banks which need liquidity from the lender of the last resort could be suspected in the process of insolvency.

Accordingly, banking industry in Ethiopia has its own unique features that distinguish them from other countries financial market. One of the feature is the regulation of the country is not allowed foreign nations or organization to fully or partially acquire share of Ethiopian banks. The Ethiopia financial sector is largely bank-based as the secondary market is still not established in the country and as such the process of financial intermediation in the country depends heavily on banks. In fact the banking sector in Ethiopia is currently acts as the link that holds the country's economy together. 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 Worku (2006) and Semu (2010) on the determinates of bank performance and profitability, indicated the presence of excess*- liquidity held by commercial banks in Ethiopia. Moreover, in the country, a rapidly growing industry is the banking sector. Only one study have gone beyond this to look at the factors determining any of the explanatory variables in a separate study lest to consider both in a single study by considering both internal and external factors. In the context of Ethiopia, to the knowledge of the researcher only one related study conducted by Tseganesh (2012) which tried to identify the impact of some bank-specific and macroeconomic variables of Ethiopian banks liquidity. The study made by Tseganesh (2012) overlooked some important variables that can significantly affect liquidity of the Ethiopian banking industry.

In light of the above facts and research gaps, the purpose of this study are to show how purchase of national bank bill affects liquidity and the impact of profitability on liquidity. To this end, this study tries to provide real information about the determinant factors affecting liquidity of commercial banks and feasible recommendation for the impact of identified variables on the levels of liquidity for series of 12 Years(2002-2013). The research is basically concentrated on the data available in financial statements of banks and other documents which had macro-economic data in relation to the selected variables kept by NBE, the banks themselves and Ministry of Finance and Economic Development (MoFED) covering the period of 2002-2013.

1.3 Research Objectives

Given the importance of commercial banks in Ethiopia, this paper would examine the factors that contribute to the bank safety and soundness in term of liquidity and the general objective of this paper is to determine the factors that affect the liquidity of commercial bank in Ethiopia.

1.4 Research Question and Hypothesis

1.4.1 Research Question

In order to achieve the objectives listed above, the following question would be the focus of the research:

- What are the determinants of banks' liquidity in Ethiopia?
- How do those factors influence the liquidity of Ethiopian banks'?

1.4.2. Research Hypothesis

These broad research questions were motivated by the following hypotheses:

1.4.2.1 Capital Adequacy

H0: Capital adequacy has positive and no significant effect on bank liquidity.

H1: Capital adequacy has positive and a significant impact on banks liquidity.

1.4.2.2 Bank Size

H0: Bank Size has negative and no significant effect on bank liquidity.

H1: Bank size has negative and a significant effect on bank liquidity.

1.4.2.3 Profitability

H0: Profitability has negative and no significant effect on bank liquidity.

H1: Profitability has negative and a significant effect on bank liquidity.

1.4.2.4 Non-Performing Loan (NPLs)

H0: NPLs has negative and no significant effect on bank liquidity.

H1: NPLs has negative and a significant effect on bank liquidity.

1.4.2.5 Loan Growth

H0: Loan Growth has negative and no significant effect on bank liquidity.

H1: Loan Growth has negative and a significant effect on bank liquidity.

1.4.2.6 Gross Domestic Product (GDP) Growth

H0: GDP growth has negative and no significant effect on bank liquidity.

H1: GDP growth has negative and a significant effect on bank liquidity.

1.4.2.7 Rate of Inflation

H0: Rate of Inflation has positive and no significant effect on bank liquidity.

H1: Rate of Inflation has positive and a significant effect on bank liquidity

1.4.2.8 National Bank Bills

H0: NBEB has negative and no significant effect on bank liquidity.

H1: NBEB has negative and a significant effect on bank liquidity.

1.5. Scope of the study

The scope of the study was restricted to the assessment of the internal and external factors affecting bank liquidity of all commercial banks registered by the NBE. As a result, it includes the two governments owned commercial banks namely, CBE and CBB and it includes the six leading private commercial banks in the country in terms of their year of establishment and market share. The reasoning behind choosing these eight banks is due to their availability of data, number of branches and geographical coverage, and working experience for the specific duration of 2002 to 2013 namely CBE, CBB, AIB, DB, BOA, WB, UB and NIB.

1.6. Significance of the study

Beside the fact that there is generally scanty literature on liquidity risk relative to other risk faced by banks such as credit risk and market risk, the story of the Ethiopian banking system with the

respect to this topical issue is found small studies. Though there have been some studies in Ethiopia on bank profitability which liquidity risk had sometimes been considered as an explanatory variable little is said about how it is determined. This study however looks at the determinates or causes of liquidity risk by hypothesizing it as an endogenous variable, which is absent in most studies.

The study would have great contribution to the existing knowledge in the area of factors determining commercial banks liquidity in the context of Ethiopia. This in turn contributes to the well being of the financial sector of the economy and the society as a whole. This study can be used as a reference for commercial banks to focus and control over the variables that bring negative effects to its liquidity, regulatory bodies, the academic staff of the country and the society as a whole in the country.

1.7. Organization of the study

This research was organized in five chapters. Chapter one provides the general introduction about the whole report. Chapter two describes the review of related literatures. Chapter three provide detail description of the methodology employed by the research. Chapter four contains data presentation, analysis and interpretation. Finally, the last chapter concludes the total work of the research and gives relevant recommendations based on the findings.

Chapter Two: Literature Review

II. Introduction

This chapter informs both the theoretical and empirical foundation upon which the ideas and opinions developed in its study were constructed and discuss the variables that influence the safety and soundness of commercial bank in terms of liquidity in Ethiopia. The chapter reviews literature containing thoughts and ideas shared by various authors and researchers, some regulator bodies and findings of past research on internal and external factors affecting liquidity of commercial bank of Ethiopia. This chapter consists of concepts of bank liquidity, theoretical literature of determinants of bank liquidity, theoretical model, conceptual framework, review of empirical studies International and Ethiopia, and discuss the knowledge gap.

2.1 The Concept of Bank Liquidity

According to business dictionary, liquidity is a measure of the extent to which a person or organization has cash to meet immediate and short-term obligation or assets that can be quickly converted to do this. Liquidity can also be measure of the ability and ease with which assets can be converted to cash. Liquid assets are those that can be converted to cash quickly if needed to meet financial obligations; examples of liquid assets generally include cash, central bank reserve and government debt. To remain viable, a financial institution must have enough liquid assets to meet its short term obligations, such as withdrawals by depositors.

The transformation of liquid liabilities (deposit) in to risky liquid (illiquid) assets in the form of loans capitalizing on their maturity mismatch expose them to liquidity risk (Diamond and Dybving, 1983: Jeinson, 2008). In order to lessen the maturity gap between assets and liabilities or the inherent illiquidity, banks can adequately manage the liquidity risk underlying their balance sheet structure by holding a buffer of liquid asset. Moore (2009:9) explained that "a bank needs to hold liquid assets to meet the cash requirements of its customers… if the institution does not have the resource to satisfy its customers' demand, then it either has to borrow on the inter-bank market or the central bank". It follows therefore that a bank unable to meet its customers' demands leaves itself exposed to a run and more importantly, a systemic lack of confidence in the banking system. The liquidity position of a given bank is determined by its holding of cash

and other readily available marketable assets, as well as by its funding structure and the amount and type of contingent liabilities that may come due over a specific horizon.

Thus, assets and liabilities are classified as liquid, semi- liquid or illiquid according to their maturity and their category. In addition, their indicators on and off-balance sheet items, as they assume that banks can create liquidity through loan commitment and similar claims to liquid funds. An asset is liquid if it can be sold quickly without significant losses. What determines the liquidity of an asset is still a dispute issue among theorists (Kyle. 1985). The conventional wisdom found in the management literature state that as assets is liquid if it is widely known to have low risk (such as government debt) and if it has a short maturity (a short maturity implies that the asset's price is less sensitive to the interest rate movement, making large capital losses unlikely) (Garber and Weisboard 1992 and Hempel et al, 1994).

There is a large volume of theoretical literature dealing with bank liquidity creation (Bryant 1980: Diamond and Dybving 1983: Holmstrom and Tirole 1998 and Kashyap et al. 2002). However, most researchers focus on measuring the amount of liquidity created in the banking sector (Deep and Schaefer, 2004 and Berger and Bouwman, 2007): yet few studies have shed light on the determinants of bank liquidity creation. Therefore, this research focuses on examining the relevant determinants on bank liquidity creation. This chapter will discuss in depth study, including reviewing and analyzing of literature and the core concepts of liquidity creation. This review of the literature establishes the framework for the study and clearly identifying the gap in the literature that help to formulate the research hypothesis for the study.

2.2 Theoretical literature of the determinants of bank liquidity

Globally, the adequacy of liquidity plays very crucial roles in the successfully functioning of all business firms. However, the issue of liquidity though important to other business, it most important to banking institution and that explain why banks showcase cash and other liquid securities in their balance sheet statement annually. Unlike other conventional firms, banks assets are arranged in terms of the most liquid assets beginning with cash. With respect to finance & financial institutions liquidity defined by different authors: the ability of financial institution to meet all legitimate demands for funds (Yeager and Seitze, 1989), the ability of a bank to fund increase in assets and meet obligation as they come due, without incurring unacceptable losses

(Bank for International Settlement, 2008), and liquidity is the amount of capital that is available for meeting short-term obligation (Kimberly Amadeo, 2013). Based on the above definition, it is understood that a bank must possess adequate funds to meet the requirements of its customer. It is important for us to appropriately measure bank liquidity because financial institution that fails to meet customers' demands face illiquidity that may result to worsened financial system stability.

According to Nwaezeaku (2006), liquidity in banking measures the availability of cash and the rate at which current assets are converted into cash to meet ordinary and extra – ordinary request. Several scholars have viewed liquidity as a measure of bank's bargaining power and strength. One of the views is that, the more effective a deposit money bank is in managing its liquidity, the stronger its ability to provide loanable funds. Adequate liquidity enables a bank to meet three risks namely: Time risk (which is the ability to compensate for non-repayment of funds. That is, if the borrower defaults their commitment at a specific time), funding risk (which signifies the ability to replace net out flows of funds, either via usual withdrawals of retail deposits or non-renewal of wholesale funds), lending risk (which denotes ability to meet occasional withdrawals of funds from cogent customers).

The two most widely used approaches to measure liquidity risk of banks are by liquidity gap/flow approach and liquidity ratio/stock approach. The liquidity gap approach adapts the variation between assets and liabilities both currently and future periods. A positive liquidity gap means for deficit, requiring for liabilities to be increased (Bessis, 2009). The liquidity gap treats liquid reserves as a reservoir: the bank computes the required liquidity by comparing inflows and outflows during a specified period. On the other hand, liquidity ratio uses various ratios to identify liquidity tendency. The various ratios label for immediate viable source of funding. This indeed entitles portfolio of assets that can be sold off without any excitement and also adequate amounts of stable liabilities. Most importantly, ready credit line with other financial institutions. Various authors like Moore (2010), Rychtárik (2009), or Praet and Herzberg (2008) have also provided similar understandings with 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 (as cited in Vodová, 2011).

Even tough, both approaches are intuitively appealing. Researches find the liquidity gap approach is more confusing as it is data intensive yet no standard method to forecast inflows and outflows. So, academic literatures prefer liquidity ratio due to a more standardized method (Crosse and Hempel 1980; Yeager and Seitz 1989; Hempel et al. 1994; Vodova 2011). Referring to Crosse and Hempel (1980), the most extensively used ratio is the loan-to-deposit ratio and liquid asset-to-total assets ratio. When these ratios are low, they indicate for high liquidity. However, the setback of loan-to-deposit ratio is it does not consider other assets available for conversion into cash, while the liquid asset-to-total asset ratio ignores the flow of funds from repayments, increases in liabilities and the demand for bank funds. Providentially, these ratios are likely to move in parallel ways (Crosse and Hempel 1980).

Hence, to meet the objective of this research the liquidity ratio/stock approach was chosen over the latter. The Researcher chooses to utilize the liquid asset-to-total ratio over loan-to-deposit ratio because the liquidity framework from NBE is favorable towards liquid asset-to-total ratio.

A. Bank specific factors

2.2.1 Capital adequacy and bank liquidity

Patheja (1994) has defined bank 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 reseves also serve 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 indicates the creation of liquidity by changing assets 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(1994) shows that capital may also affect bank's asset portfolio composition, thereby affecting liquidity creation through a change in the assets mix.

As Richard Cantor (2001) definition capital adequacy is the sufficient fund to absorb losses to protect depositors, creditors, and official institutions in the interest of maintaining banking system stability. NBE-Capital adequacy framework indicates the regulatory requirements for the banking institutions to meets its obligations if they fall due, while also maintaining the

confidence of customer, depositors, creditors and other stakeholders in their dealings with the institution. Ritab al-Khouri(2012) Indicates a bank's financial ability to pay depositors whenever they demand their money and still have enough funds to increase the bank's assets through additional lending. Based on the definition above, it is understood that the NBE's definition fits best since this research concerning Ethiopia. NBE provides the measurement of capital adequacy as:

Total Capital Ratio = Total capital/Total Risk weighted assets

A high ratio expresses low risk. It shows how much the market value of the bank's assets can drop before endangering its depositors and creditors. Basically, capital adequacy seeks to ensure that risk exposures of banking institution are backed by an adequate amount of capital to absorb losses on a continuous process. To best knowledge, authorities have put forth capital requirements to preserve liquidity among financial institutions and also promote public confidence towards financial providers. This fact is enticed by Robert Anderson (n.d.), stating minimum capital requirement is necessary to take up unexpected losses simultaneously reducing the risk of insolvency, while ensuring banking institutions have adequate capacity to operate the intermediation function, which is compulsory for the progress of the economy.

It is also found in Gorton and Winston (2000) proposing the "Crowding Out Effect" indeed meaning for preference of banks to shift investors' funds to capital accounts in purpose to meet higher capital requirements. Yet investments in capital accounts are prone to financial volatility and cyclical ups and downs. Also in facts, capital investments are not insured and cannot be withdrawn as desired. This indeed lowers liquidity creation. Similarly, Heuvel (2007) argued that higher capital requirements hinder the amount of asset a bank can hold issuing deposits. Hence, higher capital requirement regulations can be exorbitantly costly to banks. In agreement to higher capital requirements provide higher liquidity to financial institutions. Where risk absorption theory is realized for "Higher capital improves the ability of banks to create liquidity". This evidence is provided by Diamond and Dybvig (1983) and Allen and Gale (2004) stating that liquidity creation exposes banks to risk.

This activity being directly related to one of the roles played by financial intermediaries (risk transformation) (Al-Khouri, 2012). The greater liquidity needs of banks, most likely for banks to incur higher losses due to the disposal of illiquid assets at available market prices rather than the desired prices to meet the customers' obligations. This however, can be absorbed via higher capital levels. Also in fact, Bhattacharya and Thakor (1993) and Coval and Thakor (2005) emphasized the point by quoting that "bank capital absorbs risks and expands banks risk-bearing capacity". Briefly, higher capital ratios allow banks to create more liquidity. Repullo (2004) has as well stated that higher bank capital allows for more efficient absorption of risk. Consecutively, Al-Khouri (2012) has also consistent findings to above which states that bank capital increases bank liquidity through its ability to absorb risk. This concludes that recent studies also agree that a positive and significant relationship exist between bank capital and liquidity.

2.1.2. Bank size and bank liquidity

The different authors thoughts like; Boyd and Runkle (1993) the magnitude a bank, which is also associated with the concept of economies of scale, and Cornett, McNutt, Srahan, and Tehranian (2011) total assets or total net assets and also used to describe a fund's size, based the above authors definition, it is understood that the bank size defined broadly as the banks net total assets. Review results presented below discuss, the relationship between bank size and liquidity.

To best knowledge the term 'too big to fail' is applicable here, where regulators are most likely to reimburse for any insolvency encountered by large institutions. Large banks take advantage of this to indulge in high risk activities. This has caused liquidity creation to differ among banks according to their sizes. This indeed branches to both positive and negative relationship between bank size and bank liquidity. This is agreed by Deléchat, Henao, Muthoora, and Vtyurina (2011) who found that liquidity ratios grant higher liquidity with bank size but also begins to decrease slightly after a certain level in bank size.

According to the "too big to fail" argument, large banks would benefit from an implicit guarantee, thus decrease their cost of funding and allows them to invest in riskier assets (Iannotta et al. 2007). Therefore, "too big to fail" status of large banks could lead to moral hazard behavior and excessive risk exposure. If big banks are seeing themselves as "too big to fail", their

motivation to hold liquid assets is limited. In case of a liquidity shortage, they rely on a liquidity assistance of Lender of Last Resort. Thus, large banks are likely to perform higher levels of liquidity creation that exposes them to losses associated with having to sale illiquid assets to satisfy the liquidity demands of customers. Hence, there can be positive relationship between bank size and illiquidity. However, since small banks are likely to be focused on traditional intermediation activities and transformation activities (Rauch et al. 2008; Berger and Bouwman 2009) they do have small amount of liquidity. Hence, there can be negative relationship between bank size and illiquidity.

2.2.3 Profitability and bank liquidity

Recent crisis has highlighted the vitality of sound liquidity management of a bank. In response, regulators were developing new liquidity frameworks to make stable and resilient financial system. However, there is often that, these two variables pose a conflicting relationship (dilemma of maintaining liquidity or profitability exist). A financial manager has to ensure, on one hand, that the firm has adequate cash reserves as a contingency plan for any emergency while ensuring that the funds of the bank are available for investment with good value. Different authors state their opinion on this issue like; Mchael Webber (2013) profitability is a business term that is used to mean the likelihood of a business venture earning the desire level of income and incentives, within a specific period of time, under certain prevailing business condition, Pavla Vodava (2013) profitability is a measurement of the amount by which a company's revenues exceeds its relevant expenses, and Myona R.Berrio (2013) profitability is the measure of the different between the purchase price and the costs of bringing to market.

Since banks need to be both profitable (shareholders demands) and liquid (legal regulations), there is inherently conflicts between the two and the need to balance both. In this regard, the liquidity (legal regulations) is different for non-bank businesses. Therefore, banks should always strike a balance between liquidity and profitability to satisfy shareholders' wealth aspirations as well as regulatory requirements. As all this fact is agreed by Owolabi, Obiakor and Okwu (2011) whose research result provide evidence that, there is a trade-off between profitability and liquidity in that increase in either one would decrease the other, which mean more liquidity implies less profitability.

Subsequently, Bordeleau and Graham (2010), in their research analyses the significance of holding liquid assets on bank profitability for a sample of large Canadian and U.S. banks and results suggest that profitability will be improved for banks that hold some liquid assets, however, there is a limit to it where holding further liquid assets reduce a banks' profitability, holding all else constant. Moreover, empirical studies reveal that this relationship varies depending on the condition of the economy and bank's business model. According to the author, banks must also consider the tradeoff between liquidity shocks to resilience and the cost of holding lower return liquid assets as the latter may affect a banks' ability to generate income, increase capital and extend credit.

Various methods are available to measure bank profitability. According to Vodova (2013), he employed return on equity (ROE) ratio as the proxy for banks' profitability. The results suggest a negative influence on bank profitability (measured by return on equity) and bank liquidity creation. This is consistent with standard finance theory which emphasizes the negative correlation of liquidity and profitability. Their result evidence that a strong capital, liquidity, and profitability ratios in the pre-crisis phase are seen to point to high liquidity creation in the crisis phase. Al-Khouri (2012), who examines the empirical effect of bank capital and other micro and macro-characteristics on liquidity creation, used ROA as proxy of profitability on one of his independent variable.

2.2.4 Non-performing loan and bank liquidity

There are many concepts on relation to Non- Performing Loans such as; Abdul Ghafoor Awan (2009) A Non-performing loan is a loan that is in default or close to being in default. Many loans become non-performing after being in default for 90 days, but this can depend on the contract terms, as many authors indicates Muhammed Nawaz (2012) Non-performing loans are loans that the customers fail to meet their obligations problems, Berriors (2013) Impaired loans are those loans with a high likelihood of default, and Joseph, Edson, Manuere, Clifford & Michael (2012) Non-performing loans are also known as "bad loans", impaired loans or problem loans which are ninety days or more past due or no longer accruing interest and are not generating

income. Based on the above definitions, it is understood that NPLs are loans that a bank customer fails to meet his contractual obligations on either principal or interest payments exceeding 90days. NPLs are loans that give negative impact to banks in developing the economy. Rise of non-performing loan portfolios significantly contributed to financial distress in the banking sector.

On analysis, NPLs are found to affect liquidity. Firstly, Toby (2008), in his study quoted that the use of minimum liquidity ratio (MLR) as a monetary policy tool has an inverse association with industry asset quality measured with NPLs. As MLR rises further coupled with an outcome where bank liquidity ratio (BLR) rises, industry NPLs are expected to fall, and vice-versa. Hence, he concluded that the reason behind scheming excess liquidity may bring about adverse outcomes increasing NPLs. Equally, Joseph, Edson, Manuere, Clifford and Michael (2012), further findings indicate that NPLs have a negative relationship towards banks performance be it liquidity or profitability. Clearly, NPLs reduce profits and liquidity of banks. Similarly, Gupta (1997) added that NPLs does affect profits of banks and eventually to liquidity crunch and hinders growth in Gross Domestic Product (GDP) (as cited in Sharma, 2005).

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.

2.2.5 Loan growth and bank 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.

B. Macroeconomic factors

2.2.6 GDP growth and bank liquidity

Macroeconomic context is likely to affect bank activities and investment decisions as the profile of bank liquidity (Pana et al. 2009 and Shen et al. 2010), GDP growth is a countries financial health indicators, as well the measure of a country's standard of living (Andrew Ang, Monica Piazesizz, and Min Wei, 2006), and The market expenditure on final goods and services produced equal to consumption, investment, government expenditure and net exports (Juan Pablo Painceira, 2010). It is the measurement of level of economic activity of a country, it is understood, GDP is a countries financial health indicator. It is hypothesized from previous studies, that macroeconomic factors affect bank liquidity. For example, Gavin and Hausmann (1998) justified that bank failures are to a degree caused by macroeconomic shock. This fact is also supported by (Shen, Chen, Kao, & Yeh, 2009). Indisputably, GDP is a macroeconomic factor that affects bank liquidity. For which, a major recession or crises in business operations reduces borrowers' capability to service obligations which increases banks' NPLs and eventually banks insolvency (Gavin & Hausmann, 1998).

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. In reference to Painceira (2010), research on liquidity preference during different business cycle states that banks liquidity fondness is low in the course of economic boom.

Where, banks confidently expect to profit by expanding loanable funds to sustain economic boom, while restrict loanable funds during economic downturn to prioritize liquidity. To sum up, banks prefer high liquidity due to lower confidence in reaping profits during economic downturn. Aspachs, Nier and Tiesset (2005) has also inferred that banks prioritize liquidity when the economy plummets, during risk lending opportunities, while neglecting liquidity during economic boom when lending opportunities may be favorable. Thus, to best knowledge, banks forgo liquidity inducing lending during economic growth. Even Valla, Saes-Escorbiac and Tiesset (2006) reported a negative relationship between liquidity and GDP real growth.

Consequently, Bordo, Eichengreen, Klingebiel, Martinez-Peria and Rose (2001) opinions and suggests on a different view. He says during recession it is likely for an increase in the number of loan default. This causes depositors to perceive high solvency risk and immediately tend to withdraw deposits held at financial institutions. Subsequently, financial institutions face bank run causing liquidity risk, resulting in bank insolvency. Other researchers have also agreed to the findings of Bordo et al. (2001). Alper, Hulagu and Keles (2012) exemplified that during economic expansion banks would issue more loans and run down their liquidity buffer. Moreover, it's harder for banks to attract deposits during economic expansion, consequently increasing their financing gap.

2.2.7 The Rate of inflation and bank liquidity

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.

2.2.8 National bank bills

Apparently, national bank bills can seriously affect a bank's liquidity. Government regulation which forced private banks exclusively to make investment on bonds that amounts 27% of the total loans provided by the banks to customers is currently affecting the Ethiopian private banks liquidity since huge amount of loan able funds tied up in this bond (NBE Bills). Study presents a negative impact of national bank bill on bank liquidity. NBEB is used as a dummy variable in this model where one would be allocated for private banks and zero for the other government banks.

2.3 Proposed Theoretical Model/Conceptual Framework

2.3.1 Dependent Variable:

2.3.1.1 Bank Liquidity

Although from analysis, the researcher identify there are two approaches to measure bank liquidity such as liquidity gap/flow approach and liquidity ratio/stock approach (Bessis, 2009). The researcher propose liquidity ratio/stock approach due to be in accordance to the NBE definition of bank liquidity in liquidity framework, as liquid assets to deposit ratio.

2.3.2 Independent Variable:

2.3.2.1 Capital Adequacy

Basing on NBE, the researcher employed the capital adequacy as:

Total capital ratio = Total Capital / Total Risk Weighted Asset

Consistent to findings, bank capital is referred to mitigate liquidity shock. This concludes that recent studies also agree that a positive and significant relationship exist between bank capital and liquidity.

2.3.2.2 Bank Size

As generally accepted, the researcher employed bank size as the banks net total asset. Reviewing journals, present a positive relationship between bank size and liquidity. However, there were also results stating crowding out effect. This is when bank size increases after a certain level, liquidity begins to decrease. The proxy for bank size is the natural logarithm of total assets.

2.3.2.3 Profitability

To knowledge, there is a trade-off between liquidity and profitability. The researcher employed the definition of profitability as generating revenue in excess of cost, in relation to the bank's capital base. Banks can't prioritize liquidity entirely, for loss waits in the long-run or prioritize profitability entirely and suffer during economic mishaps. This result indicates the banks' liquid assets holding behavior in different stages of economic cycle hence, banks necessarily must balance both for better resilience to avoid liquidity shocks. The proxy used to measure profitability is ROE.

2.3.2.4 Non-Performing Loans (NPL)

Based on facts above, NPLs are loans that a customer fails his contractual obligations on either principal or interest payments exceeding 90days. Banks play "Risk Transformation" (riskless deposit to risky loans) in order to survive and find a negative relationship between NPLs and profitability. The proxy for NPL is the percentage of NPLs to total loans.

2.3.2.5 Loan growth

Lending is the principal business activity for most commercial banks. The loan portfolio is typically the largest asset and the predominate source of revenue. Since loans are illiquid assets, increase in the amount of loans means increase in illiquid assets in the asset portfolio of a bank.

As it was made by various empirical studies as well as the above argument the study expected negative relationship between banks loan growth and liquidity.

2.3.2.6 Gross Domestic Product Growth (GDP)

The researcher accepted GDP as a countries financial health indicator. GDP is a macroeconomic factor affecting business operations (collection of receivables). It is concluded that GDP has negative relationship with liquidity. Banks generally expect to profit during bullish market and expect to sustain liquidity during bearish market. The proxy of GDP is Economic Growth: Real GDP / Nominal GDP.

2.3.2.7 Inflation rate:

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, the variable is expected to exhibit positive relationship with bank liquidity.

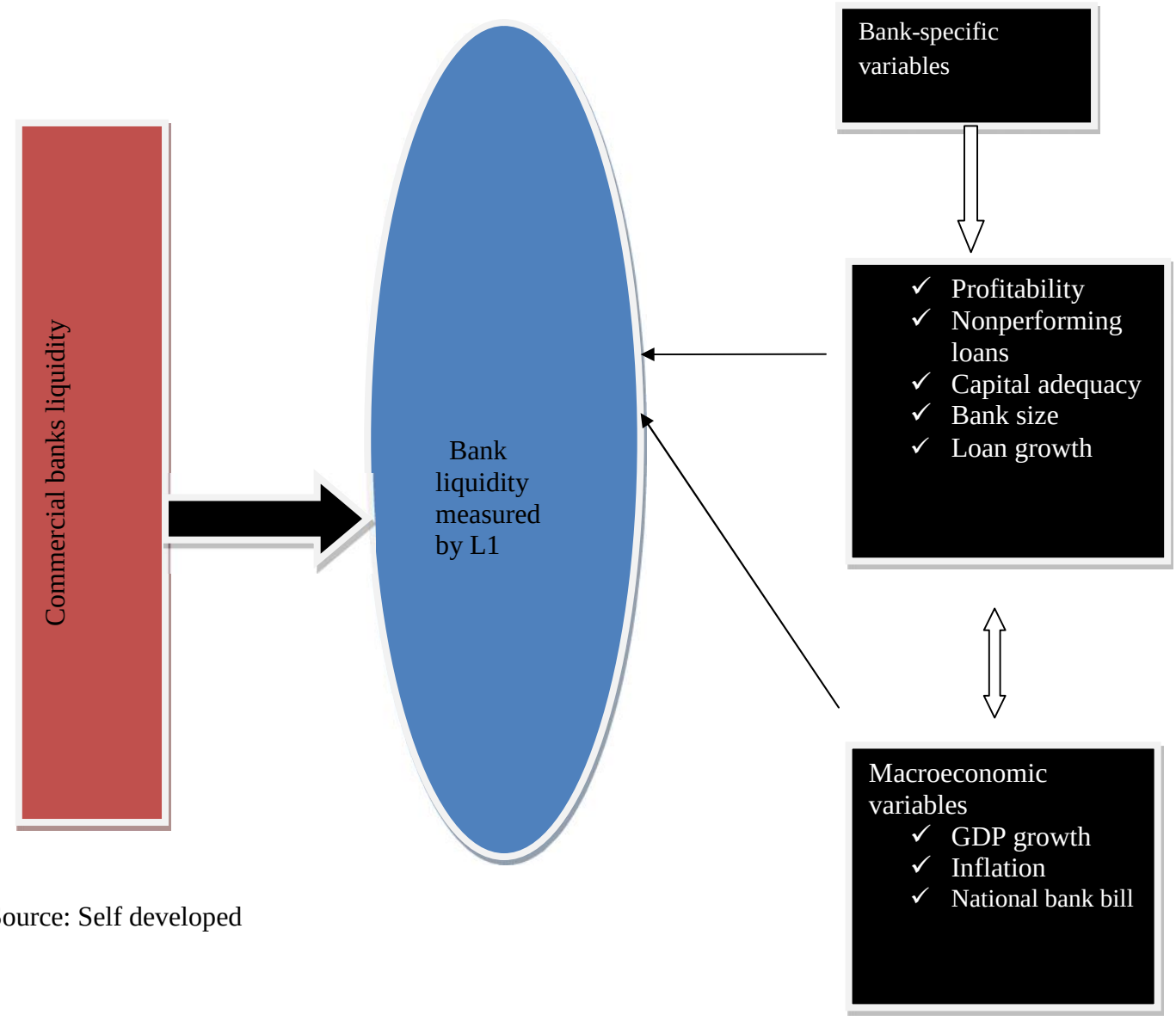
2.3.2.8 National Bank Bill

Apparently, NBEB can seriously affect a bank's liquidity. Government regulation which forced private banks exclusively to make investment on bonds that amounts 27% of the total loans provided by the banks to customers is currently affecting the Ethiopian private banks liquidity since huge amount of loan able funds tied up in this bond (NBE Bills). Study presents a negative impact of NBEB on bank liquidity. NBEB is used as a dummy variable in this model where one would be allocated for private banks and zero for the other government banks.

2.4. Conceptual Framework

The conceptual frame work which describes the relationship between bank liquidity with bank specific and macroeconomic determinants based on the theoretical and empirical perspectives was formulated as follows:

Fig. 2.1 Relation between liquidity and its determinants



Source: Self developed

2.5 Empirical Literature on the Determinants of Liquidity

2.5.1 Reviews of International 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 EViews7 soft ware 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.

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. The 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 reviled 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 banks‟ 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 1985 to 2003. 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(Lender of last resort), 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.

2.5.2 Related empirical studies in Ethiopia

Some related studies were conducted by different researchers in Ethiopia. Specifically, 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 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).

The study conducted by Tseganesh(2012) on the determinants of bank liquidity and their impact on the financial performance: empirical study on commercial banks in Ethiopia. It also attempts to examine the possible factors that on the determinants of bank's liquidity. Balanced fixed effect panel regression was used for the data of eight commercial banks in the sample covered the period from 2000 to 2011. Eight factors affecting banks liquidity were selected and analyzed. The results of panel data regression analysis showed that capital adequacy, bank size, share of non-performing loans in the total volume of loans, interest rate margin, inflation rate and short term interest rate had positive and statistically significant impact on banks liquidity. Real GDP growth rate and loan growth had statistically insignificant impact on banks liquidity.

2.7. Summary and Knowledge gap

In line with the above theoretical as well as empirical reviewes, liquidity is important to all business specially for banking industry since their function is creation of liquidity both on the asset and liability side of their balance sheet. It also revealed that banks liquidity can be affected by different factors such as bank specific, macroeconomic and regulatory factors. While this study will be focus on some of the bank specific and macroeconomic factors affecting liquidity.

Theory on bank liquidity is well documented unlike empirical studies. According to the review, most of the empirical studies done on the area of bank liquidity were done following the U.S. subprime mortgage crisis. Although liquidity problems of some banks during global financial crisis re-emphasized the fact that liquidity is very important for functioning of financial markets and the banking sector, an important gap still exists in the empirical literature about liquidity and its measurement. Only few studies aimed to identify determinants of 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 profitability as an explanatory variable for bank liquidity and to the knowledge of the researcher there is only one empirical studies done regarding to determinants of banks liquidity in Ethiopia. Since the banking industry is in the growth stage with opening of new banks and the absence of active secondary stock exchange in the country, it is important to notify the important determinants of banks liquidity and its impact on financial performance by making empirical investigation to already established banks. Therefore, the study investigated some of bank specific and macroeconomic factors affecting banks liquidity other than the study made by Tseganesh(2012).

Chapter Three

Research Design and Methodology

3.0 Introduction

In this chapter, researcher would brief about the research methodology. The researcher adapt secondary data from different resources. The data are collected from annual reports of each bank for specific factors. For macroeconomic factors National Bank of Ethiopia/NBE and Ministry of Finance and Economic Development/MoFED. Method employed to carry out this research project were E-view 8. This chapter consists of six sections that include: research methodology, hypothesis and question, research design, data collection method, data analysis, and data processing.

3.1. Research methodology, hypothesis and question

Quantitative methods approach would be used to meet the objective of the study and to answer research questions and to test hypotheses under it. Among the quantitative research approach strategies of enquiry survey was adopted by the study. According to Creswell (2009), this approach enables the researcher to test objective theories in the real world by constructing the cause and effect relationship between variables and promote the replication of research. In this study, this approach enabled to saw the impact of the major bank specific and macroeconomic factors on banks liquidity in Ethiopia. The panel data ordinary least square/OLS regression model would used for the sample of eight commercial banks having twelve years experience (i.e. from 2002 to 2013). Structured document survey used to collect the necessary data from audited financial statements of each commercial bank in the sample for bank specific factors and annual reports of National Bank of Ethiopia/NBE and Ministry of Finance and Economic Development/MoFED for macro factors. And the data were analyzed by using Eviews8 soft ware package.

3.1.1. Dependent variables

Bank Liquidity: Liquidity is defined as ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Generally, there are two

methods of measuring liquidity of banks which are stock/ratio approach and the flow/gap approach. The first approach employs various balance sheet ratios to identify liquidity trends and it is easy to compute. Whereas, the second 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 (Crosse and Hempel 1980; Yeager and Seitz 1989; Hempel et al. 1994; Vodova 2013). Therefore, this study attempted to measure liquidity by using two different liquidity measures similar to most of the aforementioned researchers by using stock approach due to its easiness and availability of data to measure banks liquidity. Accordingly, the following liquidity ratio was used.

Liquid assets to total deposits (L1)

Liquidity ratio L1 measures the liquidity of a bank assuming that the bank cannot borrow from other banks in case of liquidity need. This is relatively strict measure of liquidity but it enables the researcher to capture at least the part of the market liquidity risk. This ascertains whether the bank's short-term assets are readily available to pay off its short-term liabilities. The bank is able to meet its obligations in terms of funding (the volume of liquid assets is high enough to cover volatile funding) if the value of this ratio is 100% or more (Vodova, 2013). Lower value indicates a bank's increased sensitivity related to deposit withdrawals. This enables the researcher to capture the bank's vulnerability related to these funding sources. The higher is the value of the ratio, the higher is the capacity to absorb liquidity shock (the bank is in a better position to meet its stochastic withdrawals).

As per NBE's last replaced liquidity requirement directives No. SBB/57/2014, "liquid assets" includes cash, deposits with the National Bank and other local and foreign banks having acceptance by the National Bank, other assets readily convertible into cash expressed and payable in Birr or foreign currency having acceptance by the National Bank, deposits held in Organization for Economic Cooperation and Development (OECD) member countries' currencies and payable by banks of OECD member countries and in such other currencies as may be approved by the National Bank as well as securities issued by OECD member countries denominated in currencies of such countries and such other assets as the National Bank may from time to time declare to be liquid assets. For the purpose of this research, the liquid assets

include cash on hand (local and foreign), deposits with the National Bank Ethiopia and other local and foreign banks having acceptance by the National Bank and treasury bills.

$$L1 = \frac{\text{Liquid assets}}{\text{Total deposits}}$$

3.1.2. Independent variables

This subsection describes the independent variables that are used in the econometric model to estimate the dependent variable. According to prior researches towards the determinants of banks' liquidity, the independent variables are classified into bank-specific and macroeconomic variables (Valla et al. 2006 and Vodova, 2013). The bank-specific variables are internal factors and controllable by banks' managers while the macroeconomic variables are variables that are not related to bank management but reflect the economic and legal environment and hence external. Moreover, these subsection present hypotheses, by proposing the expected sign of the coefficients, based on academic literature.

- Bank specific variables

Profitability: 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). The trade-offs that generally exist between return and liquidity risk are demonstrated by observing that a shift from short term securities to long term securities or loans raises a banks' profitability but also increases its liquidity risks and the inverse is true. Therefore, the hypothesis is stated as:

H0: Profitability has negative and no significant effect on bank liquidity.
H1: Profitability has negative and a significant effect on bank liquidity

Non-performing loans: non-performing loans are loans that a bank customer fails to meet his

contractual obligations on either principal or interest payments exceeding 90 days. 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. NPLs are the main contributor to liquidity risk, which exposes banks to insufficient funds for operations. Liquidity risk is the outcome of credit risk, which is the inability of borrowers to meet their repayment obligation. According to Dolan and Collender (2001), credit risk is measured by the percentage of non-performing loans to total loans. Therefore, it is expected that there is negative relationship between bank liquidity and the amount of non-performing loans, the hypothesis is stated as follows.

H0: NPLs has negative and no significant effect on bank liquidity.
H1: NPLs has negative and a significant effect on bank liquidity.

Capital adequacy: Although the reason why banks hold capital is motivated by their risk transformation role, recent theories suggest that bank capital may also affect banks' ability to create liquidity. These theories produce opposing predictions on the link between capital and liquidity creation. The "financial fragility-crowding out" theories predicts that higher capital reduces liquidity creation. Diamond and Rajan (2000, 2001) focus on financial fragility. On the other hand, "risk absorption" hypothesis, which is directly linked to the risk-transformation role of banks, higher capital enhances banks' ability to create liquidity. This insight is based on two strands of the literature. One strand consists of papers that argue that liquidity creation exposes banks to risk (e.g., Diamond and Dybvig 1983, 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. The second strand consists of papers that posit that bank capital absorbs risk and expands banks' risk-bearing capacity (e.g., Repullo 2004 and Thadden 2004). Combining these two strands yields the prediction that higher capital ratios may allow banks to create more liquidity. Since the expected sign of the effect of capital adequacy on liquidity is unpredictable, the hypothesis is stated as follows:

H0: Capital adequacy has positive and no significant effect on bank liquidity.

H1: Capital adequacy has positive and a significant impact on banks liquidity

Bank size: There is consensus in academic literature that economies of scale and synergies arise up to a certain level of size. Beyond that level, financial organizations become too complex to manage and diseconomies of scale arise. There are two opposing arguments both theoretically as well as empirically regarding to the relationship between bank liquidity and size. The first view is too big to fail which considers negative relationship between size and liquidity whereas; the traditional transformation view suggests positive relationship (Iannotta et al. 2007). Hence, the expected sign of the coefficient of bank size is unpredictable based on academic literature. This study uses the logarithm of total asset as a proxy to measure the bank size similar to Athanasoglou et al. (2008) and Sastrosuwito & Suzuki (2011).

H0: Bank Size has positive and no significant effect on bank liquidity.
H1: Bank size has positive and a significant effect on bank liquidity.

Loan growth: lending is the principal business activity for most commercial banks. The loan portfolio is typically the largest asset and the predominate source of revenue. Since loans are illiquid assets, increase in the amount of loans means increase in illiquid assets in the asset portfolio of a bank. As it was made by various empirical studies as well as the above argument the study expected negative relationship between banks loan growth and liquidity.

H0: Loan Growth has negative and no significant effect on bank liquidity.
H1: Loan Growth has negative and a significant effect on bank liquidity.

- ❖ Macroeconomic variables

Real GDP growth: GDP is a countries financial health indicator. In reference to Painceira (2010), research on liquidity preference during different business cycle states that banks liquidity fondness is low in the course of economic boom. Where, banks confidently expect to profit by expanding loan able funds to sustain economic boom, while restrict loan able funds during economic downturn to prioritize liquidity. To sum up, banks prefer high liquidity due to lower

confidence in reaping profits during economic downturn. Aspachset al (2005) has also inferred that banks prioritize liquidity when the economy falls, during risk lending opportunities, while neglecting liquidity during economic boom when lending opportunities may be favorable. Thus, to best knowledge, banks forgo liquidity inducing lending during economic growth. Even Valla et al (2006) reported a negative relationship between liquidity and GDP real growth. Therefore, the study expected negative relationship between banks liquidity and economic cycle.

H0: GDP has negative and no significant effect on bank liquidity.
H1: GDP has negative and a significant effect on bank liquidity.

Inflation rate: 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, the variable is expected to exhibit positive relationship with bank liquidity.

H0: Rate of Inflation has positive and no significant effect on bank liquidity.
H1: Rate of Inflation has positive and a significant effect on bank liquidity

National bank bill: Apparently, national bank bills can seriously affect a bank's liquidity. Government regulation which forced private banks exclusively to make investment on bonds that amounts 27% of the total loans provided by the banks to customers is currently affecting the Ethiopian private banks liquidity since huge amount of loan able funds tied up in this bond (NBE Bills). Study presents a negative impact of NBEB on bank liquidity.

H0: NBEB has negative and no significant effect on bank liquidity.
H1: NBEB has negative and a significant effect on bank liquidity.

The following table 3.1 presents the summary of hypothesized expected sign for the relationship between the explanatory variables (independent variables) and banks' liquidity ratios (dependent variables).

Table 3.1 Description of the variables and their expected relationship

Variable	Measure	Notation	Expected Sign
Dependent variables			
Liquidity ratio 1	Total liquid assets to total deposits	LI	NA
Independent variables			
Bank-specific variables			
Profitability	Net income after tax/total assets	POF	Negative
Non-performing loans	Non-performing loans/gross loans Ratio	NPLs	Negative
Capital adequacy	Equity/ total assets ratio	CAP	Positive
Bank size	Natural logarithm of bank's total asset	BSIZE	Positive
Loan Growth	Annual change in total loans	LG	Negative
Macroeconomic variables			
Economic growth	Growth rate of real GDP	GDP	Negative
National bank bill	27% of loan and advance to customer	NBEB	Negative
Inflation	Annual inflation rate of Ethiopia	INF	Positive

3.2. Research Design

It was very important to understand the role and purpose of research design. In order to finalize the data presentation, the researcher would frame a question by developing an econometric equation to determine the entire research process. The researcher intended to use panel data model in this study. In this research paper, the researcher used quantitative model which is numerical. The aim of this research paper is to determine the relationship between the

explanatory variables and the liquidity of commercial banks in Ethiopia. This study provides a reliable and practical evidence to verify a significant result of bank liquidity determinants.

According to Eldabi et al., (2002), a quantitative research was carried out to examine a social setting by identifying individual components and explaining the phenomenon in terms of constructs and relationship between constructs. Hence, quantitative research plays a role in emphasis on methodology, procedure and statistical measures of validity. It also relies on the measurement and analysis of statistical data to produce quantifiable conclusion. For the determinants of liquidity among commercial banks in Ethiopia, the researcher includes twelve years of data from 2002 until 2013. The data used are acquired from annual reports of eight commercial banks in Ethiopia calculate the ratio such as liquidity ratio, capital ratio, log of total asset and non-performing loan ratio. The researchers also collected macroeconomic data for GDP, and inflation data from national bank Ethiopia/NBE and Ministry of Finance and Economic Development/MoFED. All these data represent dependent and independent variables.

3.3 Data Collection Methods

The researcher reviewed journal articles and annual reports pertaining to the commercial banks in Ethiopia. Data collected from secondary resources. The secondary data that used in this paper includes twelve years annual reports of eight commercial banks from year 2002 to year 2013 periods from National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development/MoFED.

3.3.1 Secondary Data

Secondary data is collected by the researcher to analyze and meet the requirements of the various research objectives. In this study, a literature review would be providing to present the relationship between the dependent variable and the independent variables. While the dependent variable is liquidity ratio and the independent variables consist of capital adequacy, bank size, profitability, non-performing loan, loan growth gross domestic product, rate of inflation and national bank bill. The main sources of secondary data for this research would be taking from

articles, online information, journals and books which are relevant to explain the factors affecting bank's liquidity.

Type of data	Source
Macroeconomic factors	
Gross domestic product	MoFED
National bank bill	NBE
Inflation	MoFED
Bank's specific factors	
Profitability	Bank's annual reports
Non-performing loans	Bank's annual reports
Capital adequacy	Bank's annual reports
Bank size	Bank's annual reports
Loan Growth	Bank's annual reports

Table 3.2.1: Sources of Data

3.4 Sampling Design

3.4.1 Target Population

Population of the study: The study population/participants were all commercial banks in Ethiopia including private as well as public that exist in the fiscal year 2013/14. According to NBE (2013/14), there are nineteen commercial banks in the year 2013/14 such as Commercial Bank of Ethiopia (CBE), Construction and Business Bank (CBB), Dashen Bank S.C (DB), Awash International Bank S.C (AIB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion International Bank S.C (LIB), Cooperative Bank of Oromia S.C (CBO), Berehan International Bank S.C (BIB), Buna International Bank S.C (BUIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Debub Global Bank S.C(DGB), Abay Bank S.C, Addis Internationa Bank S.C(AIB), Enat Bank S.C, and Development bank of Ethiopia . The first Three are publically owned and the remaining sixteen are privately owned commercial banks.

Sampling design: The first two are publicly owned and the remaining sixteen are privately owned commercial banks. But, because of lack of 12 years data that is required for the analysis purpose in most of the newly established private banks, the number of sample banks were reduced to eight namely, (CBE), (CBB), (DB), (AIB), (WB), (UB), (NIB) and (BoA). The researcher believed that the sample size is sufficient to make sound conclusion about the population as far as it covers above 44% of the total population. The purposive sampling technique was employed. Purposive sampling targets a particular group of people. When the desired population for the study was rare or very difficult to locate and recruit for a study, purposive sampling may be the only option. The eight commercial banks chosen to examine liquidity factors in Ethiopia are presented as below:

	Establishment	No. of Branches
Commercial Bank of Ethiopia	August 1942	718
Construction and Business Bank	June 1975	86
Awash International Bank S.C	Nov. 1994	120
Dashen Bank S.C	Sep. 1995	111
Bank of Abyssinia S.C	Feb. 1996	85
Wegagen Bank S.C	June 1997	82
United Bank S.C	Sep. 1998	77
Nib International Bank S.C	Sep 1999	71

Table 3.3.1: Sample Commercial Banks in Ethiopia as of Sep 30, 2013

3.4.2 Analytical Tools

In this study, the analytical tools would use E-view 8 and Stata 11. Two tools would use because, after running the result in E-Views 8, the researcher has an intuition of econometric problem, leading to the use of Stata 11. Stata 11 would use because E-views 8 have a limitation to detect econometric problems in panel data. Since econometric problem would be detected in Stata 11, the researcher then would solve those using E-views 8.

3.5 Data processing

A description of data preparation processes such as checking, editing, coding, and transcribing as well as specifying any special or unusual treatments of data before they are analyzed. To get a robust result, the model (I) has to be free from any econometric problems such as multicollinearity, heteroscedasticity, autocorrelation, and must make sure the error term for each variable is stationary. This part of study is dedicated to describe the said econometric problem. Before conducting the diagnostic test on model (I), the researcher would have to perform redundant fixed effect test and Housman test. The reason is to examine whether pooled OLS model or fixed effect model or random effect model is better for this study.

3.5.1 Redundant fixed effect

H0: Pooled OLS is better than fixed effect model

H1: Fixed effect model is better than pooled OLS model

Decision Rule: Reject Ho if p-value is less than significance level.

Otherwise, do not reject Ho.

Decision: Reject H0 since the p-value is less than the significance level 0.01 (1%).

Conclusion: There is sufficient evidence to conclude that fixed effect model is better than pooled OLS model.

3.5.2 Multicollinearity

There are various methods to detect multicollinearity. Firstly, by comparing the expected sign of independent variables obtained from the model with prior expectation. It is possible that multicollinearity problem exists in the model if the expected sign for independent variable is inconsistent with theory or prior expectation. Secondly, by examining the correlation matrix provided by Eviews 8. If the researcher found that there is any correlation between two variables to be more than 80%, automatically the suspicions for the existence of muliticolinearity problem is derived. Besides, multicollinearity problem can be detected by viewing the estimated model has high R-square but with only few or no independent variables found to have significant effect

on the dependent variable besides there is high-pair wise correlation between two independent variables.

If multicolinearity is detected, the researcher will conduct the Variance Inflating Factors (VIF) and tolerance (TOL) to detect the seriousness of multicollinearity. VIF is undefined if R2 is equal to 1, it indicates that there is perfect multicollinearity between the two independent variables. There is serious multicollinearity if VIF is equal or more than 10%, whereas, there is no serious multicollinearity if VIF is less than 10% or equal to 1%. There is no multicollinearity if R2 is equal to 0. However, there is negative relationship between seriousness of multicollinearity and level of TOL. The higher the TOL, the less serious the multicollinearity, whereas, lower the TOL, the more serious is the multicollinearity.

3.5.3 Heteroscedasticity

Heteroscedasticity occurs when the variance of error term is not constant across the number of observations. The researcher has to make sure that the model is free from heteroscedasticity to obtain a precise and interpretable result. A hypothesis test is carried out using Stata 11 and pvalue is obtained to detect the heteroscedasticity problem. If the obtained p-value more than 10% significance level, it implies that the model does not have heteroscedasticity problem.

H0 : There is no heteroscedasticity problem

H1 : There is heteroscedasticity problem

Decision Rule: Reject Ho if p-value is less than significance level.

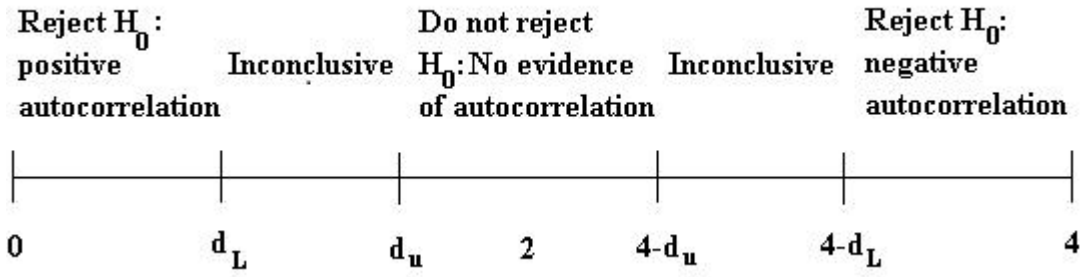
Otherwise, do not reject Ho.

Decision: Do not reject Ho since the p-value is more than the significance level 0.01 (1%).

Conclusion: There is sufficient evidence to conclude that the model (I) does not consist of hetetoscedasticity problem.

3.5.4 Autocorrelation

Autocorrelation problem would occur when error term at the period *t* is correlated with the error term at period before *t*. Autocorrelation is most likely to happen in the time series data due to the importance of the sequence of the time period. Autocorrelation test is carried out by using


Reject H_0: positive autocorrelation
Inconclusive
Do not reject H_0: No evidence of autocorrelation
Inconclusive
Reject H_0: negative autocorrelation
0
d_L
d_u
2
$4-d_u$
$4-d_L$
4

H1: The error term is not normally distributed

Decision Rule: Reject H0 if the p-value for Jarqua-Bera statistic < significance level (1%), otherwise do not reject H0.

Decision: Since the p-value for Jarqua-Bera statistic < significance level (0.01), reject H0 and conclude that the error term is not normally distributed.

3.6 Data Analysis

To meet the objective of the study, the paper was primarily based on panel data, which was collected through structured document review. As noted in Baltagi (2005) the advantage of using panel data is that it controls for individual heterogeneity, less collinearity among variables and tracks trends in the data something which simple time-series and cross-sectional data cannot provide. Thus, the collected panel data was analyzed using descriptive statistics, correlations, multiple linear regression analysis and inferential statistics. Mean values and standard deviations were used to analyze the general trends of the data from 2002 to 2013 based on the sector sample of eight commercial banks and a correlation matrix was also used to examine the relationship between the dependent variable and explanatory variables. A multiple linear regression model and t-static was used to determine the relative importance of each independent variable in influencing liquidity. The multiple linear regressions model was run, and thus OLS was conducted using EVIEWS 8 econometric software package, to test the casual relationship between the firms' liquidity and their potential determinants and to determine the most significant and influential explanatory variables affecting the liquidity of Ethiopian banks. The rational for choosing OLS is as noted in Petra (2007) that OLS outperforms the other estimators when the following holds; the cross section is small and the time dimension is short. Therefore, as far as both the above facts hold true in this study it is rational to use OLS.

The equation is shown as below:

$$Y_{it} = \beta_{1i} + \beta_2 X_{it} + u_{it} \text{---------- Model (I)}$$

- Y_{it} is the dependent variable, where i = entity and t = time.
- β_{1i} (i=1….n) is the unknown intercept for each entity (n entity-specific intercepts)
- X_{it} represents one independent variable
- β_2 is the coefficient for that particular independent variable

- u_{it} is the error term

Therefore the general models which incorporate all of the variables to test the hypotheses of the study were:

$LIQ_{i,t} = \alpha + \beta 1\ CAP_{i,t} + \beta 2\ SIZE_{i,t} + \beta 3\ LG_{i,t} + \beta 4\ NPL_{i,t} + \beta 5\ POF_{i,t} + \beta 6\ GDP_t + \beta 7 INF_t + \beta 8 NBEB_t + u_{i,t}$……………….……… (1)

Where,

LIQ_{it} = is liquidity ratio measured by L1 for ith bank on year t.

POF_{it} = is the profitability for bank i at time t.

NPL_{it} = is the non-performing loans for bank i at time t.

CAP_{it} = is capital adequacy for bank i at time t.

$BSIZE_{it}$ = is the size for bank i at time t.

LG_{it} = is the loan growth for bank i at time t.

GDP_t = is the real domestic product/GDP growth of Ethiopia on the year t.

INF_t = is the overall inflation rate in Ethiopia on the year t.

NBEB = is investment in Government securities and balance with NBE

U_{it} = is a random error term

Chapter Four

Data presentation and analysis

4.0 Introduction

In this chapter, the researcher used eight commercial banks in Ethiopia over a twelve years bracket, which is from 2002 to 2013. The data extracted by the researcher were obtained from annual reports from each bank for bank specific independent variables. As for macroeconomic factors, the data is extracted from NBE and MoFED . The researcher used E-views 8 software to analyze this research findings and data. Further, the researcher carried out relevant diagnostic testing to identify for any presence of econometric problems using E-views 8 and Stata11. No doubt, E-views 8 were reliable to provide an accurate output in analyzing descriptive statistics, correlations and regressions. In the preceding chapters important literatures relating to the topic were reviewed that gives enough understanding about the topic and used to identify knowledge gap on the area. To meet the broad research objective and to answer research questions and to test research hypotheses under it the research design used for this study also discussed in the preceding chapter. This chapter is divided in to four sections: the first one is to discus Documentary analysis, Inferential analysis, Result of the regression analysis, at last to discus the regression results.

4.1. Documentary analysis

The main objective of this study was to identify the internal and external factors affecting commercial banks' liquidity in Ethiopia. The key data sources to this purpose are the documents held by the commercial banks themselves, NBE and MoFED. The subsequent discussion presents the results of the documentary analysis as follows. Section 4.1.1 presents descriptive statistics followed by the correlation analysis among the dependent and independent variables in section 4.1.2. Section 4.1.3 presents the scale measurement of the hypothesis.
The outcomes of the panel data regression analysis are presented in section 4.1.4.

4.1.1 Descriptive statistics

Table 4.1 presents the outcomes of the descriptive statistics for main variables involved in the regression model. The key figures, including mean, median, standard deviation, minimum and maximum value were reported. This was generated to give overall description about the data used in the model and served as data screening tool to spot unreasonable figure.

Table 4.1 descriptive statistics of dependent and independent variables

	Mean	Median	Maximum	Minimum	Standard Deviation	Observation
L1	0.4684	0.4732	0.7820	0.2153	0.1081	96
POF	0.0244	0.0268	0.0420	0.0034	0.0095	96
NPLs	0.1165	0.0805	0.5351	0.0074	0.1142	96
CAP	0.0970	0.0953	0.2707	0.0170	0.0369	96
BSIZE	22.1993	22.1034	26.0072	19.5649	1.2851	96
LG	0.2280	0.1891	0.7791	-0.1229	0.1998	96
GDP	0.0907	0.1088	0.1264	-0.0210	0.0436	96
INF	0.1419	0.1220	0.3640	-0.1060	0.1269	96
NBEB	0.2500	0.0000	1.0000	0.0000	0.4353	96

Source: Commercial banks reports, NBE, MoFED and own computation

Table 4.1 describes the descriptive statistics for the dependent and independent variables, which also reveals all variables comprised 96 observations. The dependent variables are liquidity measured by liquid assets to total deposits ratio/L1. The remaining variables are the independent variables such as: profitability, non-performing loans, capital adequacy, bank size, loan growth, real GDP growth, general inflation rate and national bank bill.

The mean value of L1 was 46.84% which was by far above the statutory requirement of 15% set by NBE under NBE Directives No. SBB/57/2014. The standard deviations of 10.81% showed moderate dispersion of liquid assets to total deposits ratio from its mean for the banks in

Ethiopia. The minimum and maximum values of L1 were 21.53% and 78.20%, respectively. Among the bank specific independent variables, bank size which is measured by natural log of total asset had the highest standard deviation which is1.2851, which means it is the most deviated variable from its mean compared to other variables. The maximum and minimum values were 26.0072 and 19.5649, respectively. The maximum and minimum values were indicating CBE and UB, respectively. Profitable firms are stronger to face financial distress and stronger to continue more than unprofitable firms in the future. Profitability, given as the ratio of profits after tax to total assets registered a mean value of 2.44% with a standard deviation of 0.95% which indicates that the variation of the profitability between the selected banks was very small. Profitability for the sample was ranged from 0.3% to 4%. That means, the most profitable bank among the sampled banks earned 4 cents of profit after tax for a single birr invested in the assets of the firm. On the other hand, the least profitable bank of the sampled banks earned 0.3 cents of profit after tax for each birr invested in the assets of the firm.

The other bank specific factor affecting liquidity of Ethiopian commercial banks was NPLs that measures the asset quality of banks. The mean value of the percentage of non-performing loans in the total amount of loans and advances was 11.65% with the maximum and minimum of 53.51% and 0.74%, respectively. The mean value of 11.65% is much above 5% maximum limit of regulatory body. The maximum value of 53.5% indicates the presence of high credit risk in some of the banks. There was moderate dispersion of NPL among banks in Ethiopia that is shown by the standard deviation of 11.42%. The mean value of capital adequacy was 9.70% which was above the minimum statutory requirement of 8% set by NBE under NBE Directives No. SBB/50/2011. The maximum and minimum values were 27.07% and 1.70%, respectively. The standard deviation for CAP was 3.69% revealing little dispersion towards the mean among banks in Ethiopia. Loan growth was measured as the annual percentage change in total loans & advances and this showed a mean of 22.80%. This indicates that, on average, growth rate was 22.80% during the twelve - year period and growth in total asset for the sample period were ranged from -12.29% to 77.91% with standard deviation of 19.98%. The 19.98% of standard deviation indicates the existence of high variation in growth rate among commercial banks in Ethiopia.

Table 4.1 also shows that the mean value of real GDP growth in Ethiopia for the last twelve years was 9.07%, with a maximum of 12.64% and a minimum of -2.1 %. As per the result GDP had a small standard deviation of 4.37% from its mean. The other macro-economic variable, general inflation rate, had a high standard deviation of 12.69% compared to GDP; this implies that inflation rate in Ethiopia during the study period remains somewhat unstable. The mean value of the general inflation rate of the country over the past twelve years was 14.19%, which was more than that of the average real GDP growth. The maximum inflation was recorded in the year 2009 (i.e. 36.40%) and the minimum was in the year 2002 (i.e. -10.60%). Finally, the other macroeconomic factor was related to National bank bill was calculated by 27% of loans and advances to customer over the year. The men value of 25% which is from 1 birr loan made to customer they must purchase 25 cents of the bank bill. The maximum and the minimum values were 100% and 0% which means there was banks which obligated to purchase (private banks) and other not(government banks). The standard deviation for NBEB was 43.53%.

4.1.2 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. As a sample size approaches to 100, the correlation coefficient of about or above 0.20 is significant at 5% level of significance (Meyers et al. 2006). The sample size of the study was 8*12 matrixes of 96 observations which was around 100 hence the study used the above justification for significance of the correlation coefficient. Table 4.1.2 bellow shows the correlation coefficient between the dependent variables and independent variables.

Table 4.2 Correlation matrix of dependent and independent variables

	L1	POF	NPLs	CAP	BSIZE	LG	GDP	INF	NBEB
L1	1.0000	0.0997	-0.0065	0.2963	-0.2298	-0.2144	0.0475	0.0210	-0.3722
POF	0.0997	1.0000	-0.5684	0.0697	0.3728	0.1957	0.5262	0.3678	0.3134
NPLs	-0.0065	-0.5684	1.0000	-0.2363	-0.2064	-0.4200	-0.4886	-0.4167	-0.4408
CAP	0.2963	0.0697	-0.2366	1.0000	-0.3452	0.2021	-0.1428	-0.0204	-0.0476
BSIZE	-0.2298	0.3728	-0.2064	-0.3452	1.0000	0.1259	0.3128	0.3855	0.4615
LG	-0.2144	0.1957	-0.4200	0.2021	-0.1259	1.0000	0.0412	-0.0390	-0.0148
GDP	0.0475	0.5262	-0.4886	-0.1428	0.3128	0.0412	1.0000	0.3011	0.1151
INF	0.0210	0.3678	-0.4167	-0.0204	0.3855	-0.0390	0.3011	1.0000	0.3525
NBEB	-0.3722	0.3134	-0.4408	-0.0476	0.4615	-0.0148	0.1151	0.3525	1.0000

Source: Commercial banks reports, NBE, MoFED and own computation

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.

As table 4.2 clearly reveals, a liquid asset to total deposits ratio/L1 was positively correlated with profitability with a correlation of 0.098. On the other hand, among bank specific factors CAP had positive relationship with L1. Bank size, NPLs and Loan growth had negative relationship with banks liquidity measured by both L1 with a correlation of-0.2298, -0.0065 and -0.2144 , respectively; which indicates that firm with higher loan growth have less bank liquidity. Among the macroeconomic factors affecting liquidity, real GDP growth rate and interest rate margin had positive and NBEB negative relationship with bank liquidity measured by L1. The positive relationship of inflation rate on banks liquidity was in line with the expectation of the study.

4.1.3 Scale Measurement

4.1.3.1 Redundant Fixed Effect Test

According to Gujarati (2004), if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model/FEM and random effect model/REM. Hence the choice here is based on computational convenience. On this score, FEM may be preferable. Since the number of time series (i.e. 12 year) is greater than the number of cross-sectional units (i.e. 8 commercial banks), FEM is preferable in this case. According to Brooks (2008); Verbeek (2004) and Wooldridge (2004), it is often said that the REM is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population, but a FEM is more plausible when the entities in the sample effectively constitute the entire population/sample frame. Hence, the sample for this study was not selected randomly and equals to the sample frame FEM is appropriate.

Test Statistics Value
Prob. Chi- Square = .0009

Table 4.1.3.1: Redundant Fixed Effect Test P-value obtained from E-view output.

In order to select the correct estimated model, the researcher had conducted Redundant Fixed Effect Test. The null hypothesis states that Pool OLS Model is better than Fixed Effect Model (FEM). The researcher can decide whether to reject null hypothesis by comparing p-value with the significance level. From table 4.1.3.1, the p-value is 0.0009 which is less than significance level of 0.10. This made the researcher to reject the null hypothesis and conclude that FEM is the best.

4.1.3.2 Multicollinearity

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 multicollinearity 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.

Table 4.3 Correlation matrix of explanatory variables

	POF	NPLS	CAP	BSIZE	LG	GDP	INF	NBEB
POF	1							
NPLS	-0.5684	1						
CAP	0.0697	-0.2366	1					
BSIZE	0.3728	-0.2064	-0.3452	1				
LG	0.1957	-0.4200	0.2021	-0.1259	1			
GDP	0.5262	-0.4886	-0.1428	0.3128	0.0412	1		
INF	0.3678	-0.4167	-0.0204	0.3855	-0.0390	0.3011	1	
NBEB	0.3134	-0.4408	-0.0476	0.4615	-0.0148	0.1151	0.3525	1

Source: Commercial banks reports, NBE, MoFED and own computation

Correlation matrix between independent variables is presented in table 4.3. The result of correlation matrix indicates that there were low data correlations among the independent variables. These low correlation coefficients indicate that, there is no problem of

multicollinearity in this study. Besides, Kennedy (2008) stated that multicollinearity problem exists when the correlation coefficient among the variables are greater than 0.70, but in this study there is no correlation coefficient that exceeds or even near to 0.70. Consequently, in this study there is no problem of multicollinearity which enhanced the reliability for regression analysis.

4.1.3.3 Heteroscedasticity

Among the OLS assumptions, the first diagnostic test which is conducted in this study is heteroscedastic test. This theoretically expressed as by Brooks (2008, p.133) "Var (Ut) = $\sigma 2 < \infty$; it has been assumed that the variance of the errors is constant, $\sigma 2$ - this is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic." White (1980) as cited by (Brooks, 2008 p. 134) is the most popular test of homoscedasticity. In this study as shown in table 4.4, both the F-statistic and Chi-Square versions of the test statistic gave the same conclusion that there is no evidence for the presence of heteroscedasticity, since the p-values were in excess of 0.05 to L1. 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 fell to reject the null hypothesis of hetroscedasticity.

Table 4.1.4 Heteroskedasticity Test: White

	L1 Model		
F-statistic	.820509	Prob. F(44,51)	0.7476
Obs*R-squared	39.7903	Prob. Chi-Square(44)	0.6525
Scaled explained SS	29.5534	Prob. Chi-Square(44)	0.9533

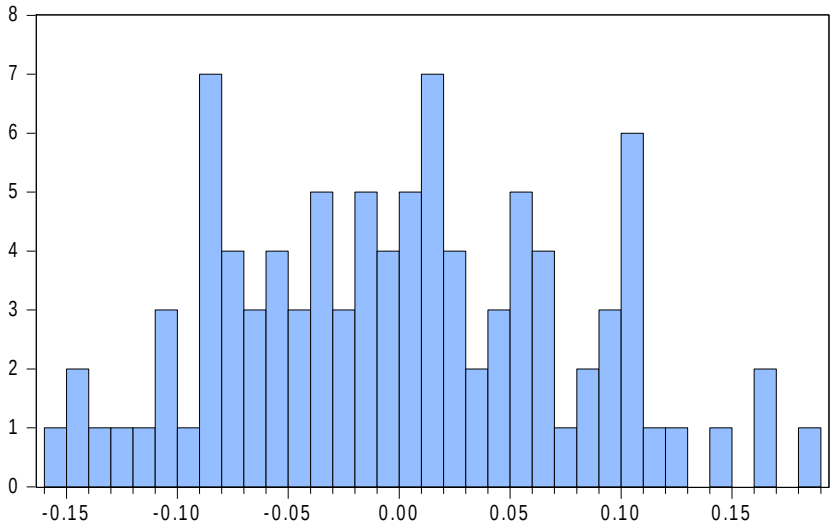
Source: Commercial banks reports, NBE, MoFED and own computation

4.1.3.4 Autocorrelation

As indicated in the table 4.1.5, the Durbin-Watson test statistic value was 1.532 for model L1. As mentioned in the previous chapter, to empirically analyze factors affecting bank liquidity in Ethiopia 96 (8*12) observations were used in the models. Therefore, the relevant critical values for the test are dL= 1.358, dU = 1.715, i.e., for 96 observations and 8 regressors and 4-dU = 4-1.715=2.285; 4 - dL = 4-1.358=2.642. The DW value (1.532) of L1 lies in the inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. Therefore, the researcher used the results of L1 for the determinants of liquidity.

4.1.3.5 Normality of the Error Term

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 skeweness 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 far 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 and our sample of 96 was equal to the frame was large; we considered the JB test also.



Series: Standardized Residuals	
Sample 2002 2013	
Observations 96	
Mean	-5.78e-19
Median	0.000143
Maximum	0.188377
Minimum	-0.153175
Std. Dev.	0.077250
Skewness	0.181540
Kurtosis	2.427144
Jarque-Bera	1.839968
Probability	0.398526

As shown in the histogram in the above kurtosis approaches to 3 (i.e. 2.427144 for L1), 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. 0.398526 for L1). This is due to the characteristics of Fixed Effect Model (FEM). Under the assumption of FEM, the error term are assumed to be normally distributed. Besides that, central limit theorem suggests that when the sample size is large (more than 100) the error term is assumed to be normally distributed (Gujarati, D.N. & Porter, D.C. (2009)). 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.

4.2 Inferential Analysis

Variables	Coefficient	P-value
Capital Adequacy	0.653974	0.0552*
Bank Size	-0.008927	0.2396
Profitability	3.499453	0.0164**
Non-performing Loan	-0.0055376	0.7241
Loan Growth	-0.261951	0.0001***
Growth Domestic Product	-0.076706	0.7705
General Inflation	0.070621	0.4136
National Bank Bill	-0.099568	0.0019**
R-square	0.503032	
Adjusted R-square	0.409851	
Prob.(F-statistics)	0.000000	

Table 4.2. Estimation model output from E-view 8.

***significant at 1 %(strong effect)

**significant at 5 %(medium effect)

*significant at 10 %(weak effect)

4.2.1 R-square

First, researcher need to analyze the R-square in Table 4.2. R-square is to measure the proportion of the total variation in the dependent variable (Y) that is explained by the variation in the independent variable (X). The range of R-square is from 1 to 100%. If the R-square value is close to 1%, it means that less variation of Y can be explained by the variation of X. If R-square is close to 100%, it means that high variation of Y can be explained by the variation of X. However, if R-square equals to 0, it is mean that there is no variation of Y that can be explained by variation of X. Since R-square of the researcher studies output is 0.5030 which is equivalent to 50.30%, the researcher can conclude that 50.3% variation of bank liquidity can be explained by the variation of bank size, capital adequacy, non-performing loan, profitability, gross domestic product, inflation and national bank bill. However, there is a remaining of 50.7% that cannot be explained in this model.

4.3. 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. R2 values indicate the explanatory power of the model and in this study adjusted R2 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 operational panel regression model used to find the statistically significant determinants of commercial banks liquidity measured by L1 :

$$LIQ_{i,t} = \alpha + \beta 1\ CAP_{i,t} + \beta 2\ SIZE_{i,t} + \beta 3\ LG_{i,t} + \beta 4\ NPL_{i,t} + \beta 5\ POF_{i,t} + \beta 6\ GDP_{t} + \beta 7\ INF_{t} + \beta 8\ NBEB_{t} + u_{i,t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Table 4.3 regression results for determinants of liquidity measured by liquid assets to total assets ratio (L1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.545514	0.151658	3.596992	0.0006
POF	3.499453	1.426764	2.452721	0.0164**
NPLS	-0.055376	0.156318	-0.354252	0.7241
CAP	0.653974	0.336040	1.946122	0.0552*
BSIZE	-0.008927	0.007535	-1.184761	0.2396
LG	-0.261951	0.062070	-4.220254	0.0001***
GDP	-0.076706	0.261583	-0.293238	0.7701
INF	0.070621	0.085929	0.821846	0.4136
NBEB	-0.099568	0.031079	-3.203726	0.0019**

R-squared	0.503032	Durbin-Watson stat	1.532685
Adjusted R-squared	0.409851		
S.E. of regression	0.084181		
F-statistic	5.398417		
Prob(F-statistic)	0.000000		

***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Source: Commercial banks reports, NBE, MoFED and own computation

The above table presents results of liquid assets to total assets ratio (L1) as dependent variable and bank specific and macroeconomic explanatory variables for the sample of eight commercial banks in Ethiopia. The explanatory power of this model is high (i.e. around 50.3%). The regression *F*-statistic takes a value 5.398417. F-statistics tests the null hypothesis that all of the slope parameters (βs‟) 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 capital adequacy, loan growth, profitability and national bank bill

rate were the statistically significant factors affecting liquidity of commercial banks in Ethiopia. Capital adequacy had positive and statistically significant impact on liquidity at 10% level. profitability had positive and significant and national bank bill negative and significant impact on liquidity at 5% level respectively. And loan growth had negative and statistically significant influence on banks liquidity in Ethiopia at 1% level. Whereas, non performing loan, real GDP growth rate, inflation and bank size were statistically insignificant.

4.4. Discussion of the regression results

4.4.1. Determinants of banks liquidity-discussion

4.4.1.1Capital adequacy and liquidity

The positive and statistically significant impact of capital adequacy on liquidity as of L1 is inconsistent with hypothesis (1) and findings of Czech commercial banks analysis (Vodova 2011). This is based on the argument of risk absorption. 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 deposits. In turn this enable banks to hold more liquid assets that create better potential to liquidity creation to the external public. However, the coefficient value of the variable (i.e. 0.653974) indicate a percentage rise/decline in capital to total asset ratio of banks result in less proportionate (i.e. 0.65%) rise/decline in liquidity position of commercial banks in Ethiopia. Generally, we reject the first research hypothesis (i.e. there is positive and significant relationship between capital adequacy and bank liquidity).

4.4.1.2 Bank size and liquidity

The negative and statistically insignificant impact of bank Size on liquidity as per L1 consistent with hypothesis (2). It is found that bank size is insignificant at 10% interval with p-value 0.2396. From running the data, it is detected that bank size has a coefficient value of -0.008927. This is consistent with the researchers' prior expectation. From this research, when bank size increases by 1 percentage point, Ethiopian commercial bank's liquidity ratio decreases by

0.008927 units, by holding other variables constant. As indicated earlier, a lower ratio means higher liquidity. Generally, the results in both cases revel that higher banks have high amount of liquid assets. And also we fail to reject the hypothesis saying bank size has negative and insignificant impact on banks liquidity.

4.4.1.3 Loan growth and liquidity

The coefficient signs of loan growth in L1 show negative impact of loan growth on banks liquidity position. The negative impact of loan growth on banks liquidity was in line with the hypothesis (5) 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. Nevertheless, the negative impact of loan growth on banks liquidity was statistically significant. In other words, the impact of loan growth on liquidity of commercial banks in Ethiopia was statistically different from zero. Therefore, this finding reveal that larger amount of loans was provided from periodic deposits with affecting the amount of liquid assets held by the commercial banks in Ethiopia. Thus, in statistical term hypothesis (5) should be rejected.

4.4.1.4 None-performing loans and liquidity

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 same effect. The negative and statistically insignificant impact of NPLs the case of L1 was in line with hypothesis (4).The coefficient value of the variable in L1 (i.e. 0.055376) 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 0.5%. Generally, we should fell to reject the hypothesis stating NPL has negative and insignificant impact on liquidity.

4.4.1.5 Profitability and liquidity

Like loan growth real POF rate had statistically significant impact on liquidity of commercial banks measured by L1 in Ethiopia. The coefficient sign for real POF rate was positive opposing

to hypothesis (3). The bank's profit ratios show increment time to time, commercial banks in Ethiopia prefer to hold more and more liquid assets. This result indicates the banks' liquid assets holding behavior in different stages of economic cycle hence, banks necessarily must balance both for better resilience to avoid liquidity shocks. Therefore, the hypothesis stating positive and significant relationship between real POF rate and banks liquidity should be rejected.

4.4.1.6 Real GDP growth rate and liquidity

Like loan growth real GDP growth rate had statistically insignificant impact on liquidity of commercial banks measured by L1 Ethiopian commercial banks. The coefficient sign for real GDP growth rate was negative and in line with hypothesis (6). Even if the country has been recording double digit growth since the year 2004, commercial banks in Ethiopia prefer to hold more and more liquid assets. The insignificancy and negative impact of real GDP growth rate could be due to the high level of inflation rate and credit crunch problem. Therefore, the hypothesis stating negative and insignificant relationship between real GDP growth rate and banks liquidity should not be rejected.

4.4.1.7 National Bank Bill

The negative and statistically significant impact of bank Size on liquidity as per L1 inconsistent with hypothesis (8). It is found that NBEB is significant at 5% interval with p-value 0.0019. From running the data, it is detected that NBEB has a coefficient value of -0.099568. This is consistent with the researchers' prior expectation, which forces banks to invest 27% of total loans disbursed on bonds (NBE Bills) on which banks have no right to use it for payment and settlement purposes when the need arises. For 1 birr loan and advance to customer they must purchase 27 cents of national bill, Hence, the hypothesis stating NBEB has negative and significant impact on bank liquidity should not be rejected the hypothesis.

4.4.1.8 Inflation and liquidity

Inflation had positive impact on banks liquidity measured by L1. The positive and statistically insignificant impact of inflation in the case of L1 was in line with hypothesis (7) which was based on the argument that is based on the theory of information asymmetry, stating in the inflationary economy economic units including commercial banks 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. 0.070621) indicates for a percentage rise/decline in the general inflation rate of the country, commercial banks holding of liquid assets rise/decline by 0.16% (reduce long term/ capital investments by 0.07%). Hence, we fell to reject the hypothesis stating INF has positive and insignificant impact on banks liquidity.

Table 4.7 Summary of actual and expected signs of explanatory variables on the dependent variables

Explanatory variables	Expected impact on liquidity	Actual impacts
	Liquidity	
	L1	
CAP	Positive & Sign	Positive & Sign
BSize	Negative & Sign	Negative & Insign
LG	Negative & Sign	Negative & Sign
NPL	Negative & Sign	Negative & Insign
POF	Negative & Sign	Positive & Sign
GDP	Negative & Sign	Negative & Insign
NBEB	Negative & Sign	Negative & Sign
INF	Positive & Sign	Positive & Insign

Note: Sign= Significant Insign= Insignificant

Chapter Five

Conclusion and Recommendations

5.1 Conclusion

Banks should remain liquid at all times to prevent falling into liquidity crisis and cause distress in the overall economy. Thus, this study attempts to identify the determinants of liquidity of commercial banks in Ethiopia. This research also provides summary of previous studies on similar topics. Eight variables affecting banks liquidity were chosen and analyzed. The panel data was used for the sample of eight commercial banks in Ethiopia from 2002 to 2013 year and estimate using Fixed Effect Model (FEM). Data was presented by using descriptive statistics. The balanced correlation and regression analysis for liquidity ratios was conducted. Before performing OLS regression the models were tested for the classical linear regression model assumptions. Fixed effect model/FEM was used based on convenience. Eight factors affecting banks liquidity were chosen and analyzed. From the list of possible explanatory variables, 50% of them proved to be statistically significant. The results of models enable us to make following conclusions.

The result showed a negative relationship between loan growth and liquidity with strong statistical significance in case of L1 which is as expected, indicating that the increase in loans provided by banks lead to the reduction of the level of liquid assets held by banks. In accordance with expectation of study, capital adequacy and profitability showed positive and significant relationship with banks liquidity measured by L1. The positive influence of the share of capital on total assets is consistent with the assumption that bank with sufficient capital adequacy should be liquid, too. The positive and statistically significant impact of inflation was based on which a bank needs to sacrifice liquidity to achieve a higher profitability which in turn increases the liquidity risk and liquidity ratio. Liquidity need is actually a constraint for a bank from investing all its cash as profit comes from either bank lending activities or by investing it. National bank bill had negative and statistically significant impact on Ethiopian banks liquidity measured by L1 which was same as to expected sign and it may indicate the presence of forced investment on bonds (NBE Bills) which amounts 27% of each total loans disbursed. In contrary to the above results inflation, non-performing loans, bank size and GDP are factors that have little or no

impact on the liquidity of Ethiopian banks as per L1 as far as all those variables were not significant even at 10% significance level.

Besides, variables such as total deposits, branch network, efficient management of the liquid assets, availability of the adequate foreign currency on hand and bank's appetite to investments by themselves are also considered as possible internal factors that can affect Ethiopian banks liquidity. Furthermore, external variables such as change of interest rate by NBE, competition in the market, government regulation, absence of active secondary stock market, limited number of bank issue holding branches and lack of public awareness in relation to savings also contributes their own impacts for the presence of high or low level of liquidity in the Ethiopian commercial banks.

5.2 Recommendations

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

A. External factors have influence on liquidity of Ethiopian banks so all commercial banks in Ethiopia that they cannot ignore the macroeconomic indicators when strategizing to improve on their position of liquidity. Thus, banks in Ethiopia should not only be concerned about internal structures and policies/procedures, but they must consider both the internal environment and the macroeconomic environment together in developing their strategies to efficiently manage their liquidity position.
B. Government regulation which forced private banks exclusively to make investment on bonds that amounts 27% of the total loans provided by the banks to customers is currently affecting the Ethiopian private banks liquidity since huge amount (about 48 billion birr) of loan-able funds tied up in this bond (NBE Bills). Thus, the government should take some corrective actions like lessening the limit on portfolio share of short-term loans from its minimum limit of 60%. Since the maturity date of the short term loans at maximum is one year, there would have high probability of purchasing of bonds for a number of times as same amount of facilities provided to different customers which in turn adversely affects liquidity position of the Ethiopian banks.

C. The banks must have extended their outreach to unreached of people by openings up more and more branches every year throughout the country, and have significantly improved their banking services by introducing new products and services like Agent Banking to serve unreached ones for collecting more fund from the public and promote people to make deposit by different mechanisms like: giving incentive for deposit made with certain time and use good advertisement mechanism to show the importance of saving money.

D. Due to limited studies done in Ethiopia, more researchers are encouraged to conduct research on liquidity issues faced by banks in Ethiopia. This would actually benefit the policy makers to setup a better new policy. Researchers have examined the relationship between dependent variable (bank liquidity) and independent variables (bank size, capital adequacy, non-performing loan, profitability, gross domestic product, inflation and national bank bill). Therefore, future research is recommended to use more challenging independent variables (for example, short-term monetary interest rate, political influence, government implications and others) to explain the dependent variable of bank liquidity ratio.

Therefore, further investigation which includes the above variables might have a better role in identifying other factors contributing to liquidity of Ethiopian banks.

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APPENDICES

APPENDIX- 1 FIXED EFFECT REGRESSION OUT PUTS

APPENDIX-2 REDUNDANT FIXED EFFECT RESULT

APPENDIX -1

Dependent Variable: L1
Method: Panel Least Squares
Date: 12/14/15 Time: 21:19
Sample: 2002 2013
Periods included: 12
Cross-sections included: 8
Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BSIZE	-0.008927	0.007535	-1.184761	0.2396
CAP	0.653974	0.336040	1.946122	0.0552
GDP	-0.076706	0.261583	-0.293238	0.7701
INF	0.070621	0.085929	0.821846	0.4136
LG	-0.261951	0.062070	-4.220254	0.0001
NBEB	-0.099568	0.031079	-3.203726	0.0019
NPLS	-0.055376	0.156318	-0.354252	0.7241
POF	3.499453	1.426764	2.452721	0.0164
C	0.545514	0.151658	3.596992	0.0006

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.503032	Mean dependent var	0.464722
Adjusted R-squared	0.409851	S.D. dependent var	0.109580
S.E. of regression	0.084181	Akaike info criterion	-1.960689
Sum squared resid	0.566912	Schwarz criterion	-1.533298
Log likelihood	110.1131	Hannan-Quinn criter.	-1.787931
F-statistic	5.398417	Durbin-Watson stat	1.532685
Prob(F-statistic)	0.000000		

APPENDIX- 2

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.377415	(7,80)	0.0033
Cross-section Chi-square	24.855852	7	0.0008

Cross-section fixed effects test equation:
Dependent Variable: L1
Method: Panel Least Squares
Date: 12/14/15 Time: 21:23
Sample: 2002 2013
Periods included: 12
Cross-sections included: 8
Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BSIZE	-0.005546	0.003192	-1.737708	0.0858
CAP	1.111057	0.302771	3.669632	0.0004
GDP	-0.005230	0.278494	-0.018779	0.9851
INF	0.061189	0.089812	0.681295	0.4975
LG	-0.207287	0.057150	-3.627047	0.0005
NBEB	-0.108459	0.028315	-3.830473	0.0002
NPLS	-0.035776	0.130612	-0.273913	0.7848
POF	2.986837	1.460318	2.045333	0.0438
C	0.440082	0.082471	5.336207	0.0000

R-squared	0.356166	Mean dependent var	0.464722
Adjusted R-squared	0.296963	S.D. dependent var	0.109580
S.E. of regression	0.091880	Akaike info criterion	-1.847607
Sum squared resid	0.734448	Schwarz criterion	-1.607200
Log likelihood	97.68515	Hannan-Quinn criter.	-1.750431
F-statistic	6.016013	Durbin-Watson stat	1.212197
Prob(F-statistic)	0.000004		